

Transforming Nutritional Behaviors in Schoolchildren Through a School-Based
Participatory Nutrition Education Intervention

Yadu Ram Upreti

A Dissertation for the Degree of Doctor of Philosophy (PhD) in Health Education

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An abstract of the dissertation prepared by Yadu Ram Upreti for the Degree of Doctor of Philosophy (PhD) in Health Education in November 2023 with the title 'Transforming Nutritional Behaviors in Schoolchildren through a School-Based Participatory Nutrition Education Intervention' is approved by:

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This study showcases the results of a participatory action research (PAR) in transforming nutritional behaviors in basic level schoolchildren through school-based nutrition education intervention (SBNEI) in a public school in Chitwan district of Nepal. Mixed-methods participatory intervention research design was contextualized to pursue in the realm of participatory and/or social justice-based research framework.

The needs assessment study—the beginning stage of the (participatory) action research, identified multilevel factors extending from individual to the environment, which influenced the nutritional behaviors of children. Therefore, SBNEI was conceptualized using a socio-ecological model (SEM)—a guiding theoretical framework of the study and intervention was implemented with three key components: 'sensitization and motivation', 'classroom-based nutrition education', and 'supportive school environment'. The underlying activities of each component were implemented throughout the PAR cycle consisting of the components that include plan, act, observe, and reflect followed by the modifying process such as act, observe, reflect, and replan to address the emerging contextual issues.

The study findings demonstrated that children markedly improved their school meal consumption behaviors due to the increased food and nutrition knowledge, dietary attitude and intention to eat healthy meals. The proportion of students consuming healthy school meals has significantly increased. The number of junk food consumers overtly dropped down. Meal skipping, returning home from school at tiffin (lunch break) time, school absenteeism, and falling sick due to hunger have been decreased. Students have also demonstrated adopting healthy dietary behaviors at home including improved handwashing practices before meals at school and home.

Similarly, students learned the skills of self-examining their nutritional status following anthropometric skills such as calculating BMI based on height and weight measurements. Over the years, the proportion of underweight, overweight, and stunted number of students has substantially decreased. In addition, the SBNEI meaningfully increased parental engagement in the school activities and student enrollment at basic school. The teachers, parents, school leaders, and PAR committee members also improved their nutrition-related knowledge and behaviors. SBNEI has triggered the school community to improve their dietary behaviors as the spillover of the intervention.

The study concludes that SBNEI has a potential role to improve students' food and nutrition knowledge, positive attitude and intention towards healthy eating, self-awareness, self-efficacy, and commitment to unhealthy dietary behaviors. However, retaining healthy nutritional behaviors among students requires sustainability strategies in the intervention. The present study recommends three approaches to fostering the sustainability of the intervention: 'developing an intervention following the bottom-up model', 'considering the multilevel and multicomponent intervention', and 'owning transdisciplinary and interdisciplinary collaboration within and beyond

the school community'. The study also demonstrates that participatory nutrition education results in pedagogical innovation in classroom teaching by developing transformative thinking and acting among the learners as informed by Mezirow's transformative learning theory. The evidence from the study indicates that participatory nutrition pedagogies have several transformative outcomes: they foster critical reflection among students in their learning; offer opportunity for teachers to reflect on their teaching; nurture dialogic and authentic relationship between students and teachers; promotes dialectical thinking and acting among students and teachers; create holistic orientation towards learning environment; and critical awareness of the real-world problem in the given context.

Finally, the study suggests that the school community, health education teachers, educators, and researchers could use PAR framework with transformative worldview to bring sustainable change in young people's healthy behaviors. However, undertaking such kind of study requires prolonged fieldwork with cultural competence, dialogue, and negotiation skills to resolve the context bound problems.

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I, Yadu Ram Upreti, hereby declare that the submitted dissertation titled 'Transforming Nutritional Behaviors in Schoolchildren through a School-Based Participatory Nutrition Education Intervention' is my original work. To the best of my knowledge, I assure that no any part of thesis or whole document has been submitted by any candidature for any other academic degree yet.

A handwritten signature in black ink, appearing to read 'Yadu Ram Upreti'.

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Dedication

I would like to dedicate this dissertation to the loving memory of my late father, Mr. Gyan Prasad Upreti, who passed away in 2066 BS.



Table of Contents

Abstract	i
Declaration	v
Recommendation for Approval.....	vi
Approval Letter	vii
Acknowledgements.....	viii
Dedication	xi
List of Tables	xx
List of Figures	xxi
Abbreviations	xxiii
Chapter One: Introduction	1
Background of the Study.....	1
Motivational Factors for Undertaking the Study	5
Getting Immersed into the Research Context.....	8
Posing the Research Problem of the Study	10
Rationale of the Study	13
Objectives of the Study	14
Research Questions	15
Delimitation of the Study	16
Operational Definitions of the Key Terms Used.....	18
Organization of the Chapters.....	22
Chapter Summary.....	25
Chapter Two: Reviewing the Literature	26
Conceptual Review of the Study	26
(School-Based) Nutrition Education	28
Transformation	32
Theoretical Review of the Study.....	33
Multilevel Determinants of Nutritional Behavior	33
Food Choices and Decision-Making Model of Nutritional Behavior	36

Socio-Ecological Model	39
Dominant Learning Theories of Teaching Nutrition Education.....	43
Transformative Learning Theory.....	47
Review of Related Policies and Programs	50
Review of Basic School Level Nutrition Education Curriculum.....	53
Empirical Review of Related Literature.....	56
Methodological Review of the Study.....	61
Genealogy of Participatory Action Research	62
Use of PAR in Educational Research	65
Research Gap.....	67
Conceptual Framework of the Study.....	67
The Implication of the Literature Review for this Study	69
Literature Search Strategy	71
Chapter Summary.....	72
Chapter Three: Philosophical and Methodological Underpinnings.....	73
Philosophical Worldview: Transformative Participatory Paradigm	73
Ontology: Co-constructed Multiple Social Realities.....	74
Epistemology: Communicative Action Inquiry.....	75
PAR Methodology: Emergent and Multi-Paradigmatic	76
Axiology: Reciprocal Influence in Beliefs and Value System	78
Research Design: 'Mixed-Methods Participatory Intervention Design'.....	78
Ethics of Using Mixed-Methods Research Design.....	80
Study Site	84
Research Participants: Co-researchers of the Study.....	85
Data Collection Instruments, Tools, and Methods.....	87
Instruments for Data Collection	87
Data Collection Tools.....	88

Data Generating Methods	90
Intervention Strategies.....	96
Phase First: Needs Assessment Phase	96
Phase Second: Planning Phase	97
Phase Third: Intervention Phase	97
Phase Fourth: Evaluation Phase	97
Data Analysis and Integration in PAR Mixed-Methods	98
Quantitative Data Analysis	98
Qualitative Data Management and Analysis	101
Data Integration Strategy	103
Quality Standards of the Study.....	104
Validity of the Quantitative Study	104
Rigour and Trustworthiness of the Qualitative Study	105
Praxis	108
Pedagogical Thoughtfulness.....	109
Self-Reflexivity	110
My Positionality and Role in the Study	111
Ethical Considerations.....	113
Limitations of the Study.....	116
Methodological Limitation	116
Theoretical Limitation	117
Empirical Limitation.....	118
Chapter Summary.....	118
Chapter Four: Needs Assessment and Intervention Development	120
Exploring the Needs	120
Food and Nutrition Knowledge	121
Dietary Intentions and Attitudes.....	123

School Meal Consumption Behaviors	125
Serving Snack Foods Through the Canteen	129
Multilevel Determinants of Nutritional Behavior	132
Biological Predispositions	134
Individual Behaviors.....	135
Family Environment	137
Social Network	138
School Environment	140
Sociocultural and Environmental Norms and Practices	142
School Policy and Program	144
Needs Prioritization: Negotiation with the School Community.....	146
Negotiation with Students	146
Negotiation with Parents	147
Negotiation with Teachers.....	148
Bridging-the-Gap Workshop	149
Developing Intervention Activities	150
Students' Involvement in Developing Intervention Activities	150
Teachers' Involvement in Developing Intervention Activities	151
PAR Committee Involvement in Developing Intervention Activities.....	151
Mapping the Intervention Action Plan	152
Pros and Cons: A Decisional Balance for Intervention Implementation	156
Chapter Summary.....	157
Chapter Five: Implementation of School-Based Nutrition Education Intervention ..	158
PAR Cycle-I: Sensitization and Motivation.....	159
Audio-Visual Session Activities.....	159
Home Visits and Parental Interaction	162
Nutrition Fair, Drama Show and Commitment Session	163

Brief Speech on Food and Nutrition.....	167
Parent-Teacher Interactions.....	168
PAR Cycle-II: Classroom-Based Nutrition Education.....	169
Exploring Teachers' Perception towards Pedagogical Innovation.....	171
Contextualizing the Nutrition Education Curriculum.....	172
Developing Teaching-Learning Materials.....	174
Developing Themes and Key Messages of Nutrition Education.....	175
Developing Nutrition Education Lesson Plans.....	176
Implementing Participatory Pedagogies of Nutrition Education.....	177
PAR Cycle-III: Supportive School Environment for Sustainability.....	192
Formation of School Health and Nutrition Committee.....	194
School Feeding Program.....	194
Reorienting School Canteen Service.....	196
Junk Food Prohibition at School.....	198
Role Modelling by Nutrition Champions.....	199
Advocacy for School Health and Nutrition Policy and Program.....	200
Follow-up Nutrition Education.....	202
School Nutrition Wall Magazine Publication.....	203
Chapter Summary.....	204
Chapter Six: Outcomes of School-Based Nutrition Education Intervention.....	206
Nutritional Behaviors of Basic Schoolchildren.....	206
Food and Nutrition Knowledge.....	208
Dietary Intentions and Attitudes.....	210
School Meal Consumption.....	214
Junk Food Consumption.....	224
Hand Washing Practice.....	228
Meal Consumption Behaviors at Home.....	229

Anthropometric Measurements and Nutritional Status	230
Teachers' Nutritional Behaviors	232
Shifting Away from Junk Food	232
Teachers as Role Models for Students	233
School Leaders' Nutritional Behavior.....	236
School's Midday Meals Service.....	239
Reorienting Canteen Service System	239
Menu-Based School Meals	240
Parental Involvement in the School	241
Covid-19's Impact on the Study: [जे गर्नु कोरोनाले गर्यो].....	244
Psychological Distress and Resilience amid Covid-19 Pandemic.....	245
Classroom Pedagogy and Learning Management System amid Covid-19 Pandemic	245
Post-Covid Nutritional Behaviors of Students	247
Chapter Summary.....	250
Chapter Seven: Transformation in Human Agency, Pedagogical Innovations, and Sustainability.....	253
Personal Transformation in Human Agency	253
Self-Transformation.....	257
Social Transformation in Human Agency.....	258
Social Transformation in the Form of Parental Engagement	259
Social Transformation in the Form of Role Modeling Behaviors	261
Pedagogical Innovations in Classroom Teaching and Learning	265
Individual Experience.....	268
Critical Reflection.....	269
Classroom Dialogue	270
Holistic Orientation	271

Critical Awareness of the Context.....	272
Authentic Relationship	272
Sustainability of the School-Based Nutrition Education Intervention.....	273
Bottom-up Model of Intervention.....	273
Theory-Guided Multilayered and Multicomponent Intervention.....	276
Transdisciplinary and Interdisciplinary Collaboration.....	278
Emergent Opportunities and Challenges in PAR.....	283
Opportunities (Pros)	283
Challenges (Cons).....	287
Chapter Summary.....	293
Chapter Eight: Summary of the Findings, Conclusions, and Implications of the Study	295
Summary of the Findings	295
Nutritional Behaviors and Multilevel Determinants	295
Components of School-Based Nutrition Education Intervention (SBNEI).....	296
Pedagogical Innovation in Classroom Teaching	297
Personal Transformation in Nutritional Behaviors.....	298
Social Transformation	299
Sustainability of the Intervention Outcomes	299
Emergent Opportunities and Challenges in PAR-Based Study.....	300
Conclusions	301
Implications.....	304
Practice Level Implications	304
Policy Level Implications.....	309
Final Reflections	310
Lessons Learned.....	311
References.....	313

Appendices.....	346
Appendix A: Survey Questionnaire for Students (Needs Assessment)	346
Appendix B: Survey Questionnaire for Students (Outcome Evaluation)	350
Appendix C: Survey Questionnaire for Teachers	357
Appendix-D: 24 Hour Food Recall Form (For Students)	359
Appendix-E: 24 Hour Food Recall Form (For Parents).....	360
Appendix-F: A Weeklong Midday Meal Consumption Logbook for Students.....	361
Appendix-G: FGD Guideline for Students.....	362
Appendix-H: FGD Guideline for Teachers.....	363
Appendix-I: FGD Guideline for Parents	364
Appendix-J: FGD Guideline for PAR Committee Members.....	365
Appendix-K: FGD Guideline for School Meal Management Committee	366
Appendix-L: Total Days in Field Work During the PhD Project	367
Appendix M: Expected Timeline of the Study.....	368
Appendix N: Ethical Approval Letter	369
Appendix O: Information Statement Letter and Consent Form for the School	370
Appendix P: Informed Consent Form for Teachers	372
Appendix Q: Informed Consent Form for Parents	374
Appendix R: Likelihood of Junk Food Consumption in Schoolchildren.....	376
Appendix S: Contextualized Nutrition Education Curriculum for Basic School...378	
Appendix T: School Health and Nutrition Committee	379
Appendix U: School Midday Meal Management and Supervision Committee.....	380
Appendix V: School Nutrition Wall Magazine Publication Team	381

List of Tables

Table 1. <i>Overview of Basic School Nutrition Education Curriculum 2063 BS</i>	54
Table 2. <i>Overview of Basic School Nutrition Education Curriculum 2076 BS</i>	55
Table 3. <i>Glimpse of Methodological Overview</i>	61
Table 4. <i>Total Number of the Participants/Co-researchers</i>	86
Table 5. <i>Detail of FGD Conducted in Needs Assessment and Outcome Study</i>	91
Table 6. <i>Detail of Interview Conducted in the Study</i>	92
Table 7. <i>Data Analysis Procedures Using IPA</i>	102
Table 8. <i>Data Integration Stages and Strategies in PAR Mixed-Methods Design</i> ...	104
Table 9. <i>Methods Used to Ensure the Quality Standard and Trustworthiness</i>	106
Table 10. <i>A Week-long Snack Foods Serving through the Canteen and Tuck Shop</i> ..	130
Table 11. <i>Overview of Needs Prioritized by the School Community</i>	150
Table 12. <i>Overview of Intervention Activities Suggested by the School Community</i>	152
Table 13. <i>School-Based Nutrition Education Intervention Action Plan</i>	154
Table 14. <i>Decisional Balance for Action Plan Implementation</i>	156
Table 15. <i>Audio-Visual Session Activities</i>	160
Table 16. <i>Themes of Speech on Food and Nutrition</i>	168
Table 17. <i>Lessons, Themes and Key Messages of Nutrition Education</i>	175
Table 18. <i>Joint Display of Transformative Changes in Nutritional Behaviors</i>	206
Table 19. <i>Food and Nutrition Knowledge of Children</i>	208
Table 20. <i>Comparison of Students' Attitude towards Healthy Dietary Behaviors</i> ...	210
Table 21. <i>School Meal Consumption Behaviors of Children</i>	215
Table 22. <i>Junk Food Consumption Behaviors of Children</i>	225
Table 23. <i>Nutritional Status of Children</i>	232
Table 24. <i>Transforming Nutritional Behaviors of Self and his Family Members</i>	258

List of Figures

Figure 1. <i>Motivational Drivers of the Study</i>	5
Figure 2. <i>Funneling the Research Problem</i>	12
Figure 3. <i>Multilevel Determinants of Nutritional Behaviors</i>	34
Figure 4. <i>SEM That Explains Nutritional Behavior of Students</i>	42
Figure 5. <i>Lewin’s Model of Action-reflection Cycle</i>	62
Figure 6. <i>Spiral Model of PAR Cycle</i>	63
Figure 7. <i>Conceptual Framework of the Study</i>	68
Figure 8. <i>Mixed-Methods Participatory Intervention Design</i>	79
Figure 9. <i>Schematic Overview of Intervention Strategies</i>	96
Figure 10. <i>Logical Framework Model to Evaluate the SBNEI</i>	98
Figure 11. <i>Continuum of Data Collection and Analysis in PAR</i>	101
Figure 12. <i>Image of Self-Reflexivity</i>	110
Figure 13. <i>Multiple Roles of Participatory Action Researcher</i>	113
Figure 14. <i>Socio-Ecological Framework of Food Choice and Dietary Behaviors</i> ...	133
Figure 15. <i>PAR Cycle Intervention Activities</i>	158
Figure 16. <i>Sensitization and Motivation Cycle</i>	159
Figure 17. <i>Home Visit and Interaction with Parents</i>	163
Figure 18. <i>Nutrition Corner on the School’s Annual Day-2019</i>	164
Figure 19. <i>Sample of Homemade Lunch Boxes</i>	165
Figure 20. <i>Students Performing Drama show on the 59th School’s Annual Day</i>	166
Figure 21. <i>Parental Involvement in the Commitment Session</i>	166
Figure 22. <i>Sample of Pledge Card</i>	167
Figure 23. <i>Parents-Teachers Interaction at School</i>	168
Figure 24. <i>Classroom-Based NE</i>	170
Figure 25. <i>Teachers' Involvement in Contextualizing the Curriculum</i>	173
Figure 26. <i>Involvement in Developing Teaching-Learning Materials</i>	174
Figure 27. <i>Arts-Based Learning Among Young Children</i>	178
Figure 28. <i>Learning Through Gameplay Method</i>	179
Figure 29. <i>A Showcase of Nutrition Poem</i>	180
Figure 30. <i>Storytelling with Students</i>	180
Figure 31. <i>Teachers’ and Students' Involvement in Roleplaying Method</i>	182
Figure 32. <i>Students Involved in the Group Discussion and Presentation Activity</i> ...	186

Figure 33. <i>Students Learning through Multimedia-Based Teaching</i>	190
Figure 34. <i>Components of Supportive School Environment</i>	193
Figure 35. <i>Basic Schoolchildren Involved in School Feeding Program</i>	195
Figure 36. <i>Grades 6-8 students Involving in Collaborative School Meal Program</i> .	197
Figure 37. <i>Canteen Menus for Basic Schoolchildren</i>	198
Figure 38. <i>School Policy Against Junk Food</i>	199
Figure 39. <i>Journal Writings by Nutrition Champion</i>	200
Figure 40. <i>Nutrition Advocacy through Local Media</i>	201
Figure 41. <i>Involvement in the School Nutrition Wall Magazine Activities</i>	204
Figure 42. <i>Students' School Meal Consumption Behavior</i>	219
Figure 43. <i>Student's Writing Published in the School Nutrition Wall Magazine</i>	221
Figure 44. <i>Student's Journal Writings</i>	222
Figure 45. <i>Students' Handwashing Practice before School Meals</i>	228
Figure 46. <i>Teachers Having their School Lunch</i>	233
Figure 47. <i>Teacher's Journal Writings</i>	234
Figure 48. <i>Showcase of Teacher's Journal Writings</i>	235
Figure 49. <i>Lunch Sharing Practice among Teachers</i>	236
Figure 50. <i>Apple Day of Headteacher</i>	237
Figure 51. <i>Meals Served through the School Canteen</i>	240
Figure 52. <i>Parent Involved as a Classroom Facilitator</i>	242
Figure 53. <i>Parental Involvement in School Feeding Program</i>	243
Figure 54. <i>Numbers of Students Between the Academic Years of 2075-2079 BS</i>	249
Figure 55. <i>Contextualized Model of Developing SBNEI</i>	274
Figure 56. <i>QR Code for Curricular Resources</i>	286

Abbreviations

BAZ	BMI for Age
BMI	Body Mass Index
CAQDAS	Computer-Assisted Qualitative Data Analysis Software
CDC	Centers for Disease Control Prevention
CDC	Curriculum Development Centre
CFS	Child Friendly School
CHD	Child Health Division
DoE	Department of Education
DR-NCDs	Diet Related Non-communicable Diseases
ECD	Early Child Development
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
FRESH	Focusing Resources on Effective School Health and Nutrition
GoN	Government of Nepal
HAZ	Height for Age
HDI	Human Development Index
HEIs	Higher Education Institutions
HPE	Health and Physical Education
HPS	Health Promoting School
ICT	Information, Communication and Technology
IEC	Information Education and Communication
IPA	Interpretive Phenomenological Analysis
JICA	Japan International Co-operation Agency
LMICs	Low-and Middle-Income Countries
MOEST	Ministry of Education, Science and Technology
MoHP	Ministry of Health and Population
MSNP	Multi-sector Nutrition Plan
NCDs	Non-Communicable Diseases
NCF	National Curriculum Framework
NDHS	Nepal Demographic Health Survey
NE	Nutrition Education

NHEICC	National Health Education Information and Communication Center
NHRC	Nepal Health Research Council
NNMSS	National Micronutrient Status Survey
NORAD	Norwegian Agency for Development Cooperation
NORHED	Norwegian Program for Capacity Development in Higher Education and Research for Development
NTAG	Nepali Technical Assistant Group
PAR	Participatory Action Research
PC	Personal Computer
PEM	Protein-Energy Malnutrition
PTA	Parents Teachers Association
RCT	Randomized Control Trial
SBNEI	School-Based Nutrition Education Intervention
SDG	Sustainable Development Goal
SEM	Social Ecological Model
SHN	School Health Nutrition
SHNP	School Health and Nutrition Program
SMC	School Management Committee
SPSS	Statistical Package on Social Science
TPACK	Technological Pedagogical Content Knowledge
WASH	Water Sanitation and Hygiene
WAZ	Weight for Age
WFP	World Food Program
ZPD	Zone of Proximal Development

Chapter One

Introduction

This chapter presents background of the study, research problem, rationale of the study, research agendas in the form of research objectives and questions, delimitation of the study, and definition of the operational terms used. The last section of the chapter mentions the overall organization of the thesis.

Background of the Study

Schoolchildren pass through a journey of rapid physical growth and cognitive development (Gullotta et al., 2014). It is vital for children's growth and development to meet their nutritional requirements during this period (Centers for Disease Control Prevention (CDC), 2011). Acquiring nutritional demands depends upon many factors, including how well healthy dietary behaviors are developed during their formative stage of the life (Shrestha et al., 2020). Evidence indicates that dietary habits acquired at an early age persist across the lifespan. Therefore, developing healthy nutritional behaviors at an early stage of life is crucial (Kelder et al., 1994; Neupane, 2014) and healthy nutritional behaviors acquired during this age contribute not only to their physical growth and cognitive development, but also to increase school attendance, thereby increasing the likelihood of positive learning outcomes (Acham et al., 2012; Ministry of Education and Sports & Ministry of Health and Population, 2006). On the contrary, unhealthy nutritional behaviors among children may cause malnutrition in them (Medeiros et al., 2022; Outzen et al., 2023).

Under or over nutrition as well as micronutrient deficiencies occurring during school age impedes children's long term physical growth and mental development (Akhtar, 2016) along with impeding their cognitive development (Ghosh, 2020; National Planning Commission, 2017a). Nepali schoolchildren spend almost five to

six hours in school during the school days, where they consume midday meal, popularly known as *Diwa Khaja* under the grants received from the Government of Nepal (Government of Nepal, 2076 BS).

Ministry of Health and Population (MoHP) and Ministry of Education, Science and Technology (MOEST) of Nepal jointly endorsed National School Health and Nutrition Strategy (NSHNS) in 2006 with the aim of improving schoolchildren's health and nutrition-related behaviors (Ministry of Education and Sports & Ministry of Health and Population, 2006). Based on this national strategy, Government of Nepal implemented School Health Nutrition (SHN) pilot project in primary schools of *Sindhupalchowk* and *Syangja* districts from 2008 to 2012, in collaboration with Japan's International Cooperation Agency (JICA). The project evaluation report indicated some positive impacts on nutritional behaviors of children along with substantial increment in classroom attendance. Later on, Child Health Division (CHD) and Department of Education (DoE) endorsed a five-year long joint action program to improve the physical, mental, emotional and educational development of children through effective implementation of the school health and nutrition program [SHNP] (Government of Nepal, n.d). Government of Nepal, in collaboration with the World Food Program (WFP), implemented *Diwa Khaja* program in the districts with low human development indices since 2009 (Government of Nepal, 2076 BS) and since the fiscal year of 2019/2020, *Diwa Khaja* program was scaled up from Early Child Development (ECD) education to upper basic classes. This program laid a foundational role in increasing children's educational and health outcomes (Global Child Nutrition Foundation, 2019; Government of Nepal, 2076 BS).

Promoting healthy eating behaviors among children through classroom-based health education is a key to the success of the School Health and Nutrition Program

(SHNP) which also aligns with the UN and World Bank framework called Focusing Resources on Effective School Health and Nutrition (FRESH) approach (Ministry of Education and Sports & Ministry of Health and Population, 2006). Recently, the Multi-Sector Nutrition Plans (MSNP)-I and II (National Planning Commission, 2017a), National Adolescent Development and Health Strategy (Ministry of Health and Population Nepal, 2018), and School Education Sector Plan 2022/23-2031/32 (Government of Nepal, 2022) have also focused on improving the nutritional behaviors of children by promoting healthy dietary behaviors promoting the consumption of locally available foods and restricting the industrially processed junk food in the school premises. These policies and programs have focused on improving students' nutritional status through the SHNP, addressing both the individual and environmental determinants of nutritional behaviors. This particular strategy is also aligned with the international commitments such as Sustainable Development Goals (SDGs), particularly SDG-2 'End hunger, achieve food security, improve nutrition, and promote sustainable agriculture and SDG-3, 'Ensure healthy lives and promote well-being for all at all ages' (National Planning Commission, 2017b).

Schools play important role to improve young children's nutritional behaviors (Centers for Disease Control Prevention (CDC), 2011; World Economic Forum, 2020) and they can substantially contribute to students' health and wellbeing (Langford et al., 2014). Schools can scaffold to promote healthy eating behaviors among the large number of students in a single setting more effectively than others (Townsend & Foster, 2011). Contento (2011) argues that the school environment can powerfully influence young children's nutritional behavior, where they can learn from their interpersonal settings through observational learning (Story, Lytle, et al., 2002; Wouters et al., 2010). Nutrition education can be given to schoolchildren integrating

its contents with pure science, health science, and social science subjects. More so, it can also be combined with co-curricular activities. Thus, school is considered a cost-effective setting for implementing nutrition education compared with others (Centers for Disease Control and Prevention, 1996; Story, Lytle, et al., 2002). In this context, School-Based Nutrition Education Intervention (SBNEI) offers an important setting to reach children, their families, and the broader societal context on a regular basis to promote positive nutritional outcomes in children (Ruzita et al., 2007).

Nutrition education promotes healthy eating and active living, which may reduce healthcare costs preventing chronic diet-related diseases (Centers for Disease Control and Prevention, 1996). Evidence from a Randomized Control Trial (RCT) study in Brazil (Leme & Philippi, 2015), an interventional study in the UK (Leme & Philippi, 2015) and in Lebanon (Habib-Mourad et al., 2014), a systematic review in Asian countries (De Bourdeaudhuij et al., 2011), and an interventional study in Kathmandu (Leme & Philippi, 2015) have shown that school-based nutrition education promotes healthy food choices and dietary behaviors in students. Several studies conducted in Nepal have emphasized the need for school nutrition interventions to develop healthy dietary behaviors in children (Acharya et al., 2021; Pahari & Baral, 2020; Poudel et al., 2018; Poudel, 2018; Sapkota & Neupane, 2017; Subedi & Bhusal, 2021; Upreti et al., 2020; Upreti et al., 2021).

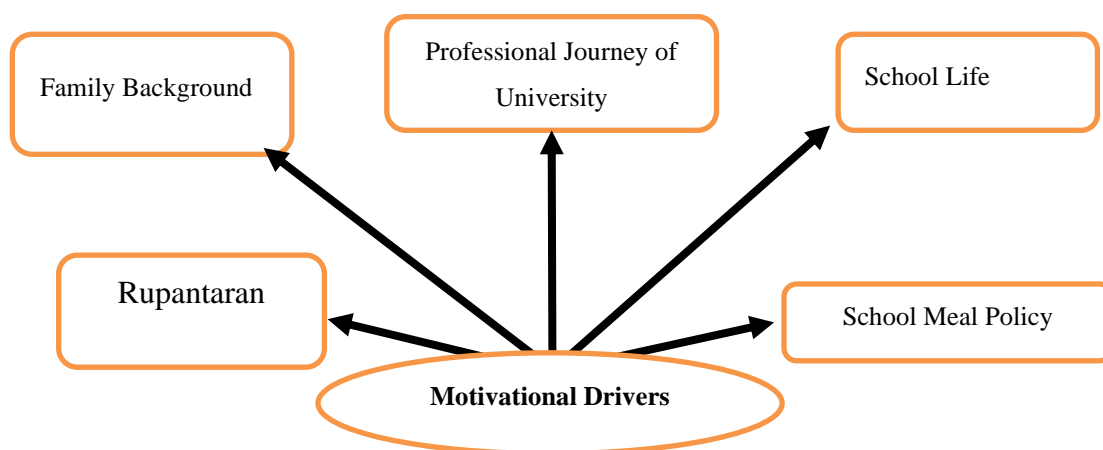
Since children's nutritional behaviors are affected by multicomponent and multilevel determinants, a multicomponent and multi-layered, SBNEI seems to hold potential to effectively increase nutrition knowledge, dietary intentions, and healthy food choices and dietary practices in children (Contento, 2011; Harake et al., 2018; Melnick et al., 2022; Prelip et al., 2012; Wang et al., 2015). Further, it is believed that nutrition education literate children would make an informed decision on healthy food

choices and develop healthy dietary behaviors in their future life (Brooks & Begley, 2014; Kalkan, 2019; Liao et al., 2019). Evidence also claims that when nutritionally literate children become parents, they are more likely to adopt the value of healthy nutritional behaviors during their special period of life such as pregnancy, postnatal, complementary feeding to child, sickness and elderly periods of the life (FAO, 2005). Besides, the environmental factors such as home environment, food availability and accessibility, foods choices in the settings like canteen and/or tuck shop, school feeding program at school, and food (in)security condition in the community, and public level policy of food and nutrition also heavily influence the nutritional behaviors (Upreti et al., 2022). Realizing the need of nutrition education at an early stage of life, I wanted to explore how SBNEI could serve this purpose. Thus, I decided to undertake this project as my PhD research and the section below presents the motivation behind my interest to this research.

Motivational Factors for Undertaking the Study

The research journey has led me to focus on transforming nutritional behaviors of basic schoolchildren through SBNEI and the motivational factors presented in the diagram below are deeply rooted in my personal and professional background.

Figure 1. *Motivational Drivers of the Study*



When I recall my school days three decades ago, there was no access to school meals to us. I still remember the day of *Soltee Bazar*¹. Sometimes, I used to skip my regular class to reach the *Bazar*, expecting to eat something if my parents would have gone there. If not, I used to return home with a hunger stomach and unhappy mood. My hungry stomach would not allow me to live in the class. I nostalgically remembered the days that I missed my regular classes in the school after snack (lunch) break, also called tiffin in Nepal.

Access to school meals was like ‘pie in the sky’ in those days, but now, the situation has changed. Nowadays, considerable numbers of students have access of school meals as the federal government of Nepal has begun to scale up school feeding program from the fiscal year of 2077/78 BS at least at the basic level up to fifth grades. However, some questions that are often raised, which include Are the school meals consumed by the students are healthy enough to support their physical growth and cognitive development? Are school communities, along with the local government, aware of the snacking behavior of children? Does the school focus on nutrition education to promote healthy dietary behaviors in children? Do parents, community people, and local government join hands to solve problems in their context? These are some of the unanswered questions that have pushed me to undertake this study.

My school teaching experiences as a health education teacher also sparked my interest to choose this agenda. I spent around 12 years in teaching health education

¹ A local economy market hosted by community people twice a week, where people used to sell and buy their basic necessities like foods, clothes, goods, medicines.

from primary to secondary level in Nepal. In the schools, most of the students had access to school meals but they brought from home. However, only a few of them would consume healthy school meals, where a considerable number of students used to eat readymade instant foods, popularly known as junk food. Since then, I used to reflect myself why do students not consume healthy meals at school? What factors impede them from not choosing healthy meals at school? And how can I involve myself to address this issue? How could we be aware of the students against unhealthy dietary practices? These were the questions that I wanted to respond to while undertaking this study.

After becoming a teaching faculty at Tribhuvan University (TU), I got involved in a series of professional development experiences that also pushed me to pursue the agenda of this study. When I became an internal and external supervisor of the students during their teaching practice, I used to be critical while reviewing the curriculum they followed, pedagogical practices they applied, and the context they connected to. I used to become surprised and wondered why they did not translate their knowledge into practice? I sometime used to demonstrate model lessons connecting the curriculum with participatory pedagogies, and the context of the learners. I do believe that teachers should not just rely on themselves on textbook-based information following the chalk and talk method. Instead, they should be critically aware of the meaningful engagement of students in classroom learning allowing them to be fully involved in the communicative learning spaces (Parajuli & Das, 2013).

Yet another driver for pushing me to undertake this study was the NORAD supported NORHED portfolio Rupantaran project—a collaborative research project between three research partners including Tribhuvan University (TU), Kathmandu

University (KU), and the Norwegian University of Life Sciences (NMBU) since my research interest was matched with the scope of the Rupantaran project, which offered me a research grants to undertake this study.

Getting Immersed into the Research Context

Chitwan district, where this study was situated, is a growing semi-urban area, a mix of both rural and urban settings. Majority of people living here are predominantly farmers and they grow major staple foods, cash-crops, seed-crops, and vegetables, along with animal husbandry and poultry farming (Paudel & Matsuoka, 2008). This area is increasingly growing urban with respect to transportation; market facilities; industry and factory; permanent buildings for accommodation; education facilities including schools and campuses; health services and facilities like nursing homes, hospitals and medical colleges (District Development Committee Chitwan, 2014). As in other parts of the country, junk food consumption among schoolchildren is common (Sapkota & Neupane, 2017; Subedi & Bhusal, 2021; Upreti et al., 2021). Moreover, buying junk food in Chitwan is comparatively cheaper than eating at tuck shop, canteen, bakery shop, vending shop, cottage, and restaurant (Upreti et al., 2020).

Prior to the field engagement for this study, I passed through the journey of disorienting dilemmas as I was not well-versed with my research context and the research agenda. Unlike in conventional research, I wanted to understand the context through observation before I set the research agenda for my study. So, I was involved in the early field work activities without deciding guided research questions, research design, tools, and methods for data collection. I started the journey by engaging myself in a series of interactions with the school communities exploring the issues concerning school health and nutrition.

In those events, I tried to follow democratic partnership principles such as being loyal and committed, punctual, flexible, non-judgmental, ensuring two-way communication, and promoting mutual trust, respect, and autonomy (Whitty-Rogers et al., 2020) to develop an egalitarian relationship (Gillis & Jackson, 2002), and build collegiality (Rajbanshi & Luitel, 2020) with the school communities. At the beginning of my fieldwork, I established reciprocal relationships with the headteacher (HT), school management committee (SMC), parent-teacher association (PTA), and the community people including parents who were the gatekeepers of the school. Subsequently, I got engaged with teachers and students. I started arriving at the school before the teachers' arrival time, joined the school's morning assembly, spent time together with teachers in their room, discussed about students' nutritional behavior and classroom teaching. Gradually, I realized that the teachers did not feel comfortable interacting with me in the teachers' room because some we did not have enough time to become familiar with each other, and the teachers' room was a common place for all. As a result, they did not wish to have open discussion since there was no privacy in the room and the next reason was the power relations between the teachers and the university researcher. Once I consciously realized this, I switched the interaction venues and customized the modes of inquiry. I started sharing a table with teachers at the school's lunch time and interacted with them in a friendly manner. After doing this, I realized that the teachers felt more comfortable interacting with me in informal places. This informal interaction brought us closer to each other. In the following days, I continued informal interaction outside of the school premises

such as *Chiya Pasal*², *Chautara*³ and *Melamahottsab*⁴. These kinds of social interactions reduced anonymity and supported me to get immersed into the research context. All these participatory approaches helped me to develop a collegial and egalitarian relationship with the school community.

Posing the Research Problem of the Study

The prevalence of malnutrition among children has become an escalating problem around the globe, where high-income-countries are facing the problem of over-nutrition, particularly overweight and obesity (Simmonds et al., 2016) and low- and middle-income countries (LMICs) with the challenge of undernutrition, particularly protein-energy malnutrition (PEM) such as wasting, stunting and underweight (Katoch, 2022), and micronutrient malnutrition disorders such as Anaemia, Night blindness, Goitre, and Rickets (Akhtar, 2016; Bari et al., 2019). Studies have also shown that overweight and obesity is increasingly higher in the LMICs (Pant & Vaidya, 2018). The World Health Organization (WHO) also reports that over-nutrition has risen notably in the LMICs (World Health Organization, 2016). Malnutrition continues to be a major public health concern in South Asian countries (Ghosh, 2020), including Nepal (Akhtar, 2016; Karki et al., 2019b; Shrestha et al., 2022); though the prevalence of malnutrition has been lowered down over the decade (National Planning Commission, 2017a).

² The place where Nepali people take a sip of tea with their friends in a tuck shop.

³ A junction of informal talks among the community people, where they gossip with a cup of tea, which is very common in Nepal mostly in the countryside.

⁴ It is a socio-cultural festival where community people exhibit their local foods, goods, and animals, followed by folk songs, costumes, and cultural dance.

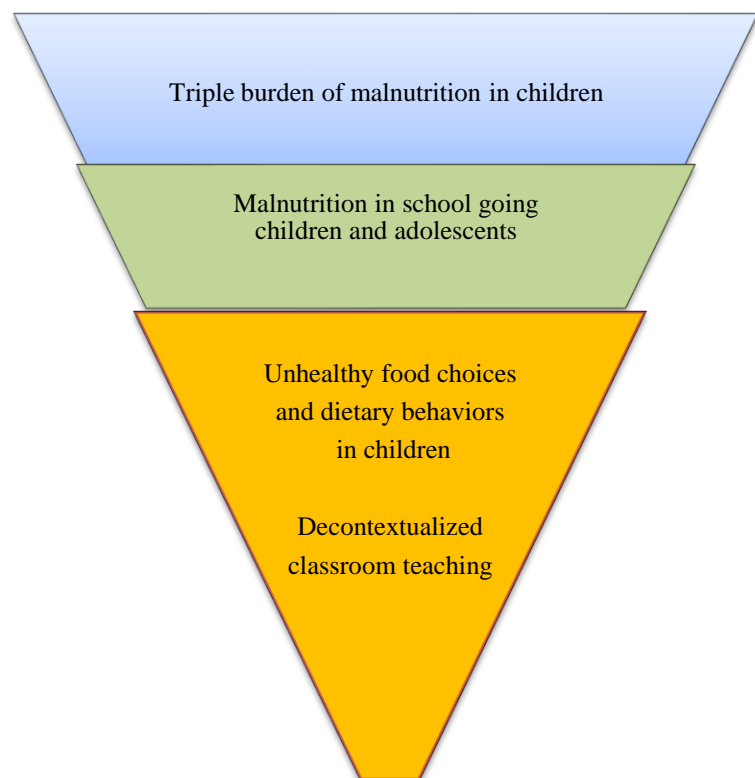
The recent Nepal Demographic Health Survey (NDHS) 2021 revealed that one-fourth (25 %) of under-five children are stunted, 8 % are wasted, and near to one-fifth (19 %) are underweight. Similarly, 43% and 69% of young children are fed with a high calories of sweet beverage and sentinel unhealthy foods respectively (Ministry of Health Nepal et al., 2022). The Nepal National Micronutrient Status Survey (NNMSS) of 2016 showed that more than one-third (35 %) of under-five children were stunted, close to one-third (29 %) were underweight, one in ten (11 %) were wasted, followed by 19 percent were anemic, and four percent were vitamin A deficient. Similarly, one-third (32 %) of 10-19 years adolescent boys and girls were stunted (low height for age). One in ten (11 %) boys and two in ten (21 %) of adolescent girls were anemic (Ministry of Health and Population Nepal et al., 2018). The National Adolescent Nutrition Survey - 2014 also demonstrates that 71 percent of boys and 59 percent of girls were undernourished while one-third were anemic. This prevalence was higher among early adolescents (10 to 14 years) boys and girls (Aryal et al., 2016).

Unhealthy snack consumption among children is ubiquitous, it is more so common in the LMICs (Huffman et al., 2014; Neupane, 2014) and Nepal is no exception (Acharya et al., 2021; Bohara et al., 2021b; Pries et al., 2016; Sharma et al., 2019; Subedi & Bhusal, 2021; Upreti et al., 2021). A growing body of literature reveals that consuming industrially-processed foods, widely known as junk foods, are common snacks among children in both urban and rural areas of Nepal (Pries et al., 2016; Subedi et al., 2017; Upreti, 2012). Studies conducted in the major cities of Nepal indicate that eating junk food is common among school-going children (Chalise, 2018; Karki et al., 2019a; Pahari & Baral, 2020; Poudel et al., 2018; Pries et al., 2016; Sapkota & Neupane, 2017; Singh et al., 2020; Subedi & Bhusal, 2021). A

study concludes that unhealthy snack consumption at school is the outcome of the unhealthy dietary behaviors at home (Neupane, 2014). Unhealthy school meals do not necessarily contain useful nutrients required for grown-aged children. Consequently, unhealthy eating behaviors push the children at greater risk of malnutrition, which further impedes their physical growth, cognitive development, and learning outcomes (Akhtar, 2016; Karki et al., 2019b; WHO, 2005).

Improving the nutritional status of children through school-based nutrition intervention is a high priority around the globe since the 1980s (UNICEF, 2009). National-level surveys also reveal that children are vulnerable to a triple burden of malnutrition: over-weight/obesity, protein-energy malnutrition (PEM), and micro-nutrient deficiencies (Ministry of Health and Population Nepal et al., 2018; Ministry of Health Nepal et al., 2017). A growing body of research also points out the need to address this gap through school-based intervention (Arya & Mishra, 2013; Ashakiran & Deepthi, 2012; Gupta et al., 2018; Karki et al., 2019a; Neupane, 2014; Pahari & Baral, 2020; Poudel et al., 2018; Poudel, 2018; Pries et al., 2016; Sapkota & Neupane, 2017; Sharma et al., 2019; Singh et al., 2020). It is obvious that children with poor nutrition do not achieve proper physical growth and

Figure 2. *Funneling the Research Problem*



cognitive development. As a result, it hampers their future life with unintended casualties along with poor cognitive performance and associated outcomes (National Planning Commission, 2017a). This shows that school-going children and adolescents have developed unhealthy food choice and dietary behaviors.

Given the context, I pose unhealthy food choices and dietary behaviors along with poor nutrition knowledge and dietary intention among basic level children and decontextualized classroom teaching of health education as the underlying research problems of this study. Thus, focusing on unhealthy nutritional behaviors among basic level children, I have problematized the research agenda in the forms of research inquires such as: Why do school-going children prefer eating junk snacks and dislike taking homemade healthy lunch boxes to school? What socio-ecological factors influence them to consume un(healthy) school meals?

Rationale of the Study

Unhealthy nutritional behaviors, particularly junk food consumption, is increasing around the globe (Baraldi et al., 2018; Liu et al., 2021; Mandoura et al., 2017), and this trend is alarming in LMICs (Baker & Friel, 2016; Saha et al., 2021). Unhealthy nutritional behavior is particularly common among children (Gupta et al., 2018; Moradi Latreyi et al., 2020; Sahoo et al., 2015; Silva et al., 2021; Upreti et al., 2020) and it is a leading cause of preventable diet-related diseases and untimely deaths (Vignola et al., 2021). Premature deaths and preventable illnesses from diet-related non-communicable diseases have also increased substantially around the globe, including Nepal (Gupta et al., 2018; Neupane, 2014). It has negative health consequences for people of all ages and children and teenagers are particularly more vulnerable (Neupane, 2014). These days, young people's nutritional behaviors have shifted away from homemade staple foods to industrially processed foods (Bohara et

al., 2021b; Upreti et al., 2021) and junk food consumption has become a common snacking practice among children in Nepal (Neupane, 2014; Poudel et al., 2018; Poudel, 2018; Sapkota & Neupane, 2017; Upreti et al., 2020; Upreti et al., 2021).

Studies (Antwi et al., 2020; Dhauvadel et al., 2020; FAO and United Arab Emirates University, 2019; Hawkins et al., 2020; Kirkland et al., 2018; Medeiros et al., 2022; Ponnambalam et al., 2022) have shown that school-based intervention is promising to bring positive outcomes in dietary behaviors and nutritional status in children and adolescents. Since nutritional behaviors of children are influenced by multilevel determinants (Gedrich, 2003; Melnick et al., 2022; Monterrosa et al., 2020; Sobal & Bisogni, 2009; Townsend & Foster, 2011; Upreti et al., 2022; Upreti et al., 2021), a multi-component school-based nutrition education intervention could help them develop healthy dietary behaviors and improve nutritional status. Thus, this study attempted to transform the nutritional behaviors in basic level children through SBNEI.

Since the present study developed and implemented SBNEI, following the bottom-up participatory approaches, by involving the school community: teachers, students, parents, HT, SMC, PTA, and local government representatives as the co-researchers, the findings of the study will contribute to offer deeper insights to the related field, teachers, educators, and researchers to contextualize existing nutrition education intervention undergoing a PAR framework to promote healthy eating behaviors in children.

Objectives of the Study

The overarching objective of this study was to design, implement, and evaluate the SBNEI to transform the nutritional behaviors in basic level schoolchildren of a public school in Nepal in collaboration with the school

community. Based on the overarching objective, the research objectives were specified as follows.

1. Explore (un)healthy nutritional behaviors in schoolchildren and their associated socio-ecological factors.
2. Develop, implement, and evaluate school-based nutrition education intervention within the research context.
3. Contextualize existing national level nutrition education curriculum and apply participatory pedagogies to implement the contextualized curriculum.
4. Develop healthy nutritional behaviors in schoolchildren through pedagogical innovation in schoolteachers, and social transformation in school community.
5. Foster contextualized approaches for the sustainability of the school-based nutrition education intervention.

Research Questions

A set of five research questions have been formulated to guide this study on track:

1. What are the nutritional behaviors in basic level schoolchildren before nutrition education intervention? And what multi-level determinants influence their (un)healthy nutritional behaviors? (This RQ is related to needs assessment)
2. How can a school-based nutrition education intervention be developed and implemented in collaboration with the school community? And what could be the components of the intervention and their underlying intervention activities? (This RQ is related to intervention design and implementation)
3. How can basic school-level nutrition education curriculum developed by the Curriculum Development Center (CDC) be contextualized to develop healthy nutritional behaviors in schoolchildren? And what participatory pedagogies of

nutrition education would be most relevant to implementing the contextualized curriculum? (This RQ is related to contextualizing the curriculum and pedagogies of nutrition education)

4. To what extent can nutrition education intervention result in healthy nutritional behaviors in schoolchildren through pedagogical innovation in classroom, and social transformation in school community after intervention? (This RQ is related to outcomes of the intervention)
5. What contextualized approaches would be relevant for the sustainability of the school-based nutrition education intervention? (This RQ is related to Sustainability of the Intervention)

The underlying research questions demanded both quantitative data and qualitative information allowing the multiple inquiry process. For example, the first and fourth research questions demanded quantitative data followed by qualitative information, whilst remaining research questions urged for qualitative information. Hence, following the nature of the research questions, I portrayed ‘mixed-methods research design’ allowing integralism perspective extending from the ‘post-positivism’ to the ‘post-modernism’ paradigms undergoing PAR framework to understand the wider socio-cultural context of the study (see detail in chapter three).

Delimitation of the Study

Delimitation is the boundary of the study. The present study has the following research boundaries.

1. The study was delimited to consider only basic school-level students and teachers though the school selected for the study was secondary level running regular classes up to 12th grades.

2. Though the needs assessment was conducted among the five public schools in Chitwan and Nawalpur districts, in the present study SBNEI was implemented only in the action school in Chitwan. And no outcome results of the intervention were compared with the remaining four reference schools.
3. Since this study was undertaken with the research grants received from the NORAD supported NORHED portfolio Rupantaran project, the study site (school) was selected following the research protocol of the project.
4. Though the present study has involved students, teachers, parents, SMC, PTA, PAR committee members as the co-researchers, they were not involved in the meaning making process of the data such as data analysis and interpretation. Nonetheless, they were involved together with me in the experience sharing forums like 'seminars' and 'workshops'. They also joined as the co-authors in the journey of academic writing and publishing.
5. Though this study was anticipated to complete the intervention activities within two consecutive academic years (2018-2020), it was extended to four years (2018-2022). The reasons were two folds: a) Covid-19 pandemic suffering due to which the school remained closed off for a long time, b) the intervention activities that we planned to implement took longer time than the anticipated timeline.
6. The outcome results of the present study might have been influenced due to supporting PhD projects designed and implemented in the same school together with this study. The present study has not assessed the confounding effects of the interrelated projects.

Operational Definitions of the Key Terms Used

The key terms that I have used in this study are defined with their operational definition, which imply contextual meaning of the present study. They may not necessarily represent their universal meaning and may not generalize to other contexts.

Action School

It refers to the study school where SBNEI was designed, implemented, and evaluated in collaboration with the school community. One public school was taken as the action school, which currently lies in the *Khairahani* municipality, Chitwan.

Advocacy

It refers to an organized effort to motivate the school community, including local government, to influence them by creating a supportive school environment for promoting healthy nutritional behaviors in children.

Co-researchers

Co-researchers refer to the active research participants of the study, who were actively involved in the study from needs assessment to the action plan development, implementation, and evaluation. The school community such as teachers, children, their parents, school leaders such as HT, PTA, SMC, and PAR committee members, and local farmers were the co-researchers of this study.

Dietary Intentions and Attitudes

This refers to students' planned behaviors and opinions towards meal consumption at school and home. It also means increased awareness levels against unhealthy dietary behaviors among basic children, teachers, school leaders, and parents.

Food and Nutrition Knowledge

It refers to students' basic understanding of food, nutrition, and nutrients and their functions, nutritional values in the food, and malnutrition-related diseases. The knowledge is limited to the contents covered under the science and health education subjects at basic school level.

Experiential Learning

Experiential learning (EL) is a sum of experience gained through critical reflection upon the carefully chosen real-life situation. The focus of EL is on the process of learning, not the product of the outcomes (Kolb & Kolb, 2005). The EL to this study includes garden-based learning, project-based learning, and experience-sharing-based learning.

Junk Food

Junk food refers to industrially processed readymade packed foods which are prepared with commercial motives containing high sugar, salt, and fats but no or low nutrition values required to the people. To this study, junk food includes sweets like candy, chocolate, cookies, biscuits, cakes; sweet beverages like soda, cola, and juicy; fast foods like *samosa*, *pakauda*, *chowmin*; and salty snacks like noodles, chips, popcorn, and cheese balls sold in the school's tuck shop and at the nearby vending shops and grocery stores.

Healthy Food

It refers to fresh and nutrients enriched healthy foods which are prepared in a hygienic manner at home and/or canteen. The examples include homemade lunch box, canteen served foods such as rice pudding, porridge, whipped rice, beaten rice and cooked legumes, boiled and fried grams and boiled egg, beaten rice and milk, fried rice with vegetables, and *puri* and *tarkari*.

Nutrition Education

Nutrition education refers to school-based nutrition education. It is defined as the combination of educational strategies accompanied by environmental support, which is designed to facilitate voluntary adoption of food choices and nutrition-related behaviors conducive to healthy lifestyle and well-being. Nutrition education to this study actively involves entire school community such as children, their families, teachers, school leaders (HT, SMC, PTA, and PAR Committee), local farmers, and canteen service providers in the educational strategies.

Nutritional Behaviors

Nutritional behaviors are the combined set of both implicit (covert) and explicit (overt) behaviors of children related to acquiring food and nutrition knowledge, sharing food and nutrition knowledge in the interpersonal group, food choice and dietary intention, meal (school snacks) consumption practice, and hand washing practice.

Participatory Pedagogy

Participatory pedagogy refers to an active learning method, where learners are engaged in the central arena of the learning process. It includes arts-based learning, small group interaction, experiential learning, experience-sharing activities, multi-modal learning, and problem-based learning, which offer the learners communicative learning space at larger socio-cultural context.

Public School

It is called a community school in Nepal, which receives regular government grants for teachers' salaries and other administrative expenses, where the SMC governs the school's day-to-day activities.

School-Based Nutrition Education Intervention (SBNEI)

It is a school-based health and educational intervention designed to promote healthy nutritional behaviors of children, which includes three- components: ‘sensitization and motivation’, ‘classroom-based nutrition education’, and ‘supportive school environment’.

Schoolchildren

It refers to students who study at basic level i.e., 1- 8 grades. Further, basic schoolchildren are grouped into three levels: grades 1-3 are lower basic schoolchildren, grades 4-5 middle basic schoolchildren, and grades 6-8 are considered as the upper basic schoolchildren. The term ‘schoolchildren’ is also written as ‘children’ throughout the dissertation.

School Community

School community is also called as school stakeholders, is a group of people with a mutual interest in creating a supportive school environment that encourages students to learn. To this study, school community refers to students, parents, teachers, HT, SMC, PTA, PAR committee members, and community people like local farmers and entrepreneurs.

School Meals

The term ‘school meals’ is interchangeably used as ‘school snacks’, ‘midday meals’, ‘school lunch’, and popularly ‘*Diwa Khaja*’ in the context of Nepal. In this study, school meals refer to the light snack foods eaten in between the two major meals at school lunch break time.

School Teachers

It refers to basic schoolteachers who teach at basic school level i.e., 1-8 grades. They are also called as teacher co-researchers. The term ‘teachers’ is used instead of ‘schoolteachers’ throughout the dissertation.

Self-efficacy

It refers to the confidence level of students in their ability to take action against unhealthy food choice and dietary behaviors.

Transformation

Transformation, to this study, refers to *Rupantaran* in Nepali, is the process of becoming critically aware of unhealthy eating behaviors, having increased knowledge on basics of food and nutrition, developing healthy school meal consumption behaviors, and hand washing practice before meals among the children.

Organization of the Chapters

The present study has eight chapters.

Chapter One

The main purpose of this chapter is to introduce the research context with how I navigated through my research journey, where I highlighted how my personal and professional background triggered me to undertake this study followed by the research problem, research agenda, rationale of the study, research objectives and questions, delimitation of the study, and definition of the operational terms used in the study.

Chapter Two

This chapter articulates the conceptual, theoretical, policy, methodological, and empirical reviews of the study. In this chapter, I have critically reviewed conceptual and theoretical understanding related to the study. Furthermore, this

chapter also introduces the theoretical framework that I used for designing, implementing, and evaluating the intervention and theoretical lens to make the meaning of the research context. I eventually developed the conceptual framework of the study at the end of this chapter.

Chapter Three

This chapter outlines the philosophical and methodological underpinnings of the study embedded with my research agenda within the philosophical grounds i.e., ‘PAR as a transformative worldview’. In the beginning, I have explained my philosophical worldview covering its fundamental components: ontology, epistemology, methodology, and axiology of the study. After this, I have presented PAR as an ‘emergent research methodology’ and ‘multi-paradigmatic worldview’ allowing the integralism perspective, mixed-method research design, and methodological procedures such as research site and participants, data collection methods and tools, data analysis and integration strategies. It is followed by the interventional strategies used in this study. Then after, I came up with articulating credibility and trustworthiness as the quality standards of the study along with reflexivity, praxis, and pedagogical thoughtfulness. At the end of this chapter, I explained researcher’s positionality and role in the study, ethical considerations, and limitation of the study.

Chapter Four

This chapter offers valuable insights of how I as a PAR inquirer collaborated with the school community as the co-researcher to explore the school health and nutrition-related needs to develop SBNEI. This chapter attempts to provide answers to the research questions: i) what are the existing nutritional behavior of basic children? What multilevel determinants influence their nutritional behavior? ii) How can

SBNEI be developed in collaboration with the school community? In the beginning of this chapter, I explain in detail about the needs assessment and prioritization process following the participatory methods, it is followed by developing SBNEI by involving school community as the co-researchers throughout the research process.

Chapter Five

Chapter five focuses on addressing the research questions, i.e., how can a SBNEI be implemented in collaboration with the school community? The chapter describes intervention activities under three components: ‘Sensitization and Motivation’, ‘Classroom-Based Nutrition Education’, and ‘Supportive School Environment’ and intervention activities implemented following the planning, acting, observing, and reflecting components of the PAR cycle. This chapter also articulates about how I developed a collaboration with the school community while empowering them to ensure their active involvement in the study and foster ownership of the intervention following the bottom-up approach. The chapter also describes how the Covid-19 pandemic situation has impeded implementing intervention activities within the given time frame.

Chapter Six

This chapter seeks to provide the answers to the research question i.e., to what extent school-based nutrition education intervention can develop healthy nutritional behaviors in children. Along with children’s nutritional behavior, this chapter also deals with the teachers’ and school leaders’ improved nutritional behaviors with respect to their knowledge, attitude, and practice/behaviors under different themes such as ‘nutritional behaviors of children’, ‘nutritional behaviors of teachers and school leaders’, ‘school midday meal practices’, ‘parental involvement in the school’, and Covid-19 impact [जे गर्नु कोरोनाले गर्यो] on the study.

Chapter Seven

This chapter attempts to describe to what extent an SBNEI can develop healthy nutritional behaviors in students, pedagogical innovation in teachers after collaborative classroom teaching. It also describes what social change outcomes (social transformation) occur in the school community after implementing the SBNEI. At the end of the chapter, I have explained the context-bound opportunities and challenges while designing, implementing, and evaluating the intervention.

Chapter Eight

This chapter deals with summing up the major findings, conclusions, research implications, and final reflections with lessons learned.

Chapter Summary

I have opened-up the chapter one with articulating the background of the study, which introduces the context of the study illustrating how I navigated through the research context with disorienting dilemmas, it is followed by how my personal and professional identities triggered me to undertake this study. Afterwards, I posed the research problem by narrowing down my research agenda, followed by the rationale of the study. I have stated the objectives of the study accompanied by research questions. I have also included significance of the study, delimitation of the study, definition of the operational terms used, and organization of the thesis in this chapter. In the next chapter i.e., ‘reviewing the literature’, I articulate the conceptual, theoretical, policy, methodological, and empirical review of the study, followed by conceptual framework of the study, implications of the reviewed literature, and literature search strategies.

Chapter Two

Reviewing the Literature

This chapter deals with the conceptual, theoretical, policy, methodological, and empirical review of the study that supports framing and implementing the school-based nutrition education intervention (SBNEI). The chapter incorporates a review of related literature under the six broad themes: conceptual review, theoretical review, policy and program review, curriculum review, empirical review, and methodological review followed by research gap. At the end, the chapter also includes the underlying conceptual framework, implications of the literature, and literature search strategies used.

Conceptual Review of the Study

Nutritional behaviors, nutrition education, and transformation are the key concepts that I use in this study and here I present the review of these concepts one by one.

Nutritional Behavior

The term 'nutritional behavior' can be interchangeably used with many other terms such as 'dietary behavior', 'dietary practice', 'meal behavior', 'food behavior', and 'food choice behavior'. Sobal and Bisogni (2009) used the term "food behaviors" (p. S37) and they defined it from the multifaceted, situational, dynamic, and complex perspective. To them, nutritional behavior is the sum of acquiring, preparing, storing, giving away, serving, eating, and cleaning up. Nutritional behavior, according to Hummel and Hoffmann (2016), can be explained as "the sum of all planned, spontaneous, or habitual actions of an individual, group or larger social groups who intend to procure, prepare, and consume foods" (p. 241).

Nutritional behavior is closely associated with multiple factors such as health, environment, economy, and society. Gedrich (2003) explained “multitude level factors of nutritional behaviors” (p. 231) and argued that nutritional behavior is framed by multilayered process including biological determinants such as metabolism and feelings of hunger or satiety; anthropological determinants such as freedom of food choice; economic determinants such as food price and purchasing capacity of consumers; psychological determinants such as individual food preference, food-related value, perception, and attitudes; socio-cultural determinants such as community, culture, spirituality; and home economics like family income and expenditure, family size, and farming field. Nutritional behavior is also shaped by individual contingency factors like time and availability of foods.

An individual’s nutritional behavior is a complex phenomenon that includes nutrition knowledge, dietary intention and attitude, food choices, and dietary practice (Contento, 2011; Monterrosa et al., 2020). The present study defines the concept of nutritional behaviors as the sum of both covert (implicit) and overt (explicit) behaviors that is related to acquiring food and nutrition knowledge, sharing food and nutrition knowledge in the interpersonal group, food choice and dietary intention, meal (school snacks) consumption practice, and hand washing practice. Covert nutritional behavior refers to having knowledge of food and nutrition, dietary intentions, and attitudes towards healthy school meals, and developing self-efficacy to avoid unhealthy food choice and dietary behaviors. On the other hand, overt nutritional behavior refers to the selection and consumption of meals (school snacks) and handwashing practices. The theories suggest that both covert and overt nutritional behaviors are influenced by the multilevel determinants (see Figure 3).

(School-Based) Nutrition Education

In general, nutrition education is seen as a part of educational strategy designed to prepare a nutritionally literate individual. Food and Agricultural Organization (FAO) uses the terms: ‘nutrition education and communication’ and/or ‘food and nutrition education’. Otherwise, it is referred to as community nutrition and nutrition behavior change communication (McNulty, 2013). The formal field of nutrition education started when the US Department of Agriculture in 1917 introduced nutrition education as a teaching tool to improve the food choice and dietary behavior (Contento, 2011). Nutrition education is considered a key element to promote healthy nutritional behaviors in people. It has long been recognized as a key strategy to empower people to utilize available resources for improving nutritional behaviors (FAO and United Arab Emirates University, 2019).

Nutrition education, according to Gil (2010) can be seen as "a part of applied nutrition that focuses its resources towards learning, adaptation and acceptance of healthy eating habits" (McNulty, 2013, p. 5). FAO (2005) defines nutrition education "as an intervention that provides people with the knowledge, skills and motivation to make wise dietary and lifestyle choices, building thus a strong basis for a healthy and active life" (p.3).

Contento (2011) comprehensively defines the meaning of nutrition education offering its multiple settings, where all the activities underlie from individual to policy levels covering its broad area.

Nutrition education is any combination of educational strategies, accompanied by environmental support, designed to facilitate voluntary adoption of food choices and other food- and-nutrition-related behaviors conducive to health and well-being. Nutrition education is

delivered through multiple venues and involves activities at individual, community, and policy levels. (p.11)

School-based nutrition education (SBNE) is a whole school approach, which actively involves all school community including children, parents, teachers, school leaders, and community people. It is an educational process, which is supported by a healthy food environment, helps children and their communities to improve their food choice and dietary behaviors. Further, it empowers them to act as the change agent in society. The epistemic understanding of SBNE goes beyond the classroom-based transmission of generic information of food and nutrition and it covers a wide array of hands-on learning opportunities linking school curriculum with extracurricular activities, school feeding program, local food production system, school gardens, and hygiene and sanitation-related practices (Food and Agriculture Organization of United Nations, n.d.).

Since multiple layers of determinants influence nutritional behaviors of individual, several studies (Harake et al., 2018; Melnick et al., 2022; Pérez-Rodrigo & Aranceta, 2001; Prelip et al., 2012; Scherr et al., 2014) have demonstrated that using a multicomponent SBNE can effectively promote healthy nutritional behaviors in children and adolescents. Pérez-Rodrigo and Aranceta (2001) suggest incorporating school curriculum, school meals, workplace policy, family involvement, and community partnership as the key components of the SBNE. Melnick et al. (2022) suggest three dimensional concept of SBNE such as student level (nutrition education in classroom), home level (parent education), and school level (policy, system and environmental school changes). Harake et al. (2018) suggest incorporating two main components of SBNE such as classroom-based nutrition education sessions and locally prepared healthy snacks at school. Scherr et al. (2014) suggest five integrated

components of the SBNE: nutrition education and promotion; family and community partnerships; supporting regional agriculture; foods available on the school; and school wellness committees and policies. In this study, I am particularly inclined to adapt three dimensional concept of SBNE theorized by Contento (2011).

Motivation. The motivational component, also known as the pre-action phase, is meant to increase awareness and enhance motivation among the intended audience. This phase enables people to be aware of the action for healthy food choices and dietary behavior. The session activities under this component raise awareness of the people regarding the possible risks of not taking the actions and address the barriers to taking actions. Developing positive attitudes and self-efficacy regarding healthy food choices and dietary behavior helps to take necessary action. The activities under this component focus on developing an understanding of why it may be important to change unhealthy food choices and dietary behaviors.

Action. The activities under this component facilitate the intended audience to take necessary actions to adopt healthy dietary behaviors. Action component activities help people bridge the gap between intention to action and bring the changes over time. This component is comparatively more complex than others. In this phase, making an action plan is recommended to translate intention into practice. Goal setting and skills enhancement are often considered as the best triggers to promote dietary behaviors of the individuals. The focus of intervention activities in this phase is how to promote dietary behaviors of people.

Environmental Support. Maintaining healthy dietary behavior is complex unless action is linked with a supportive environment. In this component, nutrition educators and researchers need to work with the policymakers and other stakeholders from local to federal level to earn environmental support for action. Supportive

environment incorporates both physical as well as mental relationships. At this phase, support and collaboration from parents, community people, local stakeholders, leaders, governmental bodies, non-governmental organizations are crucial to sustain the actions implemented.

Nutrition education in a school setting can be given with different approaches. Following the theoretical basis of Contento's nutrition education (Contento, 2011), I explain three dominant approaches of nutrition education.

Information Dissemination Approach. The information dissemination approach includes disseminating fact-based information, creating awareness, and transmitting knowledge among the recipients. This approach seeks to change the existing knowledge and attitudes of people through the provision of information. It chooses scientific information and facts while delivering the information that brings awareness regarding the factors influencing dietary behavior. This approach effectively increases motivational knowledge among the students. However, it is less effective to promote dietary behavior conducive to health and well-being (Contento, 2011).

Behavior-Focused Approach. Behavior-focused approach predominantly targets bringing change in individual's dietary behavior and community practice that influences people's health and well-being. The behavior-focused approach to nutrition education uses educational strategies, accompanied by environmental support, to facilitate dietary behavior change or actions. Besides, it also adopts a series of behavior change actions only after evaluating the potential determinants or mediators of action (Contento, 2011).

Theory and Evidence-Based Approach. Theory and evidence-based approach assumes that just knowing the potential mediators of action does not

necessarily bring the desired nutritional outcomes unless they are linked with behavior change theory and practice. Theory strengthens these potential mediators' relationship to behavior change action since the theory is built based on the evidence drawn from research practice. Intrapersonal, interpersonal, and community level theories have been developed in health education and promotion. Evidence shows that relevant theory and evidence-based nutrition education research seems to be more effective to bring desired outcomes of nutritional behavior change among children (Contento, 2011).

This study has utilized all three approaches based on the situation. For instance, in the sensitization and motivation component, the information dissemination approach was used, whilst behavior-focused and theory and evidence-based approaches were utilized in classroom-based nutrition education sessions and supportive school environment components.

Transformation

The word transformation literally means *Rupantaran* in Nepali language, which evokes the image of profound change such as turning caterpillar into a butterfly (Baumgartner, 2019). Transformation is a marked change in the form, nature and appearance of an object or behavior. It is the process of changing in a frame of reference which is the structure of the embodied assumption or habit of mind. Transformation is the process of becoming critically aware of how people perceive, understand, and view the world as outlined by Jack Mezirow in his theory of transformative learning in adult education (Mezirow, 2009). Central to his thinking, transformation is the process of change in psychological and cognitive behaviors.

There are various leading viewpoints of transformation. Clark (1993) has summed up four types of transformation. For Freire, transformation means

consciousness raising or conscientization (Freire, 2000). In Mezirow's views, transformation is critical reflection on deep-seated assumptions about self and the world (Mezirow, 2009). But Daloz sees transformation as a developmental movement of life. Boyd views transformation as conscious awareness of psyche or self (individuation) (Khabanyane et al., 2014). For Wills, transformation means self-orientation in response to some life challenges (Dirkx, 1998; Khabanyane et al., 2014). Among the five leading viewpoints of transformative learning, I particularly use Freirian and Mezirow perspectives to this study to explain the transformation in children's nutritional behaviors and classroom teaching and learning practices of teachers and students.

Theoretical Review of the Study

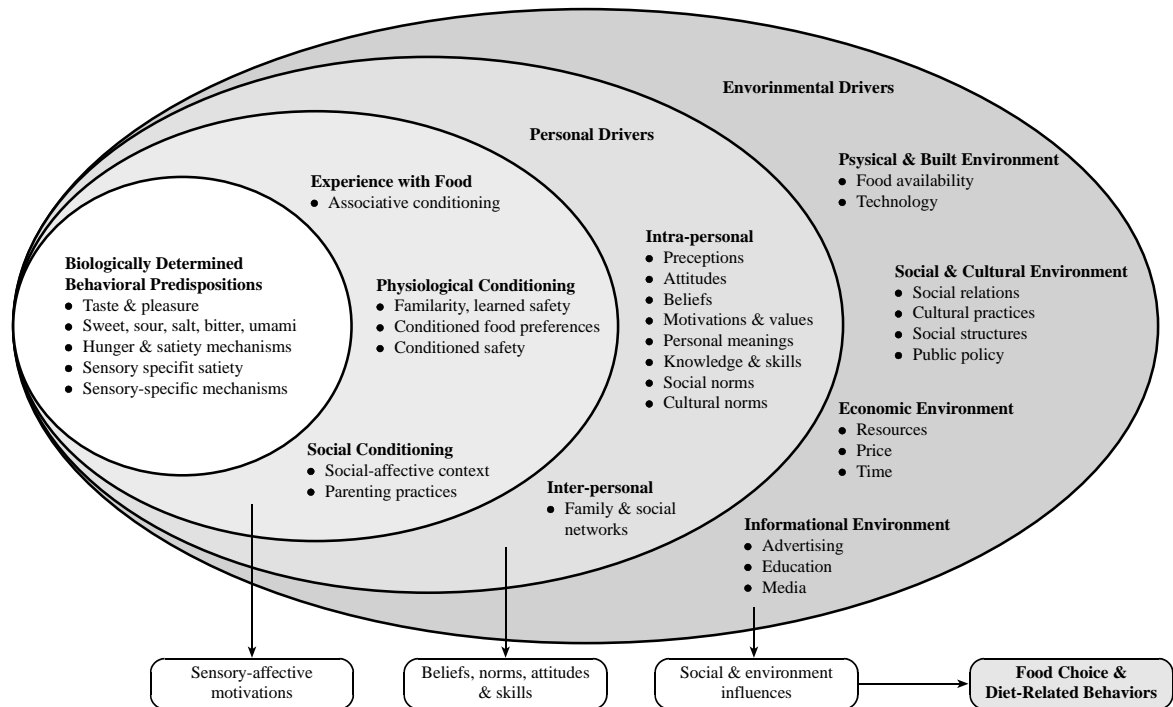
In this section, I discuss the theoretical frameworks related to the key concepts used to this study that are nutritional behaviors, nutrition education, and transformation.

Multilevel Determinants of Nutritional Behavior

Nutritional behaviors can be viewed from multifaceted, situational, dynamic, and complex perspectives (Contento, 2011; Gedrich, 2003; Sobal & Bisogni, 2009). As we know, eating is shaped by individual and socio-cultural factors, it is influenced by numerous proximal and distal determinants (Sallis et al., 2008). The determinants of nutritional behavior can be explained through an ecological framework (Contento, 2011). These multilevel determinants interact to influence nutritional behaviors across the multiple layers. These multilevel determinants are decisive to design and

implement effective nutrition interventions. I explain these multilevel determinants below (Figure 3).

Figure 3. *Multilevel Determinants of Nutritional Behaviors*



Adopted from (Contento, 2011, p. 31)

Biological Predispositions. Nutritional behaviors are influenced by biological predispositions. Human beings are born with some innate biological predispositions such as taste of foods, pleasure of eating, and hunger and satiety. These biological predispositions contribute to some degree to preference and food intake, particularly in young children. Theory suggests that it is imperative to consider biological predisposition factors while designing and implementing nutrition education for young children (Contento, 2011).

Personal Factors. Nutritional behaviors are influenced by personal factors, which include intra- and-inter-personal factors. Food and nutrition-related perceptions, thoughts, feelings, norms, values, emotions, knowledge, attitudes, and personal meanings are powerful intra-personal level determinants of nutritional

behavior. These inner forces develop strong intentions for taking action. People live in a social environment where they interact within social networks. These networks involve interpersonal factors such as family members, peers, neighbors, teachers, and the organizations with which one interacts. These personal level factors are crucial for health education teachers, educators, and researchers to target while designing nutrition education intervention for young people (Contento, 2011).

Environmental Factors. Environmental factors powerfully influence nutritional behaviors of people. This overarching layer includes physical, social, economic, and informational components. Home, school, workplace, grocery stores, vending shops, tuck shops, market, parks, cinema hall, highway are the important physical environment in the community, where people are inclined to nutritional behaviors. Growing body of evidence suggests that availability and accessibility of foods in the grocery stores, big marts and shopping malls can have a powerful role to influence nutritional behavior (Contento, 2011; Monterrosa et al., 2020).

Humans are social beings, and they are influenced by social norms and cultural practices, which can be a powerful determinant to shape their nutritional behavior. Individual food choices and dietary behaviors are largely influenced by a broader socio-cultural context (Monterrosa et al., 2020). Food-related beliefs and practices vary among the different ethnic groups of children, which eventually guide them towards selecting and rejecting the types of food. Socio-cultural organizations, like community, social and religious organizations, to which we belong can have an influence on our dietary behaviors.

Economic determinants are powerful levers that influence food choices and eating practices (Gedrich, 2003; Sobal & Bisogni, 2009). The price of food has a close relationship with the selection and consumption of the foods. The family with a

higher income level can invest a larger portion of the quality of foods than the family with poor socio-economic status (Rathnayaka & Wang, 2012).

Media exposure via TV, radio, hoarding boards, billboards, and the internet exerts a considerable influence on dietary behavior and is more influential among young children. The advertising strategies of media centres have powerful influences to persuade food choice and dietary behavior (Contento, 2011; Kearney et al., 2020). Media exposure and junk foods consumption have a close association (Hansstein et al., 2017).

The above theoretical model affirms that physical environment, socio-cultural environment, economic environment, and informational environment can have a powerful role to shape nutritional behavior (Contento, 2011).

Food Choices and Decision-Making Model of Nutritional Behavior

Food choices are the preceding stage of food consumption. Food choice decisions are multifaceted, dynamic, situational, and complex. Food choice decisions are dynamic, changing over historical and individual time. Hence, multi-level theoretical perspectives are important to fully explain the decision-making process in food choice behavior (Monterrosa et al., 2020). Sobal and Bisogni (2009) present three dominant theoretical perspectives with different ontological assumptions about the decision-making process. Following the ontological assumptions about the food choice decision-making process, I explain three constructs of the food choice decision making model.

Life-Course. This construct deals with several dynamic processes, including trajectories, transition, turning points, timing, and context. Food choice trajectory involves personal feelings, thoughts, attitudes, and practices that guide people towards specific food choice and dietary behavior. Transitions are food choice shifting

behavior caused due to changing events of life over time. Sometimes a major transition occurs in life, also called a turning point, which leads people towards sudden changes in food choice and dietary behavior. For example, people may stop consuming high-calorie foods after clinical examination confirms the report of diabetes disease and suggest avoiding high-calorie foods in the dietary plan.

Similarly, life course timing leads people with different food choice behavior, which is not fixed throughout life. For example, school-aged children may prefer readymade junk food. However, this notion may change when they become parents and older adults. The self-value system, social, cultural, and economic environment act as a historical context of life, shaping people's food choice and consumption pattern (Monterrosa et al., 2020; Sobal & Bisogni, 2009).

Influences. A diverse range of factors influence food choice decisions. Furst et al. (1996) explained five categories of influences: cultural ideals, personal factors, resources, social factors, and present contexts. These categories are placed within the life course that interacts with each other and shapes personal food choice decisions. People representing different ethnic groups and castes have different cultural practices, which role model them towards specific food choice behavior. For example, in *Tharu* community, in the context of Chitwan, they eat *Chichar*⁵ and *Ghongti*⁶ in the *Maghi*⁷ festival, which seems to be nutrients-enriched local cuisine. Everyone has distinct biological, physiological, psychological, and socio-cultural uniqueness in the

⁵ The local cuisine of Tharu indigenous people of Nepal.

⁶ It is protein enriched food eaten by Tharu indigenous people of Nepal.

⁷ It is local festival of Tharu indigenous people of Nepal.

community. These personal factors influence the food choice behavior of the people. The array of individual resources like knowledge, skills, bond with family, social capital and networking, family source of income, values and traditions are some important personal assets that influence to consider food choice behavior. The social relationship of people acts as the social factors that influence acceptance and rejection of foods. Parenting style, peer influence and social networking can develop a social relationship, further they provide opportunities for making particular food choice behavior. The social context such as economic condition, government policies, mass media, and physical context such as physical structure and resources, climate, and other material objects also influence people's food choice behavior. The recurring experience of making food choices over the life course led people developing personal systems for food choice (Monterrosa et al., 2020; Sobal & Bisogni, 2009).

Personal Food Systems. This construct includes the cognitive process of food choice behavior, which embodies values; negotiation and balancing of food choice values; classification of foods and situations; and developing strategies, scripts, and routines for recurring food decisions. People's food choice behaviors are influenced by personal value systems shaped by a set of attributes like taste, cost, preference, convenience, health, and interpersonal relationships. The set of values is specified in the situation and context. Taste could be a guiding value for specific food choice behavior in the given context. However, the same value may not be considered while choosing another type of food in different contexts and situations. Thus, people prioritize the values and negotiate them based on the specific context while making the decision for food choice and consuming them. People classify the foods they consume based on their guided value system. For example, an individual may consume an apple believing that it is a healthy food. Whilst another may consume it,

considering it as the source of calories. Others still may consume it as a fiber-dense food. Equally, another one may eat an apple considering it as a good source of multi-nutrients. Responses like acceptance, rejection, modification, and elimination to determine food choice behavior closely. Food choice scripts that include expectation about the situation and the plan of action with the specific environment's response also act as an essential personal food system determining the food choice behavior (Monterrosa et al., 2020; Sobal & Bisogni, 2009).

Socio-Ecological Model

There are several behaviors change theories and models explaining the nutritional behaviors of people. Health Belief Model (HBM), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Integrated Behavior Model (IBM), and Social Cognitive Theory (SCT) are some commonly used models to explain the health behavior of people (Glanz et al., 2008). These theories are limited on the individual level untouched the role of environmental and structural factors as such home, community, organization, socio-cultural setting, and public policy (Sniehotta et al., 2014). Thus, various theories and models have been applied to promote healthy nutritional behavior. In most of the studies, intrapersonal and interpersonal behavior change theories are applied, which could not explain from multidirectional perspective (Glanz et al., 2008).

The ecological theory was first introduced as a conceptual model for understanding human development by Urie Bronfenbrenner in 1970s and later formalized as a theory in the 1980s (Kilanowski, 2017). Bronfenbrenner's model has been used as ecological system theory, which describes four major interlocking spheres of human behavior and development influences: the microsystem, mesosystem, exosystem, and macrosystem. Social Ecological Model (SEM) is widely

considered as a holistic framework to conceptualize the linkages between individual behaviors with social and environmental determinants (Sogari et al., 2018; Townsend & Foster, 2011). The application of such a framework helps to shed insight into the determinants of dietary behavior of children. The interplay between these micro, meso, exo and macro systems influences individual health behaviors (Sallis et al., 2008).

Microsystem. The microsystem consists of individual level influences, which directly shape the behavior of an individual. The individual system pertains to physical and social contingencies that affect an individual's behavior, consisting of pre-existing biological factors, predisposed knowledge, attitudes, beliefs, and adaptive roles.

Mesosystem. Mesosystem focuses on inter-personal level influences that comes between the Exo and micro level systems. At this level, the individual becomes an active participant in the interaction among the closest people in their network, such as family, peers, relatives, and teachers.

Exosystem. The exosystem refers to organizational and community level influences on nutritional behaviors of children, which consists of working frameworks, activities, relationships, and the surrounding entities of children. The individual does not actively participate in this layer but can affect the other elements of the system.

Macrosystem. The macrosystem refers to the socio-cultural as well as policy level influences of nutritional behaviors of children. These elements consist of the outer layers of the system which affect all the elements inside the system through bi-directional influences. The elements belonging to this layer are public policy, legal and regulatory frameworks, and societal systems.

McLeroy's SEM asserts that human behavior is affected by the interaction of multifaceted determinants such as intrapersonal, inter-personal, and environmental level influences (McLeroy et al., 1988).

Intrapersonal Level. This construct includes biological and behavioral predisposing factors. Biological predispositions include age, sex, health condition, heredity, taste and pleasure of eating, hunger and satiety, and food preference. Behavioral predisposing factors include food and nutrition knowledge, attitude and practice, food related norms and values, food preference and choices, eating habits, and self-regulation and self-efficacy (McLeroy et al., 1988).

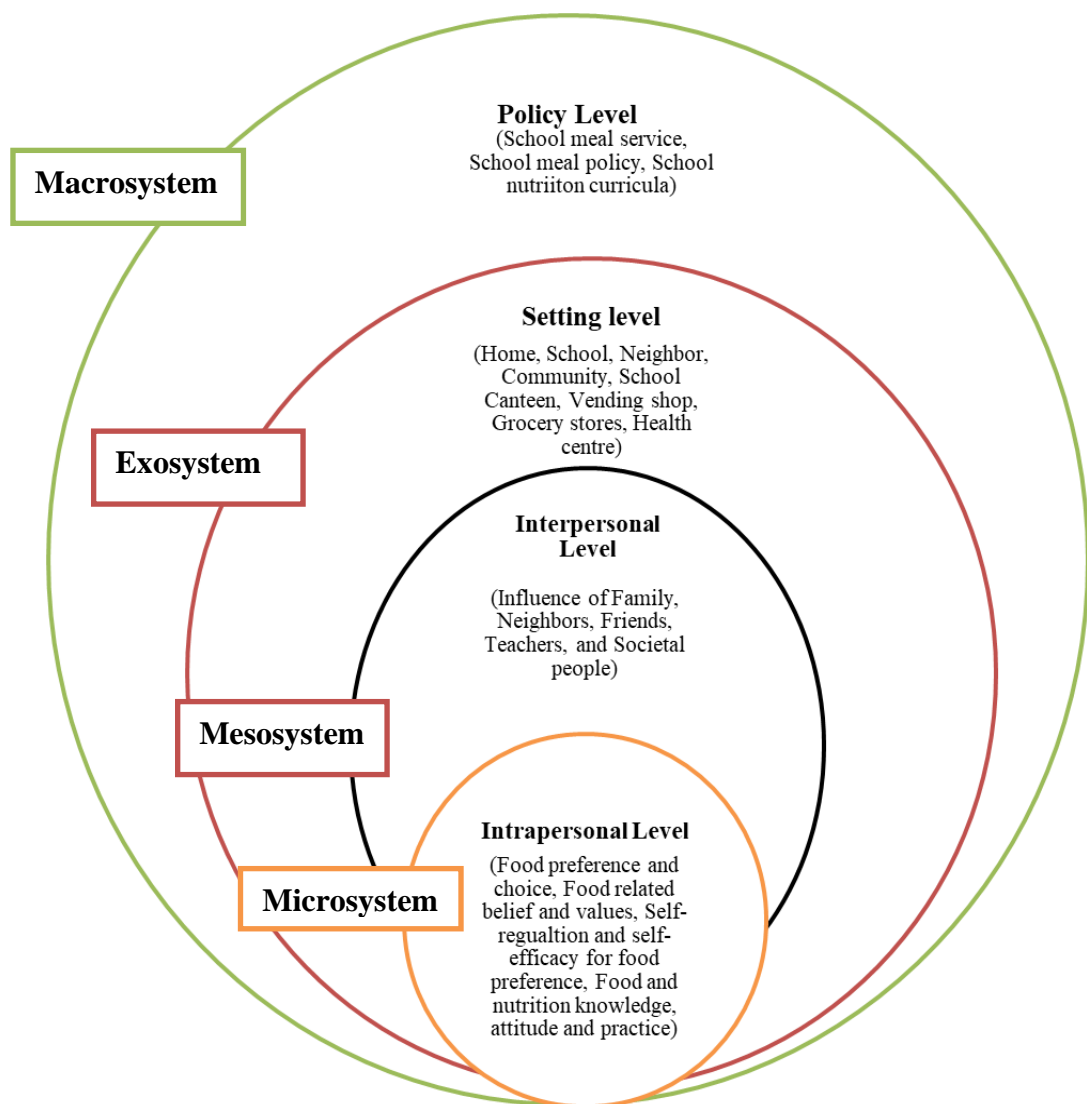
Inter-Personal Level. The interpersonal level construct includes formal and informal social networks and social support systems, which govern person-to-person linkages and relations within the social system. It includes family, neighbors, relatives, work groups, and friendship network (McLeroy et al., 1988).

Environmental Level. This level includes organizational, community, and public policy influences. The organizational factors include social institutions with organizational characteristics, and formal and informal rules and regulations for operation. Community factors refer to relationships among organizations, institutions, and informal networks within the given boundaries. Organizational and community level factors can be studied under the setting level influences. Public policy is among the top-tier level influences, which includes local, state, and national laws and policies (McLeroy et al., 1988).

Many health promotion interventions have incorporated behavioral theory in planning and implementation. The SEM is already proven to be a useful framework to explain different health issues underlie in society as such tobacco and substance use, smoking and alcohol behavior, childhood obesity, sexual promiscuity, and school-

based bullying and violence (Hovell et al., 2002; Winch, 2012). Exploring people's nutritional behavior, particularly of schoolchildren through the lens of SEM, is a growing field of research, particularly in the context of Nepal. Given this context, SEM has been used to understand children's nutritional behavior and co-design and co-implement a SBNEI. Following the major constructs of SEM asserted by McLeroy et al. (1988) and Bronfenbrenner (1979), I present theoretical framework of SEM used for this study.

Figure 4. SEM That Explains Nutritional Behavior of Students



The above socio-ecological framework illustrates four major constructs that explain the nutritional behaviors of children under this study. The bottom layer at the concentric cycle is intrapersonal level that comes to the microsystem, which includes food preference and choice, food-related belief and values, self-regulation and self-efficacy for food preference, food and nutrition knowledge, attitude, and behavior of students. These individual level factors inherently shape the nutritional behaviors of children, which repeatedly interact with children's nutritional behaviors. The interpersonal level factor comes to the mesosystem, including family, neighbors, peers, teachers, and acquaintances. These are important proximal influences as individuals often come to interact with children's lives while undergoing the socialization process. The third concentric layer from the bottom up is the setting level, which includes institutional and community level factors. This is represented by the exosystem. Home, community, school, canteen, vending shop, grocery store, and health care settings are important setting level influences, which shape nutritional behavior of individual. The top-level concentric layer represents policy level influence that comes under the macrosystem. This includes school meal service, school meal policy, and school nutrition education curriculum. Although these distal level factors indirectly influence students' nutritional behavior, it guides the nutritional behaviors of students in the group together. The interplay between these layers of influences shape food choice and dietary behaviors of basic children rather than a single factor since human behavior is determined by multitude level of determinants (Sallis et al., 2008).

Dominant Learning Theories of Teaching Nutrition Education

There are various learning theories that can guide the teaching of school-based nutrition education. Under this study, I have reviewed constructivist, experiential, and

inquiry-based learning theories to further guide me to the participatory learning approaches of nutrition education.

Constructivist Learning. Constructivist learning dates back to the work of Piaget, Vygotsky, Paper, and Bruner's theoretical framework (Palincsar, 1998). Constructivist learning stands on constructivism which is a fundamentally non-positivist school of thought, which stands opposed to both behaviorism and maturation. Learning is considered a complex and fundamentally non-linear process, where cognitive development and deep understanding are the foci. It emphasizes learning as an active process in which learners construct new ideas or concepts linking current knowledge with the prior learning (Fosnot & Perry, 1996). Barak (2017) argues that constructivist learning theory is a philosophy that emphasizes the development of cognitive structures of learners based on the knowledge and experiences in learning environment. It focuses on the interaction of new information with prior knowledge and further information have some orientation with what has previously been learnt.

Constructivist learning theory conceptualizes learning as a social process with two parts: learning occurs in a group where individual negotiate, share and organize knowledge as a social function, and one transfers the learning to the sociocultural context (Fosnot & Perry, 1996). Vygotsky (1978) argued that scientific concepts do not come to the learner in a ready-made form. He used the term 'Zone of Proximal Development' (ZPD) to describe where a child's spontaneous concepts meet the logic of reasoning. ZPD is the actual developmental level determined by independent problem-solving exercise through adult guidance or collaboration with more capable peers. This zone varies from child to child and reflects the learner's ability to understand the logic of the scientific concept (Fosnot & Perry, 1996).

Further, Vygotsky (1978) argues that life experiences affect and influences learning and social context influences learning that shapes how and what we think. Each student enters a classroom with their own experiences and prior knowledge and the role of a teacher is just to facilitate the learning process. Teachers' job is to create an environment in which the student can explore the content. This study shares the features of the constructivist learning theory while working with the upper basic level children (grades 6-8) during implementation of classroom-based nutrition education (NE).

Experiential Learning. Experiential learning approach believes that experience is the source of knowledge. Experience is possible through active participation in learning activities (Kolb, 1984). Learning occurs through action, experience, discovery, and exploration. In experiential learning, the teacher guides the learners rather than directing the learning process, where the learners seem naturally interested in learning. The foci of experiential learning is on the learning process, hands-on activities, collaborative and reflective learning experiences, which help them learn new skills and knowledge (Haynes, 2007). The present study has offered real-life experiences to the students through experiential learning, in so doing, students were involved in project-based activities.

Experiential learning involves several steps that offer the learner with collaborative and reflective learning experience, which helps them learn skills and knowledge (Kolb & Kolb, 2005). The present study included five phases of experiential learning while teaching NE. In the first step, students were provided with hands-on activities, where they were involved in role-playing, dramatization, nutrition game, eating healthy meals through school feeding, school nutrition fair, and school gardening activities to provide firsthand experience of learning. Once the learners

were involved in the activities, they were asked to share their knowledge and experiences with the classmates and teachers. Later, learners discussed among the peers sharing their past experiences. They discussed, analyzed, and reflected on their learning experience. After doing that, learners connected their experience with real-world experience, found trends and common truths in their experience and identified real-life experiences. Finally, learners were committed to applying what they learnt from their experience.

Inquiry-Based Learning. Meaningful engagement of students can be ensured by adopting inquiry-based learning that encourages students to discover or construct information themselves (Yates & Sullivan, 2017). Inquiry-based learning is a form of active learning that starts by posing questions and problems rather than simply presenting facts or principles from textbooks. Meaningful engagement of students through inquiry-based learning helps them develop students' knowledge (Widowati, Nurohman & Anjarsari, 2017) through inquiry of questioning. In this study, five stages of inquiry-based learning were followed while implementing classroom-based nutrition education.

For the inquiry-based learning, we (PhD researcher and teacher co-researchers) engaged students in real-world problems from where they collected foregrounding experiences (Drewes, 2018). As they worked together in the team, they built common experience together. We just facilitated them for their active participation in the learning enterprise. Then, students explained sequencing events in a logical format. They supported each other's understanding by articulating their observations, ideas, questions, and hypotheses while working in the group. After doing so, students expanded their concepts of what they have learned, made connections to others, and applied their understandings to the world around them.

These connections often lead to further inquiry and new understandings (Yates & Sullivan, 2017). At last, with the help of observational checklists and student conversation, the learning experiences were assessed.

Transformative Learning Theory

Transformative learning theory (Mezirow, 1997; Taylor, 2007), to this study, is considered as the guiding theoretical lens to describe the transformative changes in nutritional behaviors and classroom learning behaviors of children. Mezirow describes transformation as a process of changing taken-for-granted (underlying) assumption and contested beliefs through critical reflection on own stories and experiences (Mezirow, 1997). O'Sullivan believes that transformation is an integral process of critically reflecting on one's own world view and practices (Butterwick & Lawrence, 2009). Theory-based evidence informs that transformation takes place over time since being critically aware of taken-for-granted assumptions, contested beliefs, and false consciousness on nutritional behaviors in children is a time-consuming project. The literature suggests that commitment; shared awareness and understanding; changes in the habit of mind, underlying assumptions, and contested beliefs; critical awareness against background context are important facets of the transformation.

Mezirow (2009, p. 19), based on his research practice among the women attending higher education, identified ten phases of learning undergoing transformative process. They are i) a disorienting dilemma, ii) self-examination, iii) critical assessment of assumptions, iv) recognition of a connection between one's discontent and the process of transformation, v) exploration of options for new roles, relationships, and action, vi) planning a course of action, vii) acquiring knowledge and skills for implementation one's plan, viii) provisional trying to new roles, ix)

building competences and self-confidence in the new roles and relationships, and x) reintegration into one's life on the basis of condition dictated by ones' new perspective (p. 19).

Taylor (2009, pp. 3-14) has mentioned six core elements of transformative learning that frame a transformative approach to teaching. To this study, I use these essential components as the theoretical framework to explain transformative learning process through school-based nutrition education in classroom setting.

Individual Experiences. Individual experiences of the learners can be taken as an entry point of the transformative journey that offers opportunities for engaging a learners' personal dilemma as potentially transformative experiences. Individual experiences consist of learners' experiences and/or experiences within the classroom. Since individuals' experience is socially constructed, it can be enriched by a process of dialogue and self-reflection. Learning through direct and holistic learning can promote critical reflection among the learners.

Critical Reflection. Critical reflection is the core element of transformative learning. Critical reflection refers to questioning the integrity of deeply held assumptions and beliefs based on prior experiences. Mezirow (1990) emphasized three forms of reflection of meaning perspective: content (reflecting on what we think), process (reflecting on how we perform), and premise (awareness of why we perceive). The learners should question upon their deeply held contested beliefs and practice along with having a dialogue with others to foster transformative learning.

Dialogue. Dialogue is a social interaction which develops a reciprocal communicative relationship and trustful communication between teachers and learners which offers them an understanding and the sense of their world in transformative learning. Dialogue is the medium of building critical reflection among the transformative

agents. Through the dialogue, contested beliefs and deeply held assumptions are questioned and thereby develop greater awareness of the context.

Holistic Orientation. Holistic orientation is an approach to engage learners in an expressive way of knowing in the classroom, which creates learning environments conducive to whole person learning. Holistic environments help learners become more aware of their feelings and their relationships to sense making and help concretize an experience through expressive way of knowing.

Awareness of Context. Developing an awareness of the context in transformative learning is the process of developing a deep understanding of and appreciation of the personal and socio-cultural context. Since transformative learning is a democratic process that upholds inclusiveness of the agenda allowing critical reflection through dialogue among the learners, it creates a high demand for time.

Authentic Relationship. Authentic relationships provide teachers and students with a foundation for transformative learning by engaging them in critical reflection and critical self-reflection. Fostering transformative learning in the classroom depends on establishing authentic, meaningful relationships with students in the classroom. Tylor (2009) argued that love, memory, and self-dialogue relationships provide significant to establishing authentic relationships. Authentic relationships allow the learners to have open discussions, dialogue, share information openly, and achieve greater mutual and consensual understanding.

Participatory approach assumes that the research should be a vehicle for transformative learning (Steven, 2016). PAR, a transformative action inquiry project, which creates a high demand of time due to democratic process, inclusiveness of the research agendas, striving for consensus, critical reflection, and dialogue among the research stakeholders (Mezirow, 2009). To envisage improved teaching and learning

approaches as pedagogical innovations and transformation in the existing classroom teaching and learning practices, I believe that the transformative learning theory would be a promising theory to transform children's nutritional behavior.

Review of Related Policies and Programs

The global school health movement, around 1990s, initiated the concept of Health Promoting School (HPS) that sought the positive role of schools and strengthen their capacity to enhance the health status and educational performance of children (WHO, 1997). The global agendas like HPS and Child Friendly School (CFS) focused on children 's health and educational outcomes separately. These agendas could not interface health and education issues together and mobilize the resources effectively. Following the gap, the concept of CFS and HPS were merged into the Focusing Resource on Effective School Health (FRESH) considering the best approach to achieve Health for all (HFA) and Education for all (EFA) together through holistic approach of School Health Program (Ministry of Education and Sports & Ministry of Health and Population, 2006). This might be the first global movement that focuses on health and educational outcomes of children. Since then, school nutrition has become a globally recognized health agenda (Ministry of Education and Sports & Ministry of Health and Population, 2006). Since 2000, several global movements have been launched to expedite nutrition education program around the world including Nepal (National Planning Commission, 2017a).

National School Health Nutrition Strategy (NSHNS) of Nepal was endorsed by the Ministry of Health and Population in 2004 to achieve nutritional well-being of the Nepali citizens. Improving health and nutrition status of children was one of the strategic objectives of the NSHNS. The policy has recommended some key activities such as hand washing practices, anthropometric measurements, behavior-focused

nutrition sessions, school feeding program, school gardening activities, and school policy and protocol on healthy foods. Promoting the practice of good dietary habits among children is another strategic objective of the NSHNS. Under this program, a couple of school-based nutrition interventions were recommended such as: developing Information, Education and Communication (IEC) materials for healthy dietary habits, updating the existing nutrition education curriculum, implementing nutrition education sessions in the classroom, and strengthening parental and community participation in nutrition education sessions (Ministry of Health and Population, 2004).

Nepal, being a signatory for achieving Sustainable Development Goals (SDGs), is committed to pursuing and achieving the SDGs by 2030. In this regards, Government of Nepal (GoN) has aimed to achieve the SDG-2 'End hunger, achieve food security and improved nutrition, promote sustainable agriculture', SDG-3 'Healthy lives, and encourage well-being of the people' (National Planning Commission, 2017b). The United Nations general assembly declared 2016-2025 as the decade of action for nutrition. Nepal, being an early member of the Scaling-Up-Nutrition (SUN), adopted MSNP-I (2013-17), MSNP-II (2018-22), and MSNP-III (2023-27) to promote nutritional wellbeing among the vulnerable population, amongst which children and adolescents are the key focus group. The MSNP-I, II and III have focused on school health and nutrition related key activities such as: school midday meal, skilled-based health education, health and nutrition education curriculum, and IEC learning materials for students, teachers, and SMCs. The MSNPs suggests collaborating with at least education, health, and agriculture sectors to implement the above activities (National Planning Commission, 2017a).

GON is committed to provide good health and nutrition service to every citizen of the nation through its constitutional provision as stated in the part-three naming fundamental rights and duties under the article 35 (Government of Nepal, 2015). The National Health Policies-2048, 2071, and 2076 BS have also highlighted on improving nutritional outcomes of people through preventing any form of malnutrition including overweight and obesity. The National Health Policy-2076 has particularly focused on promoting healthy eating behaviors, discouraging the use of junk food consumption, promoting home-grown foods, and strengthening school health program and nutrition education programs (Ministry of Health and Population, 2071 BS, 2076 BS). The recent document of Government of Nepal, School Education Sector Plan- 2022/23-2031/32, also developed a key strategy of improving nutrition status and health of basic children through their equitable and accessible participation in school education system (Government of Nepal, 2022, p. x).

In collaboration with the World Food Program (WFP), the Government of Nepal implemented school feeding program in the selected districts that had had low Human Development Indices (HDIs) since 2009 (Government of Nepal, 2076 BS). This program reached over 600,000 children in 2017. Realizing the effectiveness of the school midday meal program on health and education outcomes, from the fiscal year 2020/2021, the school feeding program was extended from ECD to the fifth grade and from the fiscal year of 2022/23 to the sixth grades. The government has a target to expand the school feeding program for entire basic school education. The national and international documents embarked that school feeding program has played a crucial role in bringing positive educational and nutritional outcomes (Global Child Nutrition Foundation, 2019; Government of Nepal, 2076 BS). Yet, local to

provincial level efforts need to be integrated to sustain the school feeding program at school level.

Review of Basic School Level Nutrition Education Curriculum

Teaching nutrition education in the school setting dates back long in Nepal. Nutrition education was incorporated in the primary school curriculum under the Hygiene and Physical Education subject from the National Education System Planning (NESP) 2028 BS (1971). Since then, nutrition education has been an integral part of Health and Physical Education in school education. According to National Curriculum Framework (NCF)-2063 BS (2007), which was in practice until the academic year of 2075 BS (2018), nutrition education was incorporated into Science, Environment and Health & Physical Education subject from grades one to five and within Health and Physical Education subject from sixth to eighth grades.

Food and nutrition-related contents were designed in a separate unit (lesson) at each grade following the cyclical model of curriculum organization (Government of Nepal, 2063 BS). The NCF-2063 BS has included food and nutrition-related contents from first to eighth grades. The framework has focused on basics of food and nutrition such as introduction to foods, nutrients, and nutrition; locally available foods and their nutritional value; different food groups based on the source and function; introduction, importance, and preparation of balanced diet; and malnutritional diseases. The framework has also partially included junk food and its effects on human health. However, there was a paucity of including the contemporary issues of food and nutrition like locally available organic foods, healthy school meals, junk food and its effect on human health, adolescents' nutrition, food adulteration and its effects, hunger and food (in)security, anthropometric measurements, and consumers'

rights and responsibilities. Table 1 shows the overview of nutrition education at basic school education curriculum according to the NCF-2063 BS.

Table 1. *Overview of Basic School Nutrition Education Curriculum 2063 BS*

Grades	Nutrition education contents	Name of subject under which nutrition education contents are incorporated
First	Introduction to foods Daily eating foods Raw edible foods Ways to eat foods	Science, Environment and Health and Physical Education
Second	Foods available at locality and community Healthy and fresh foods Need for water for the body	Science, Environment and Health and Physical Education
Third	Source of locally available foods Use of vegetable and fruits Techniques of food safety	Science, Environment and Health and Physical Education
Fourth	Main foods of different places Importance of nutritious foods	Science, Environment and Health and Physical Education
Fifth	Introduction and Importance of Balanced diet Causes and preventive measures of malnutrition	Science, Environment and Health and Physical Education
Sixth	Introduction and importance of food Classification and function of food Introduction of a balanced diet	Health and Physical Education
Seventh	Introduction, importance, source and function of nutrients Importance of a balanced diet Introduction to readymade junk food	Health and Physical Education
Eighth	Introduction to malnutrition Malnutrition diseases Preparation of balanced diet utilizing locally available food Demerits of junk foods	Health & Physical Education

(Government of Nepal, 2063 BS)

Ministry of Education, Science, and Technology has developed NCF-2076.

The framework was developed under the two-tiers school education system: basic school and secondary school. Basic school education refers to grades 1-8 and grades 9-12 are considered as secondary school. The NCF-2076 BS has incorporated nutrition education from the perspective of integrated curriculum. In the integrated

curriculum, nutrition education-related contents are incorporated under the ‘Our surrounding’ subject, whilst nutrition education-related contents are included in ‘Health, Physical and Creative Arts’ subject from fourth to eighth grades.

Though NCF-2076 has continued most of the nutrition education-related contents documented by the NCF-2063 BS, it has additionally incorporated contemporary issues of school nutrition education that was not addressed by the previous curriculum frameworks. For instance, the NCF-2076 BS has focused on consuming locally available foods, selection and consumption of healthy school meals, harmful effects of junk food, food adulteration and its effects, food (in)security, and consumers’ rights and responsibilities. Table 2 outlines the details of nutrition education curriculum according to the NCF-2076.

Table 2. *Overview of Basic School Nutrition Education Curriculum 2076 BS*

Grades	Nutrition education contents	Name of subject under which nutrition education contents are incorporated
First	Name of daily eating foods	Our Surroundings
Second	Fresh and hygienic foods found in the locality Foods found at home and surrounding Green vegetables and fruits found in the locality	
Third	Source of daily eating foods Vegetarian and non-vegetarian foods	
Fourth	Introduction and function of foods Basic classification of foods based on sources: Plant source and animal source foods Introduction to balanced food Selection and utilization of healthy foods Introduction to junk foods Awareness against junk food consumption Introduction to nutrition and nutrients Functions of nutrients	Health, Physical and Creative Arts
Fifth	Food preservation methods Introduction to locally available foods Selection and utilization of locally available foods to prepare a balanced diet Effects of junk foods Ways to reduce junk foods consumption Introduction and importance of balanced diet	Health, Physical and Creative Arts
Sixth	Classification of foods based on their functions (Energy-giving foods, bodybuilding foods and body protective foods)	Health, Physical and Creative Arts

	Identification and utilization of locally available foods	
	Preparing a balanced diet utilizing locally available foods	
	Introduction to junk foods	
	Effects of junk foods	
Seventh	Nutrients: Introduction, source, and functions	
	Effects of pesticide used foods	
	Effects of junk foods	Health, Physical and Creative Arts
	Selection and utilization of healthy school meals	
	Food adulteration: Consciousness and preventive measures	
	Introduction and causes of malnutrition	
	Classification of malnutrition diseases (under and over nutrition)	Health, Physical and Creative Arts
Eighth	Causes, symptoms and preventive measures of malnutrition diseases: Marasmus, kwashiorkor, night blindness, anaemia, rickets, scurvy, and obesity	
	Food security: Introduction and elements	
	Factors to be considered protecting consumer's health	

(Government of Nepal, 2079 BS)

I do believe that curriculum is a living document which keeps changing as per the needs of contemporary society. Compared with the previous curriculums of basic school level nutrition education, the NCF-2076 BS was found more progressive to address the contemporary food and nutrition-related issues of the society compared with the previous ones.

Empirical Review of Related Literature

This section reviews the empirical literature related to the present study. Though there is a wide body of literature related to nutrition intervention conducted before 2010s, there are less studies particularly focused on nutritional behaviors of children. Thus, the review has included the studies that were conducted after 2010.

De Bourdeaudhuij et al. (2011) carried out a systematic review targeting dietary and physical activity behaviour in primary schoolchildren aged 6–12 and secondary schoolchildren aged 12–18 in Europe. Interventions were evaluated in terms of behavioral determinants (diet and physical activity), weight related outcomes (BMI) and indicators of obesity. The study analyzed that combining an educational

and environmental component might be preferable in school-based nutrition interventions to reduce obesity in children and adolescents. Habib-Mourad et al. (2014) carried out a Health-E-PALS study with the aim of evaluating feasibility and effectiveness of a multicomponent school-based intervention to promote healthy eating and physical activity among children aged 9-11 years in Lebanon. The intervention was developed based on the construct of social cognitive theory (SCT). The study used sequential explanatory mixed method involving both quantitative and qualitative results. Students from the intervention group reported that they consumed less chips and sweetened drinks after the intervention. Knowledge and self-efficacy scores also increased among the intervention group of students.

Dudley et al. (2015) performed a systematic review and meta-analysis study of randomized control trial, quasi-experimental and cluster control trials examining the school-based teaching intervention that promote eating habit of children. This study explored four healthy eating outcomes such as: reduce energy intake, increase fruit and vegetable consumption, and increase nutrition knowledge. The study synthesized experiential learning strategies, connecting it with school kitchen garden and canteen, was significantly associated with reduced high energy intake behaviour and increased fruit and vegetable consumption and increased nutrition knowledge. The study concludes that enhanced curricula, cross-curricula, and experiential learning were the effective intervention strategies for facilitating healthy eating behaviour among primary children.

Sacchetti et al. (2015) examined the effectiveness of a school-based intervention to increase physical activity and improve dietary habits of primary children within the age range of 8-11 years, using integrated educational strategies involving schools, families, public bodies, sports associations, and public health

operators. The intervention was designed based on PRECEDE-PROCEED model to implement the programme. The study found a positive association between dietary habit and BMI status of children. Similarly, Leme and Philippi (2015) conducted a Randomized Controlled Trail (RCT) multi-component intervention study in Brazil, aimed to promote healthy eating, physical activities, mental health, and social skills and reduce sedentary behaviors and prevent unhealthy weight among Brazilian adolescent girls from disadvantaged backgrounds. The intervention included the components such as: enhanced physical activities, weekly nutritional and physical activities messages, nutrition, and physical activities handbooks, interactive seminars, nutrition workshops, parents' newsletters, text messages, and dietary and physical activities diaries. The study was based on the theoretical underpinnings of SCT and SEM. The study remained successful to control school-based obesity among the adolescent girls through promoting healthy habits and physical activities. Grassi et al. (2016) also showed that school-based nutrition education intervention study conducted in four different elementary schools in Italy concluded that the intervention activities significantly improved fruit and vegetable consumption to prevent childhood obesity among the children. Another study carried out by Harake et al. (2018) implemented a school-based nutrition education intervention among the Syrian refugee primary children studying in grades 4-6. The study demonstrated that a six-month school nutrition intervention brought positive changes in dietary knowledge, attitude, behavior, and nutritional status of children.

Chalise (2018) carried out a study in Kathmandu including eight public schools with a sample of 428 students of grade eighth and ninth. The study contributed to developing a junk food prevention education package through intervention using the TPB model of health behaviour change. Junk food consumption

practice was highly prevalent, where 96 percent consumed it at least three times a week, mostly preferred instant noodles as a school snack and the average amount of money spent buying junk food was 31 rupees per day. Students reported that they consumed junk food due to better taste (83%) followed by easy availability (38%) and appealing advertisement (30%). Based on these baseline data, Chalise developed a junk food prevention intervention and implemented it in two public schools. After intervention, the results showed that there were significant differences between two groups with respect to junk food consumption related knowledge, attitude, and practices. Jung et al. (2019) demonstrated how their intervention study conducted in two primary schools of Oswego County, USA significantly improved healthy eating literacy and healthy food choices among primary schoolchildren through a school-based nutrition education program. A similar study carried by Hawkins et al. (2020), a five-year long school-based nutrition education intervention conducted among four elementary schools in a high-needs area in the USA, demonstrated that a multicomponent nutrition education program empowered the teachers to improve nutrition literacy, fruits and vegetables consumptions, and obesity prevention among elementary school students.

Antwi et al. (2020)'s school-based nutrition education intervention among school-age children (6–12 years) in basic schools of Ghana revealed that nutrition education intervention could have positive impacts on knowledge and attitudes of children, and in the development of healthy behaviors for improved nutritional status. Dhauvadel et al. (2020)'s research on a school-based nutrition intervention study in Pokhara among the ninth-grade students found that the intervention was significantly effective for changing the intention to consume healthy food and student's attitude, perceived behavioral control and intention towards healthy eating behavior. Similarly,

Melnick et al. (2022) conducted a multi-component school-based nutrition education quasi-experimental study. The intervention consists of three components: hands-on nutrition education lessons in the classroom (student level), parent education, and outreach (home-level), and facilitation of a planning process to implement policy, system, and environmental (PSE) school changes (school-level). The study concludes that a multi-component school-based nutrition education program improved students' nutrition-related outcomes such as attitude, knowledge, self-efficacy, and practice. A systematic review study conducted by Verdonschot et al. (2023) also concludes that school-based nutrition programs contributed to fruit and vegetables consumption and increased food and nutrition knowledge in primary children.

A study by Ponnambalam et al. (2022) in India found that a school-based nutrition education program was effective in reducing the excessive consumption of high-calorie and high-fat foods among the in-school adolescents. The study also claimed that an intervention remained effective in controlling unnecessary weight gain among overweight adolescents after the intervention in school. A systematic review and meta-analysis study also claims that food and nutrition education interventions in schools presented favorable results in the food consumption practice of adolescents (Medeiros et al., 2022). An analytical study in India concludes that school nutrition education interventions have the potential to positively impact dietary habits and reduce the prevalence of obesity among adolescents (Bhatt, 2022). A theory-guided quasi-experimental study conducted by Saha et al. (2023) among the elementary children also found that school-based behavior-and age-specific nutrition education intervention significantly improved in fruit and vegetables consumption practices after intervention. Another school-based educational intervention study conducted among aged 11-13 year children revealed that though the intake frequency

of sugar-sweetened beverages tended to decrease among participants compared with controls, but not significantly (Outzen et al., 2023).

Methodological Review of the Study

After reviewing the empirical studies related to the present study, I found a methodological gap in the existing body of the literature. The table below summarizes the methodological consideration of the previous studies, which are closely related to my study.

Table 3. *Glimpse of Methodological Overview*

Authors and date	Thematic area of the study	Methodological consideration
De Bourdeaudhuij et al. (2011)	School-based healthy eating interventions	Systematic review on school-based nutrition intervention
Habib-Mourad et al. (2014)	Promoting healthy eating behavior among children	Quasi experimental-pretest-posttest intervention study with control group
Dudley et al. (2015)	Promoting healthy eating through teaching approaches and strategies	Systematic review on school-based nutrition intervention
Sacchetti et al. (2015)	Improving dietary behaviors of primary children	Quasi experimental-pretest-posttest intervention study with control group
Leme and Philippi (2015)	Healthy eating behaviors among adolescent girls	Randomized Controlled Trial (RCT)
Grassi et al. (2016)	School-based nutrition education intervention on fruits and vegetable intake among children	Quasi experimental-pretest-posttest intervention study with control group
Harake et al. (2018)	school-based nutrition intervention on dietary knowledge, attitudes, behavior, and nutritional status	Quasi experimental-pretest-posttest intervention study with control group
Chalise (2018)	Junk food prevention educational package	Quasi experimental-pretest-posttest intervention study with control group
Jung et al. (2019)	school-based nutrition education program on healthy eating literacy and healthy food choice among primary children	Quasi experimental-pretest-posttest intervention study with control group
Hawkins et al. (2020)	School-based nutrition education intervention	Quasi experimental-pretest-posttest intervention study with control group
Antwi et al. (2020)	School-based nutrition education intervention on nutrition knowledge, attitude, and practices among school-age children	Quasi experimental-pretest-posttest intervention study with control group
Dhauvadel et al. (2020)	Nutrition education program in intention change for consuming healthy food among adolescents	Quasi experimental-pretest-posttest intervention study with control group
Melnick et al. (2022)	Outcomes of a multi-component school-based nutrition program	Quasi experimental-pretest-posttest intervention study with control group

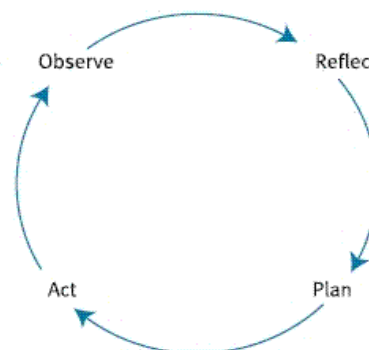
Ponnambalam et al. (2022)	Effectiveness of a school-based nutrition education program on dietary behavior among overweight adolescents	Randomized Controlled Trail (RCT)
Verdonschot et al. (2023)	Effectiveness of school-based nutrition intervention on fruit and vegetable intake and nutrition knowledge in children aged 4–12 years	Systematic review on school-based nutrition intervention
(Medeiros et al., 2022).	Effect of school-based food and nutrition education interventions on the food consumption of adolescents	Systematic review on RCT
(Bhatt, 2022)	Role of school nutrition education in improving dietary habits	Analytical review on effectiveness of school-based nutrition education programs in promoting healthy eating habits
Saha et al. (2023)	effectiveness of a behavior-and age-specific nutrition education intervention to improve nutrition knowledge and preference for fruits and vegetables among children	Quasi experimental-pretest-posttest intervention study with control group
(Outzen et al., 2023)	Effect of school-based educational intervention on promoting healthy dietary habits in Danish children	Quasi experimental-pretest-posttest intervention study with control group

The table shows that though most studies followed quasi experimental-pretest-posttest intervention study with control group, none of the study used participatory action research framework to implement school-based nutrition education intervention. Hence, given the gap, the present study attempts to design and implement school-based nutrition education intervention following the participatory action research (PAR) as a methodological approach. I have reviewed the genealogy and use of the PAR in educational research in the following subsequent sections.

Genealogy of Participatory Action Research

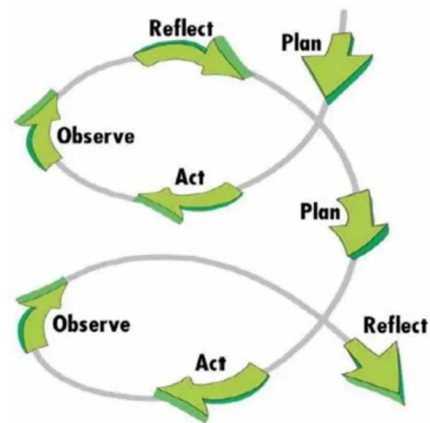
The PAR is a prototype of the action research, which focuses on making inquiry about community-identified problems and taking action to solve them, where people are fully involved and actively participate throughout the research process (Brown & Tandon, 2008). John Dewey first used action research in education in 1933 with the concept

Figure 5. Lewin's Model of Action-reflection



of 'reflecting thinking' in classroom teaching. But John Collier— commissioner of the US Indian affairs— used the term 'action research' for the first time in 1945. German social psychologist, Kurt Lewin, developed a model of action-reflection cycle of action

Figure 6. *Spiral Model of PAR Cycle*



research in 1946, which consisted of the plan, act, observe, and reflect model (McNiff & Whitehead, 2002). Thus, Lewin is known as the father of action research in the world and the model has been widely used in action research field. Later, in 1970s, Brazilian emancipatory educator and philosopher Paulo Freire resurged the concept of action research by emphasizing raising critical consciousness through critical pedagogy. Freire was an adult educator and author of critical pedagogy (MacDonald, 2012). Through his approach, collaboration, participation, and empowerment were preferably used in action research. The PAR approach of Freire was concerned with empowering the poor and marginalized members of the society through consciousness raising via sociopolitical actions (Freire, 2000). Stephen Kemmis and his associates, the educational action research team, modified the original process of action research. He conceptualized PAR as a recursive process that involves action-reflection spiral cycle in circular design (McNiff & Whitehead, 2002).

PAR is an umbrella term covering a variety of participatory approaches to action-oriented research. It is variously termed as 'participatory research', 'critical participatory action research' (Kemmis, 2006), 'transformative participatory action research' (Mertens, 2008), 'teacher action research' (Pine, 2000), 'community-based participatory action research' (Minkler, 2000). PAR aims to empower disadvantaged

groups of society through empowerment (Steven, 2016) and as an applied research it involves people in all phases of the research from initial design to the final implications (Whyte et al., 1989). Knowledge is co-constructed through collaborative action inquiry between researcher and the research participants to explore context-bound solutions of the problem (Steven, 2016). PAR enables the co-researchers to co-construct the knowledge through rigorous collaboration (Denzin & Lincoln, 2011) and it has a strength both for the improvement in practice (context bound solutions of the problem) and co-creation of knowledge.

PAR is a combination of theory and practice, action and reflection, information and transformation with the participation of the research stakeholders who seek the practical solution of the problems in their socio-political, economic, and familial contexts (Steven, 2016). It differs from conventional research in the sense that it embodies shared ownership of research outcomes, social and political empowerment, community-based analysis, focusing on social problems, and (re)orientation towards community action (Denzin & Lincoln, 2005). PAR is a participatory, systematic, dynamic, developmental, and transformative action inquiry. It inherently embodies the ideas of co-learning through critical reflection on practice.

Critical reflection is the central tenet of PAR. The PAR researchers, as critical inquirer, use critical reflection as a tool of social inquiry to take action for socio-political change (Baum et al., 2006). Paulo Freire's concept of praxis stems from action and critical reflection, which further results in pursuing transformation. Freire asserts that human consciousness brings critical reflection upon the action (Freire, 1973). It further brings refined practices, and this refined practice is called praxis (Kemmis, 2006). Through the praxis, critical awareness develops over the deeply held false consciousness, is called transformation (Freire, 1973). PAR empowers

participants to reflect on their false consciousness by enabling them to analyze the situation of the nature and consequences of a particular practice.

Use of PAR in Educational Research

The use of PAR in research has been growing globally from high to middle and LMICs in the field of medical science, social science, public health, and educational research (Baum, MacDougall & Smith, 2006). In education, PAR has been used as a methodology to improve curriculum, professional development, educational programs, system planning and policy development (Jacobs, 2016). The use of action research in educational research began from the 1920s and 1930s with the prominent role of John Dewey. But collaborative action research began in the 1940s and 1950s from Columbia University of US (Jacobs, 2016). Stenhouse and Elliott further developed an approach during the 1970s. They expanded the notion of action research by emphasizing the concept of 'teacher as a researcher (Stenhouse, 1987). Later on, Freire resurged the concept PAR in 1970s, focusing on research not 'for the participants; rather 'with the participants' (Jacobs, 2016). Since then, PAR has been used in the educational field to seek academic problems and their best remedies to transform classroom practices. PAR is a new lens to view the world based on the critical social science theories and participatory worldview, which involves research participants in all aspects of the study in the process of co-generating the context-based solution of the questions (Jacobs, 2016). The early literature of PAR used in the educational research field also suggests that PAR has been effective to get the context bound solution to the problems.

The collaborative action research conducted in Ontario of Canada among the elementary school teachers reveals that the use of action research could enable teachers to foster their expertise, strengths, talents, skills, and knowledge (Jaipal &

Figg, 2011). The study seems to support and sustain the changes in teaching practice and student's learning. Similarly, a study conducted in the urban middle school of San Francisco of the US reveals that PAR can promote meaningful engagement of students in school and develops a sense of efficacy (Ozer et al., 2010). A similar study conducted in Europe, which involved eight schools from three countries, also reveals that PAR develops collaborative and reflective practice among the teachers and increase students' active participation in the learning enterprises (Messiou, 2019). A study in primary schools of Tanzania, in eastern Africa, highlights that PAR has increased school attendance, confidence, self-esteem, and active engagement among the primary level students while teachers incorporated participatory methods in their classroom teaching (Roberts et al., 2015). A review-based study also argues that action research develops teachers' pedagogical and instructional practice, cultivates students' better learning outcomes, and improves school's teaching environment (James & Augustin, 2018). A teacher action research conducted in Chinese schools demonstrates the improvement of teachers' professional development in a meaningful and sustained manner with earnest progress in student's learning endeavour (Liu & Wang, 2018). A study conducted in a rural school in Bangladesh also illustrates that PAR based teaching practice in a rural school has improved better educational outcomes (Liu & Wang, 2018). Similarly, a study conducted in a public school of Chitwan district, Nepal also suggests that PAR has increased students' active participation in the activity-based science learning through school gardening project. The study also concludes that PAR has also fostered teachers and parents' participation to scaffold for students' learning (Acharya et al., 2020).

The above literature highlights that the use of PAR methodology in educational research can potentially empower both researchers and research

participants (co-researchers) to raise critical consciousness awareness of the context and co-create the context bound knowledge and strategies to solve the problems within their practice setting.

Research Gap

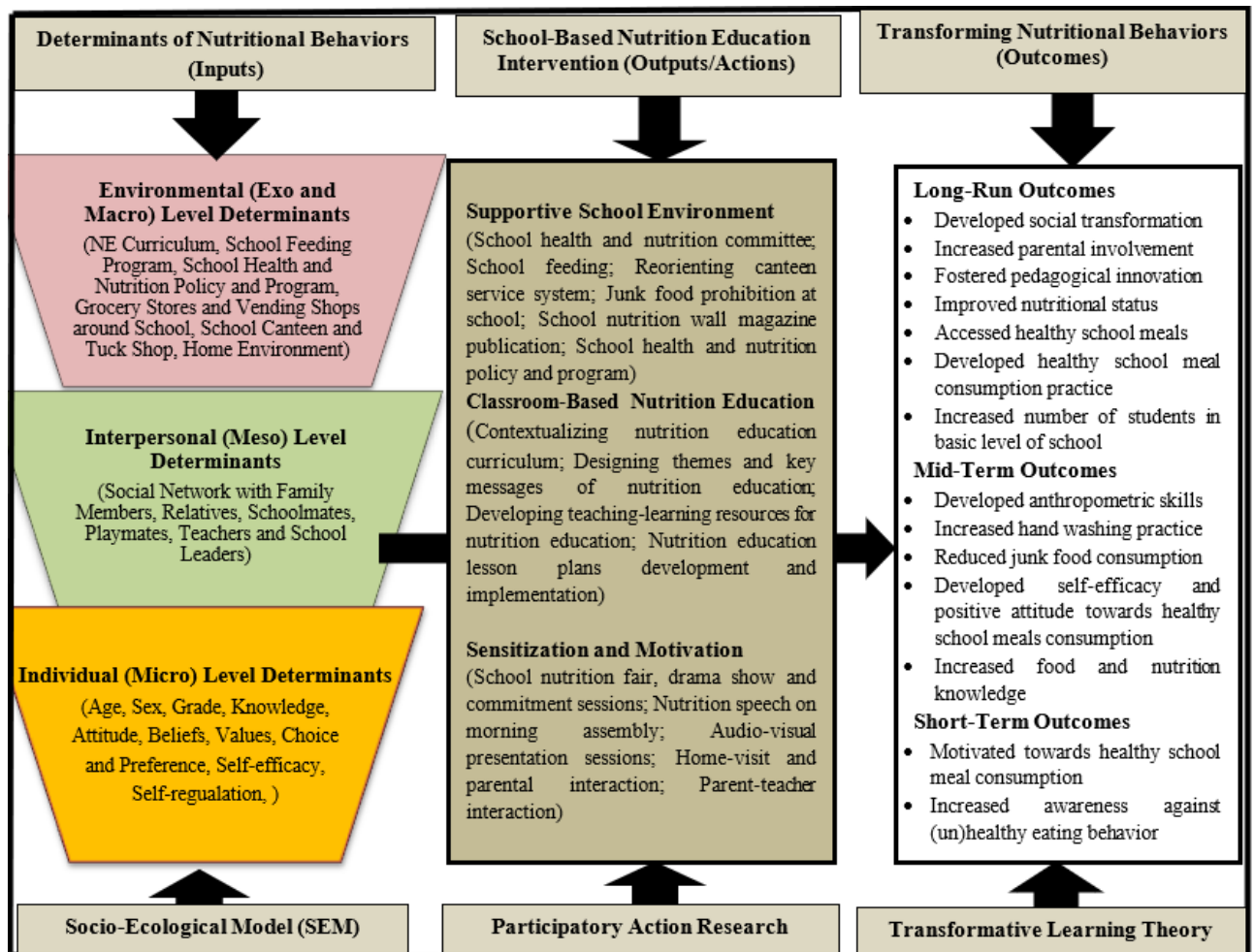
The review suggests that school-based nutrition education intervention (SBNEI) would be promising to bring positive outcomes in dietary behaviors and nutritional status of children. Though nutrition education interventions could develop healthy dietary behaviors and improve nutritional status in children, the long-run impact of the intervention would always be questionable until the research stakeholders are actively involved in the thorough process of the study. The theoretical literature also laid the research gap of designing and implementing the SBNEI to promote healthy nutritional behaviors among children being guided with the theoretical frameworks, particularly social ecological model (SEM) of health behavior changes and transformative learning theory to reflect on learning practices in the realm of classroom teaching. Besides, there is a paucity of the study focusing on promoting healthy nutritional behaviors in children through contextualized nutrition education intervention involving the school community as the co-researchers underpinned with PAR as the methodological approach, particularly in the Nepali diaspora.

Conceptual Framework of the Study

The conceptual framework is the researcher's understanding of how the research problems are explored following the specific direction based on the research questions, which also illustrates the relationship among the concepts and/or constructs used to the study (Grant & Osanloo, 2016). The conceptual framework of the present study offers a logical framework of the connected concepts/constructs of the nutrition

education intervention that provides visual display map. This framework illustrates the multiple determinants of nutritional behaviors as the inputs in the left most column of the diagram, intervention activities as the action/outputs in the middle, and the expected nutritional behaviors of students as the outcomes in the rightmost column. The conceptual framework mentioned in this study have been developed based on the logic model (Contento, 2011), social ecological model (McLeroy et al., 1988), and transformative learning theory (Mezirow, 1997; Taylor, 2009) as diagrammatically illustrated in the Figure 7.

Figure 7. *Conceptual Framework of the Study*



The framework demonstrates that nutritional behaviors of basic children are influenced by multilevel determinants extending from individual to environment levels. These determinants are considered as the inputs for this study. Since nutritional behaviors of children are influenced by multilevel determinants, this study suggests school-based nutrition education intervention with three components viz ‘sensitization and motivation’, ‘classroom-based nutrition education’, and ‘supportive school environment’. The expected outcomes of the study are presented into the three levels: short-term, mid-term, and long-run in the right extreme of the diagram. Overall, this study is guided by the SEM for designing and implementing intervention activities. Transformative learning theory is used to reflect on learning practices. The study is overall guided by the PAR methodology.

The Implication of the Literature Review for this Study

The present study has focused on transforming nutritional behaviors among basic children through SBNEI undergoing PAR framework. In this connection, I have reviewed a wide array of related literature per se conceptual, empirical, theoretical, policy, and methodological as I explained in the preceding sections. The review of these literature helped me in many ways that I explain below.

1. The conceptual review of the literature enabled me to get an insight of the key concepts used to this study: nutritional behavior, school-based nutrition education, and transformation used to this study.
2. Empirical review of the related literature provided me the information about the areas explored related to the topic of my study which supported me to narrow down the research problem, specify the research objectives and questions, and identify the research gaps. Moreover, reviewing the empirical literature helped me

to avoid the redundancy of the study and thus prevent this study from empirical and methodological distortion.

3. The theoretical review of the literature gave me the insights to connect my research agenda to the theories and identify the appropriate theories to associate my research agenda to the theoretical perspective. By reviewing the existing health behavior change and classroom learning theories, I could outline the theoretical framework of the study, based on which SBNEI was designed, implemented, and evaluated.
4. The review of the methodological literature helped me to develop philosophical underpinnings such as ontological, epistemological, methodological, axiological, and rhetorical components. The review of the methodological literature also allowed me to get deeper insight to contextualize research design based on my emergent research agenda, research methods and techniques, reasoning analogy (analytical tools) for data analysis, and meaning making process.
5. Reviewing the policy level literature published by governmental, bilateral, and UN agencies helped me to be aware of the existing national and international policies and programs in the space of my research.
6. Similarly, reviewing the school level curriculum of nutrition education helped me to identify the gap between existing nutrition education curricula and the present need of the school at the time of study, which helped us (University researcher and school co-researchers) contextualize the nutrition education curriculum.
7. Overall, the review of the literature enabled me to create a solid foundation for unravelling the research gap to uncover.

Literature Search Strategy

Reviewing literature is an important part of the study, which begins from the initial journey of the study and continues until the final submission of the dissertation. It is a rigorous process that demands scholarly initiation to summarize the evidence related to the research inquiries set by the researcher(s). A thorough literature search strategy was employed to obtain the related literature to this study. This involved utilization of different open access search engines and databases to retrieve academic literature like journal articles, book sections, and books, including the grey literature like governmental and/or organizational reports, thesis and dissertation, and conference/workshop proceeding papers.

I commonly used Google Scholar, a freely accessible web search engine, to search related literature. I also used other electronic databases to search the literature: Medline, PubMed, Hinari, ProQuest, Education Resources Information Center (ERIC), JSTOR, ScienceDirect, Open Access Library, Asian Online Journal, African Online Journal, Directory of Open Access Journal (DOAJ). Besides, online access libraries like Google Books, Library Genesis (Libgen) was used to retrieve the books and book sections. I collected related Masters' and PhD dissertations from the library of the graduate school of education, Curriculum Resource Centers (CRC) of Central Department of Education, and Central library of TU. I also searched journal articles by exploring the home page of the respective journals. Besides, I obtained scholarly literature going through academic sites like ResearchGate and Academia. My supervisors also helped me to obtain the related literature throughout the study. I also receive help from my colleagues who have advanced access to the databases library from overseas.

Chapter Summary

In this chapter, I discussed conceptual, theoretical, empirical, and methodological review of the related literature under the thematic style. The early sections of the chapter articulated conceptual and theoretical review of the study. I have described SEM as a theoretical framework and transformative learning theory as the theoretical lens. I have also discussed how I used the SEM for the purpose of designing, implementing, and evaluating the outcomes of SBNEI and transformative learning theory to unfold (self) reflective practices in the realm of classroom teaching and learning of nutrition education. In the succeeding sections, I explained empirical review, followed by methodological review and research gap. After all, I have developed conceptual framework of the study, which articulates the overall road map of my PhD project. Finally, I explained the major implications of literature review before I discussed the literature search strategies and chapter summary. The next chapter articulates philosophical and methodological underpinnings of the study.

Chapter Three

Philosophical and Methodological Underpinnings

This chapter outlines the philosophical worldview related to my research agenda under the ontological, epistemological, methodological, and axiological underpinnings. I explain participatory action research (PAR) as an emergent research methodology allowing the integralist perspective with the support from mixed-methods research design. In the subsequent sections, I have explained the methods and tools used to obtain quantitative data and generate qualitative information to this study, data management and analysis techniques and procedures, followed by data integration strategies. Finally, I discuss the quality standard procedures of the study before I describe researchers' positionality, followed by ethical consideration and limitation of the study.

Philosophical Worldview: Transformative Participatory Paradigm

PAR significantly differs from traditional research approaches since it stems out from the philosophical root of the pragmatism and transformative worldview (Guba & Lincoln, 1994). PAR is a participatory, democratic, inclusive, and culturally responsive approach that brings social change through action (Whyte, 1984). Cousins and Whitmore (1998) and Mertens (2008) argue that participatory worldviews are not enough to warrant transformative actions; rather, participatory inquiries within a transformative lens can best work for social transformation. Baldwin (2012) also reminds that PAR aims to be transformative in nature. The transformative lens in PAR is increasingly used in health and educational research, which improves the socio-political situation of those who are being researched by participating themselves in the thorough process of the action inquiry (Baum et al., 2006). The transformative lens in

the participatory paradigm recognizes the value of participants in the research process (Mertens, 2013).

My research agenda inspired me to become critically aware of social inclusion and justice, power relations, and social action for transformation (Mertens, 2008). Moreover, this study embodied transformative research agendas such as transforming children's nutritional behavior. The transformative paradigm provided me a philosophical framework for designing the study that has potential role to contribute to both personal and societal transformation (Mertens, 2017). Thus, this study is philosophically underpinned by a transformative participatory worldview as asserted by Freire (1973) and Mertens (2008). This transformative participatory worldview has ensured active participation of the school community to transform the nutritional behaviors in children through communicative action inquiry undergoing school-based nutrition education intervention (SBNEI) activities. Following the transformative participatory worldview, I describe my ontological, epistemological, methodological, and axiological standpoints of the study.

Ontology: Co-constructed Multiple Social Realities

Ontology, a branch of philosophy, deals with the nature of existence and reality (Fard, 2014). The participatory paradigm rests on the assumption of multiple social realities co-constructed by the researcher and researched in their socio-political context (Guba & Lincoln, 1994). PAR opposes objective or subjective reality alone, rather it does both (Jacobs, 2016). I believe that no single reality stands alone to this study since multidisciplinary groups of school community have multiple understanding towards their socio-political context. Hence, multiple social realities were accepted that were co-constructed by the school community involved in this study.

The nature of reality in PAR seems to be dynamic. Contextualized realities emerge from different groups of people at different times who were distinct from each other with respect to their social, political, cultural, economic, ethnic, gender, and age group. In the beginning of my field engagement, I moved on with a post-positivism worldview. At the time, I used to believe that reality was ‘out there’ that can be discerned being an external observer without allowing dialogical relationship between school community and myself. Once I became critically aware of my role that did not align with the intent of the PAR, I gradually shifted my ‘frame of reference’ as the PAR inquirer to understand the context-bound problem having a dialogical relationship with researched. Subsequently, I started to reflect upon the practice from subjective perspective embodying dialectical relationship. Consequently, I was able to observe the phenomenon from the emic perspective being on the shoes of the researched, which allowed me to understand the nature of multiple realities in the context.

Epistemology: Communicative Action Inquiry

Epistemology is the branch of philosophy that examines the ‘nature of knowledge’ (Phillippi & Lauderdale, 2017; Taylor & Medina, 2013). It is the relationship between known (researcher) and knowers (co-researchers) that deals with knowledge generation processes (Guba & Lincoln, 1994). Participatory transformative paradigm allows the space that the research participants are subjected to co-create the knowledge based on collaborative, democratic, dialogic and dialectic interaction with the researcher(s) (Baum et al., 2006; Jacobs, 2016). Non-hierarchical relationships are required to co-create the knowledge resulting from context-bound solution of the problems through communicative action inquiry. PAR researchers assume that knowledge is rooted to the lived experiences of the people who

participated in the study. Corresponding to this, Jacobs (2016), following the Maguire (1987), quoted that 'we both know somethings, neither knows everything' (p.49).

As a PAR practitioner, I believe that knowledge is embedded in the lived experiences of the research participants that is often co-created through 'communicative action inquiry' (Kemmis, 2006). Further, Kemmis et al. (2019) argued that shared knowledge is the product of action inquiry that occurs in the communicative space. Knowledge production in the present study seems to be social enterprise; where the school community participated to co-construct the contextualized knowledge while co-working together. And eventually, the co-created knowledge was applied in the context to solve the problems they experience.

PAR Methodology: Emergent and Multi-Paradigmatic

The methodology, line of inquiry (Phillippi & Lauderdale, 2017), is a strategy that shapes the choice and use of methods and links them to get the desired outcomes of the study (Baum et al., 2006). PAR methodology is grounded on the phenomenological study, which allows researcher(s) to seek the understanding of people's lived experience of their institutional situation where they belong (Baum et al., 2006; McTaggart, 1997). Phenomenologists argued that humans neither could describe an object in isolation from conscious being experiencing that object nor can they describe people's experience in the isolation from its object. Uniting subject and object to explore the lived experiences of the people is important (Crotty, 1998). I believe that PAR methodology allowed me to foster mutual collaboration with the school community who had diverse knowledge, skills, and expertise that best match the context where research is conducted. These context-bound knowledge, skills, and expertise help to explore shared knowledge related to my research agenda.

PAR Methodology: An Emergent Research Approach. PAR has been an emergent methodology that works in partnership with stakeholders leading to the action for sustainable change (Baum et al., 2006). It prescribes no cookbook methodology in advance; rather, it is developed through collaborative efforts by the researcher and co-researchers based on their communicative action (Widianingsih & Mertens, 2019). Jacobs (2016) described PAR is itself an emergent methodology that challenges traditional hierarchies between researchers and being researched, rather it assumes research is conducted ‘with participants’ (p.49). This study employed a practitioner-oriented PAR methodology as an emergent approach as it was not fully designed outside of the research context, and the aspects of the research sub-foci emerged in the process of intervention and data generation (Baldwin, 2012; McNiff & Whitehead, 2002). I followed guiding principles of PAR such as ‘embodiment of democratic principles’(Carr & Kemmis, 2004), ‘social justice principle’(Jost & Kay, 2010), and 'collaboration, reciprocity, and improved social practice principle' (Whitty-Rogers et al., 2020). I worked in partnership with the school community which led to action for social change. That is why the term ‘co-researchers’ instead of ‘research participants’ and/or ‘researched’ was used throughout the study (after this chapter). Besides, the terms co-researchers and school community have also been interchangeably used hereafter.

Multi-Paradigmatic Space in PAR Methodology. The use of multiple paradigms in a single study contributes to a greater understanding of the phenomenon under study (Tashakkori & Teddlie, 2010). The literature suggests that the use of multiple paradigms can serve as the foundation for mixed-methods design (Creswell & Cresswell, 2018; Tashakkori & Teddlie, 2010). I used multi-paradigmatic approach allowing integralism perspective (Luitel, 2019; Paul & Marfo, 2001; Peter Charles

Taylor & Medina, 2013; Taylor, 2008) in the process of intervention development, implementation, and data generation as PAR accepts methodological pluralism within a single study (Dhungana & Luitel, 2021; Taylor et al., 2012). The complexities of the research problems and underlie research questions as I raised in my study demanded hybrid research methodology (Taylor et al., 2012). Moreover, multi-paradigmatic space in PAR supports to enhance inclusive practice and nurture harmony with the research participants (Dhungana & Luitel, 2021). I have outlined my research agenda with pluralistic perspective within the PAR methodology extending from (post)positivism to postmodernism and elaborated my research journey at the end of this chapter.

Axiology: Reciprocal Influence in Beliefs and Value System

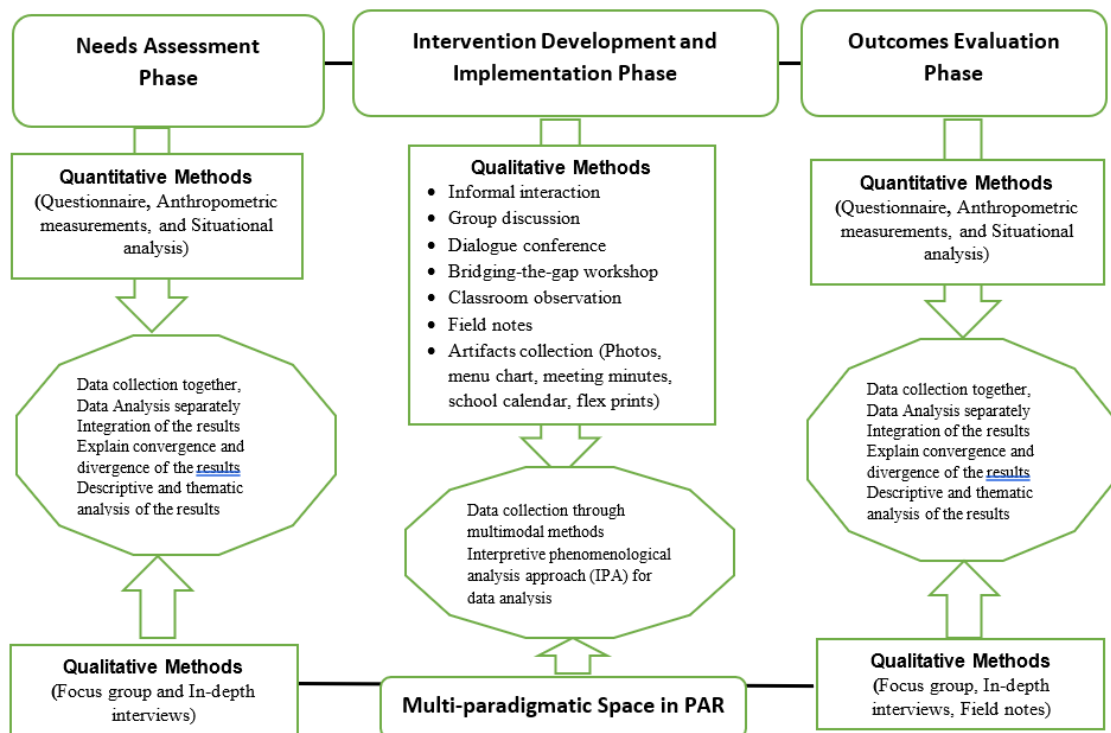
PAR is a value-based study, which assumes co-constructed knowledge cannot be separated from the possession of both researcher(s) and co-researchers (Baum et al., 2006). Participants in this study were recognized and valued as the co-researchers since they were the active agents of the study from needs assessment to the intervention evaluation phases. Thus, the axiological stance of the present study is ‘underlying beliefs and value system of both researcher(s) and co-researchers inherently influence each other, I term this as ‘reciprocal influence’. Hence, the present study affirms that nutritional behaviors-related beliefs and value system embodied within the researcher and co-researchers synergistically influence nutritional behaviors of students and vice-versa.

Research Design: 'Mixed-Methods Participatory Intervention Design'

Using the multi-paradigmatic space as a foundation, I have applied 'mixed-methods participatory intervention design' (Figure 8) for greater understanding of the phenomenon under a multicomponent school-based nutrition education intervention

[SBNEI] (Sendall et al., 2018). Mixed-methods participatory design refers to integration of two forms of data (qualitative and quantitative data) at various stages of a single study through merging, explaining, comparing, and embedding within ‘a larger participatory and/or social justice framework’ (Creswell & Cresswell, 2018, p. 311). The mixed-methods participatory intervention design, applied to this study, is different from the traditional mixed-methods design since it is explained as the collection, analysis, and integration of the juxtaposed methods in a single study at multiple stages (needs assessment, action plan development, implementation, and evaluation) of the study with varying degree of the integration of the results (Sendall et al., 2018). The mixed-methods participatory intervention design commensurate a wide array of quantitative and qualitative results integration at various levels in a different form (Creswell & Cresswell, 2018; McNiff & Whitehead, 2002). The figure below shows the data integration strategies used in this study.

Figure 8. *Mixed-Methods Participatory Intervention Design*



At the needs assessment phase, data mixing and integration occurred. For that purpose, survey questionnaire, anthropometric (height and weight) measurements, and situational analysis tools were used to get quantitative data. Whilst focus groups and in-depth interviews were utilized to collect the qualitative data. Upon the completion of the quantitative and qualitative data generation, they were analyzed in parallel form to understand the (un)healthy nutritional behaviors of children from the broader perspectives. The combination of the quantitative and qualitative results enabled us (research stakeholders) to co-develop and co-implement the SBNEI activities. During the co-development and co-implementation stages, only qualitative methods such as informal interaction, group discussion, dialogue conference, bridging-the-gap workshop, *Chiya Chautara Gaf*, and classroom observations were used. Besides, site artifacts and field notes were used to supplement the results. No quantitative data were mixed and integrated during these phases. At the end of the study, for the purpose of evaluating the outcomes of the intervention, similar strategies were used as applied in the needs assessment phase.

Ethics of Using Mixed-Methods Research Design

Since this study considered ‘mixed-methods participatory intervention research design’ to get the answers to the research questions, basic ethics of mixed-methods research design was followed as explained by Preissle et al. (2015).

The Ethics of Research Purpose. As I was consciously aware of using mixed-methods research design that provoke varied opinion to make strong inference with valid and reliable data, I used mixed-methods design so that quantitative data explains the situation in numbers and qualitative explored the lived experiences and deeper insights of the phenomenon (Wasti et al., 2022). Given the complexities of the research questions, the present study demanded both quantitative data and qualitative

information along with the interventions. For example, the research question related to the existing nutritional behaviors in children, socio-ecological determinants influencing their (un)healthy nutritional behaviors, SBNEI to develop healthy nutritional behaviors among children, pedagogical innovation among teachers, and social transformation among school community after intervention mostly demanded quantitative data with qualitative information. Similarly, other research questions related to school-based nutrition education intervention to be designed and implemented in collaboration with the school community, contextualization of basic school-level nutrition education curriculum as developed by the Curriculum Development Center (CDC), and identifying the participatory pedagogies of nutrition education to implement the contextualized curriculum 'needed change for a call for intervention/action' (Creswell & Cresswell, 2018, p. 318) with qualitative information.

Similarly, I could not get broader and deeper understanding of the real-world problems in the given phenomenon of the study enquiring with a stand-alone method (Salehi & Golafshani, 2010). For instance, the survey questionnaire provided the results concerning the nutritional behavior of students in the numbers. But the quantitative results could not explore the answers of why they were having unhealthy nutritional behaviors in the given context. Thereafter, I moved on towards qualitative inquiries to explore the greater understanding of the school community towards their real-world setting. This has reduced the potential bias and increased the credibility of the findings that come from the multiple methods (Bryers & Pitchforth, 2014; Creswell & Cresswell, 2018; Mahato et al., 2018; Tashakkori & Teddlie, 2010).

The Ethics of Sampling and Selection. Though the probability sampling and purposive selection are common in mixed-methods research design (Preissle et al.,

2015; Tashakkori & Teddlie, 2010), the present study did not strictly adhere to this provision since this study adopted improvised mixed-methods research design extending to the 'PAR mixed-methods intervention research design', which emerged during the methodological adjustment as guided by the pertinent research questions of this study. The number of participants for qualitative study were selected using judgmental criteria of the non-probability sampling, whilst the number of students for questionnaire survey was selected applying census method as the number of students for survey was small sized. The census method applied to this study enabled to generalize the findings of the whole population and the judgmental (purposive) sampling method enabled to gather rich data from concerned participants who could share their deeper understanding of the phenomenon during and after they involved in intervention activities. Using census and judgmental sampling methods underneath PAR mixed-methods intervention design can overcome the weakness of 'stand-alone method', traditional 'mixed-methods' and promotes social justice for transformative change (Mertens, 2007; Salehi & Golafshani, 2010).

The Ethics of Relationship. The degree of relationship between researcher and participants in mixed methods study varies considerably. In quantitative study of the present research, the survey method did not necessarily allow me to interact with the respondents, which in turn, maintained the bias of the researcher in the study, which might have created social desirability bias otherwise. To prevent social desirability bias, I used dialectical tool of the communicative action inquiry since I was approached with PAR methodology to interact with the research participants necessarily through the qualitative methods. The interaction between researchers and participants, in a mixed-methods study, is vital to unpack lived experiences of research participants and the meanings they ascribe to those experiences (Preissle et

al., 2015). To make the researcher-participants relationship more collaboratively, I used participatory methods such as dialogue conference, bridging-the-gap workshop, informal talks, *Chiya* and *Chautara Gaf*, and participatory classroom pedagogy. To maintain the ethic of research relationship, I engaged prolonged field work in the research site, I respected the socio-cultural beliefs, norms, values, way of living, and the practices of the participants, and I also followed principle of respect, anonymity, and beneficence. Being a PAR researcher, I strictly adhere to the ethics of social justice for change to maintain the research relationship.

The Ethics of Data Collection and Analysis. The mixed-methods research design combines various quantitative and qualitative data, which avoids methodological distortion by ensuring data-triangulation and complementary process. The mixed-methods design validates and authenticates the results of the study, along with giving just to the researched by involving them throughout the study (Finlay, 2006) following the bottom-up approach of the mixed-methods (Tashakkori & Teddlie, 2010). Though the mixed-methods research design offers the space of collecting and integrating the quantitative and qualitative data in a single study, the ethical issues are likely to emerge during data collection and analysis stages (Preissle et al., 2015). To minimize the ethical issues during the data collection, informed consent was obtained from the participants, their names were anonymized and/or pseudonymized. Moreover, I switched from formal mode of inquiry to informal interaction to obtain the qualitative data. Similarly, to minimize the ethical issues of data integration in the mixed-methods research, I used the joint display method to show quantitative and qualitative data together with in the table (Table 17) and evaluated the effectiveness of the intervention.

Study Site

The study site was the eastern Chitwan, located in the southwest part of Bagmati province. Chitwan lies in the central inner Terai region of Nepal covering the areas of 2,238.39 km² with a population of 579,984 (279,087 male and 300,897 female) people. Most of the people (70%) speak Nepali language with multiple ethnic groups such as *Tharu, Tamang, Chepang, Gurung, Darai, Bote, Dalit* as their first language, followed by a 0.520 Human Development Index (HDI) and 31.9 House Price Index (HPI) scores ([Chitwan District - Wikipedia](#)). The census report-2021 figures out that the current literary rate is 83.68 % (Central Bureau Statistics, 2078 BS). Chitwan district is a growing semi-urban area. In this setting, the lifestyle of people represents a mix of both rural and urban. Majority of people living here are predominantly farmers since they grow primary staple foods, cash-crops, seed-crops, and vegetables, along with animal husbandry and poultry farming (Paudel & Matsuoka, 2008). Chitwan is increasingly urban concerning transportation, including both surface and air services; market facilities; industry and factory; permanent buildings for accommodation; education facilities including schools and university; health services and facilities such as nursing homes, hospitals and medical colleges (District Development Committee Chitwan, 2014). The district is connected with the national and international lifeline communities through the metropolitan city, airport, east-west highways, world heritage national parks, and important religious pilgrimages.

The present study was conducted in a community school. The school lies in the *Khairahani* municipality, which is 2.5 km away in the North direction from the east-west Mahendra Highway from the *Chainpur Chowk*. The school is situated at the center of the community, where the police station, ward office, and health post lie

within a five-minute walking distance. There are three brick kilns around the school area within 500 meters. Moreover, many other production industries, such as the colour paint factory, pharmaceutical companies, biscuit factories, confectionery, and beer factories. These small to large scale industries have offered employment opportunities to many working-class people who live in this community. Many local people work here as daily wage earners in the production industries. Many people in this community have poor socio-economic status and poor access to education as they are mostly limited to earning their bread and butter. *Brahmin, Chhetri, Tamang, Gurung, Darai, Damai, Kami, and Chepang* are the major ethnic groups. Most of them (four-fifth) follow *Hindu* religion. *Nepali, Tharu, Darai, and Tamang* are the major languages spoken here. More than two-thirds of students represent *Janajati, Adhibasi* and *Dalit* community.

The school was selected purposively after consideration of the inclusion criteria set by the Rupantaran project and the criteria include: a) school be a co-educational, government-funded, multi-ethnic school; b) school having indigenous and disadvantaged groups of students; c) school having motivated teachers willing to engage in the action research; d) school having an active and functional SMC, PTA, and child/students' clubs; and e) a school having a suitable place for an Ecosan toilet as well as a place for school gardening activities.

Research Participants: Co-researchers of the Study

Research participants who are called co-researchers in this study were involved from the time of needs assessment to the implication of the co-constructed knowledge to solving the problems in practice setting (Acharya et al., 2020; Jacobs, 2016). Basic school level students from grades 1-8, their parents, school's child club members, basic schoolteachers, school leaders (HT, SMC, PTA, PAR committee

members), canteen service providers, local vendors and grocers, and the local farmers were the participants of the study (Table 4). Whilst students from grades 4-8, their parents, teachers, head teacher, school management committee, parents-teacher association, PAR committee members, school health and nutrition committee, school midday meal management committee, and school nutrition wall magazine publication committee worked as the co-researchers of this study. The research participants, particularly students and their parents who engaged in the needs assessment and the research participants who were involved in the outcome evaluation were different because most of the basic school students who were involved in the needs assessment in 2018 were already promoted to the secondary level at the time of outcomes evaluation in 2022. Therefore, this study compared the needs assessment and outcome evaluation results based on the entire school cohort, rather than comparing the results at individual level. The research participants were selected considering the study protocol of the Rupantaran project of TU. The total number of participants/co-researchers engaged in this study is shown in Table 4.

Table 4. *Total Number of the Participants/Co-researchers*

Participants/Co-researchers	Needs assessment in 2018	Outcome evaluation in 2022
Basic children (grades 4-8)	204	192
Basic schoolteachers	9	11
Basic children' parents	18	15
PTA members	7	7
SMC members	12	12
PAR committee members	21	10
Local farmers	-	4
Canteen service providers	1	1
Local grocers and vendors	-	3
Total	272	269

Data Collection Instruments, Tools, and Methods

There is no uniform standard for using particular methods of data collection under the PAR methodology. However, literature suggests that questionnaire, interview, focus group, participant observation, field notes with journal writings, and artifacts are the important methods to consider (Baum et al., 2006; Chevalier & Buckles, 2019; MacDonald, 2012; McNiff & Whitehead, 2002; O'Brien, 2001). The present PAR mixed-methods study used a wide array of data collection instruments, tools, and methods that I explain below.

Instruments for Data Collection

Several instruments were used for data collection in this study. A branded LCD digital weighing scale with 0.00 kg and height measuring tape were used to measure the weight in Kg (kilogram) and height in cm (centimeter) for anthropometric measurements. Anthropometric measurements (weight and height) were obtained to determine the nutritional status of children. The anthropometric measurements were conducted during the needs assessment study in 2018 and outcome evaluation study in 2022. The nutritional status was analyzed following the Anthro plus standards guideline of WHO (2010). Teachers and child club members participated in the anthropometric measurements after they became trained at school, where the professional trainers facilitated this training on behalf of the Rupantaran, TU.

Besides, I used a portable and handy audio tape recorder to capture the participants voices during the focus group discussions, in-depth interviews, informal interactions, group discussions, dialogue conference, and bridging-the-gap workshop. Similarly, a smartphone and DSLR camera were also used to capture still pictures and motion videos. I used my personal computer (PC) and data storage hardware to save

the captured photos and video to generate the data. I also used diaries and ball-point pens to jot down the field notes and other significant information in the field.

Data Collection Tools

A couple of data collection tools were used to collect data required for this study; I explain them below.

Questionnaire. A self-administered close-ended structured questionnaire was used to collect background information, food and nutrition knowledge, attitude towards dietary behaviors, and school meals consumption behaviors of children from grades 4-8 during needs assessment and outcome evaluation. The first section of the questionnaire contains background information about students. The second section is about food and nutrition knowledge. The third section measures attitude in 3-point Likert scale (agree, undecided and disagree) as students got confusion to understand 5-point scales that I reflected from the pretest. And the final section includes school meal consumption behaviors (Appendix A and B). A similar set of questionnaires were used for needs assessment and outcome evaluation. However, some items in knowledge and practice sections were added for outcome evaluation study. The pre-tested questionnaire was administered by getting help from the class teachers. Proper instructions were provided to students before they filled up questionnaires. During the questionnaire fill up time, fourth to fifth grade students received instruction from the teachers to complete the form, whilst sixth to eighth grade students completed the forms without seeking help. Students filled up the questionnaire in the natural setting of their classroom after they got information regarding how to fill up the forms. Besides, a set of self-administered close-ended as well as open-ended structured questionnaire (Appendix C) was also employed among the basic teachers to collect their background information and pedagogical experiences of the classroom teaching.

24-hour Food Recall Form. A 24-hour food recall form, also called as 24-hour food recall diary, food diary, food log, and food log worksheet (Ortega et al., 2015) was used for both students and their parents to assess their daily meals consumption behaviors at home. For this purpose, each student from grades 4-8 filled out the form (Appendix-D) in their classroom during needs assessment and outcome evaluation studies. Whilst we (PhD researcher and grade teachers) reached each student's home to get the form (Appendix E) filled up from their parents. Similarly, to monitor students' school meal consumption behaviors, we (Researcher and teachers) visited each class after the lunch break and asked them to fill up the school meal consumption logbook (Appendix F) everyday with the name of snacks they consumed for five consecutive days during needs assessment and outcome evaluation. Students completed a weeklong logbook by writing the name of the snacks they consumed.

Interview and Focus Group Guideline. I employed the guideline as the principal tool to collect qualitative information. I involved the school community in advance to collect their opinions regarding the issues to be interviewed and discussed .in the focus groups and interviews. Based on their feedback, I developed implemented the guidelines for the interviews and focus group discussions (Appendix G-K).

Site Artifacts. Artifacts are important sources of data in (participatory) action research as they show the changes in practice (McNiff & Whitehead, 2002) and speak a thousand words since they are the metaphor of meaning. They reveal the message to the audience regarding the situation and performance of the people who are involved in the study (Holm, 2014). During the study, I have collected a wide array of site artifacts (Duff & Talmy, 2011) which include school nutrition policy and program document, text books, pieces of writing used in school nutrition wall magazine, flex

prints, school calendar, canteen menu charts, meeting minute copies, school meal observation log book, participant-generated texts including chart papers, drawings, photographs, artwork, nutrition poem and songs, and worksheets. The use of artifacts helped to explore the rich information of the research context and make a thick description of the writings.

Data Generating Methods

Generating the qualitative data is time a consuming process, which demands a longer stay in the field, naturalistic field environment, and cultural competencies with interview expertise (Flick, 2009). I spent a long duration in the field to understand the social interactions of people and make meaning of the interactions. In so doing, I talked to people, walked to them and lived together (Flick, 2019). I used multitude methods to generate the data, which helped to reduce the social desirability bias since multimodal methods enabled me for constant comparison of the results within the groups and/or among the sub-groups to check whether the information are based on their true feelings (Grimm, 2010).

Survey. The survey method was used to gather a large portion of quantitative information from the basic school students to collect background information, food and nutrition knowledge, dietary intention and attitude, school meal consumption, and hand washing practice. The self-administered close-ended structured questionnaire was used for survey in needs assessment and outcome evaluation.

Focus Groups. Focus group discussions are an effective method within a qualitative study in the field of health education and promotion. They determine the needs for program development and evaluate the program by involving a small group in discussants, ideally 8-12, in the facilitated discussion session I used focus group as an idea-generating tool for action plan development. Participants' divergent

viewpoints are valuable in PAR and all participants have equal right to share their own opinions and counter-opinion (MacDonald, 2012). Keeping this notion in mind, I encouraged all the participants to be active and I also captured their non-verbal cues like feelings and facial expression during the discussion. The group of students, their parents, teachers, school meal management and supervision committee, and school leaders (HT, SMC, PTA, and PAR committee members) were involved in the focus group. The focus groups were conducted among the cohort group. For instance, in the focus group of students, two groups were made representing one group of boys and another of girls. The guideline for focus group was developed collaborating with the co-researchers before the focus group was conducted (MacDonald, 2012). I, with the help of one field researcher who took the field note, had conducted five focus groups in needs assessment study and ten focus groups in outcome evaluation study. Table 5 depicts the detail of focus groups conducted to this study.

Table 5. *Detail of FGD Conducted in Needs Assessment and Outcome Study*

Needs assessment study (2018)		Outcomes evaluation study (2022)	
Name of focus group	No. of participants	Name of focus group	No. of participants
FGD with grades 4-5 students	8	FGD with grades 4-5 students	8
FGD with grades 6-8 boys	9	FGD with grades 6-8 students	10
FGD with grades 6-8 girls	9	FGD with grades 6-8 students	10
FGD with teachers	9	FGD with students involved in school nutrition wall magazine	4
FGD with SMC, PTA, and PAR committee	6	FGD with teachers	8
		FGD with teachers	8
		FGD with school meal management and supervision committee	6
		FGD with SMC, PTA, and PAR committee	10
		FGD with grades 4-5 parents	7
		FGD with grades 6-8 parents	8

Interview. Interview is an effective method preferred to use in PAR to unfold the participants' lived experiences in their practice setting and find out their divergent perspectives (MacDonald, 2012). I employed face-to-face interview to generate qualitative information from the HT, teachers, students, SMC chair, ward chairperson, local farmers, canteen service provider, and local grocers and vendors. However, due to the global suffering of Covid-19, I customized the mode of some interviews. For instance, I had taken a virtual mode of interview with HT, SMC chair, and one basic schoolteacher via messenger video call. In addition to the field notes, I audio-recorded all the interviews to capture the information they provided. Table 6 portrays the details of interviews.

Table 6. *Detail of Interview Conducted in the Study*

Needs assessment study-2018		Outcomes evaluation study-2022	
Name of interview	Participants No.	Name of interview	Participants No.
Interview with headteacher	1	Interview with headteacher	1
Interview with teachers	2	Interview with teachers	4
Interview with SMC chairperson	1	Interview with SMC chairperson	1
Interview with PAR committee	1	Interview with PAR committee	1
Interview with ward chairperson	1	Interview with ward chairperson	1
Interview with canteen service providers	1	Interview with canteen service providers	1
Local farmers	2	Interview with local grocers and vendors	2

Informal Conversation. After conducting a series of structured interviews and focus groups following the topic guide, I reflected that I should move ahead from the ‘official story of the participants’ (Roer-Strier & Sands, 2015, p. 258). Thus, I switched my role and moved towards an informal conversation—also called ‘unstructured interview’ and ‘informal interview’—in a more natural and less

artificial environment to expand and enrich the contextual information (Swain & Spire, 2020). Although the use of informal conversation in qualitative and mixed-methods studies date back to long, they are rarely used by the qualitative researchers (Swain & King, 2022). Further, Swain and King (2022) contended ‘informal, or unstructured conversations formed the basis of many early ‘classic’ ethnographies from anthropologists such as Margaret Mead (1928) and Bronislaw Malinowski (1922) and later they became popular in sociology and social science fields’ (p.3).

Informal conversation revealed as powerful method concerning to unfold the in-depth information that went beyond the official story since informal conversations were flexible in terms of place and time. Unlike the structured interviews, I was able to obtain in-depth information from the co-researchers opting the informal conversation since it could be conducted outside of the workplace where people can allow them to unfold their free flows of feelings and experiences. The shared feelings, ideas, opinions, and the experiences of the co-researchers in the time of informal conversation seemed to be more realistic and contextual compared with structured ones.

Sometimes informal conversations become only the way to generate qualitative data (Swain & King, 2022). For instance, having an official interview and focus groups with teachers and leaders seemed to be impracticable to me since they had a tight schedule during the school hour, where I could not conduct structured interviews and focus groups with them. I came to know that informal conversations could ease the co-researchers to share their free flows of feelings, opinions, and experiences outside of the school settings. The informal conversations were not pre-planned and informed, nor were they recorded and followed by the interview guide. Moreover, informal conversation reduced the power relations between and among the

co-researchers by allowing participatory conversation. I had an informal conversation with the co-researchers in the staffroom, library hall, canteen, and school's ground. Besides, many informal conversations were held in the *Chiya Pasal* and *Chautara*. Some conversations were also held in their homes, farms, and their local venues. Though I did not audio-record the conversations, I materialized the conversations by writing field notes every day. The informal conversations allowed me to enrich the participatory process of needs assessment and data collection.

Participant Observation and Field Notes. I also used participant observation and field note writing as a qualitative method of data generating. Social interactions are a constituent part of participant observation in qualitative study (Swain & Spire, 2020). These social interactions undergoing participant observation is commonly employed in PAR to generate the data from the field (Baum et al., 2006; McNiff & Whitehead, 2002). In the present study, I used participant observation followed by writing field notes while being immersed in the field by seeing, being, and becoming with the phenomenon. During the observation, all the sense of seeing, being, and becoming were captured through the field notes (Flick, 2009). Since PAR is highly dependent on context, taking field notes provided me a rich contextual information for data analysis along with my field reflection (Creswell & Cresswell, 2018; Phillippi & Lauderdale, 2017).

Based on participant observation inquiry, I maintained comprehensive field notes about the study context with critical reflection detailing the major events that occurred in the field every day (Phillippi & Lauderdale, 2017). Though I did not record field notes of the interviews and focus groups in the time of needs assessment since I was not aware of taking fieldnotes at the time, I recorded the field notes of each interview, focus groups, and informal conversations immediately after each

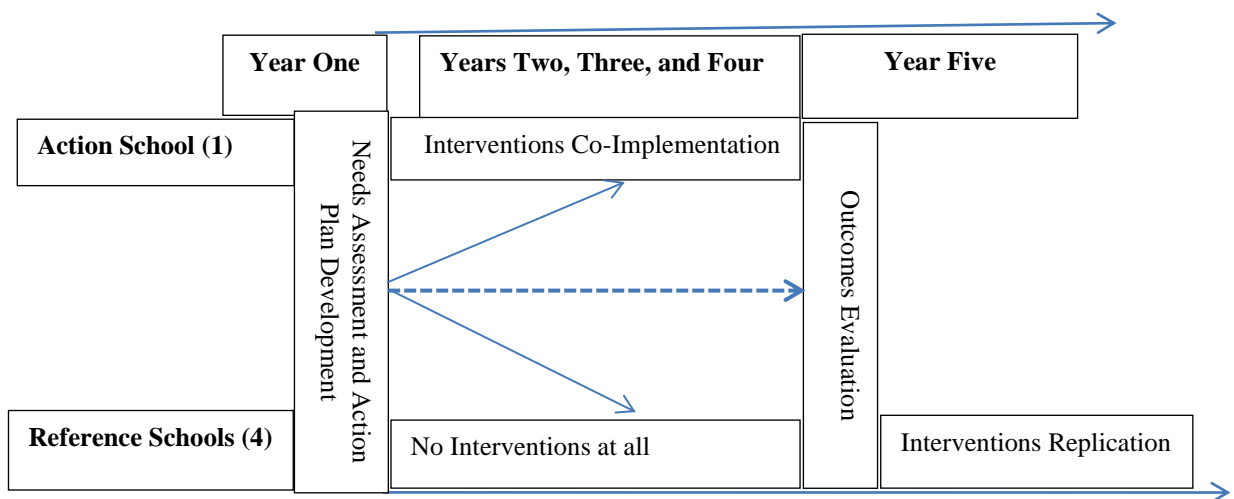
event. I also shared my field notes with the co-researchers so that they could crosscheck my writings. My prolonged field work within the four academic sessions of the school (Appendix L) allowed me to write up field notes being in the naturalistic environment (Schindler & Schäfer, 2021; Unluer, 2012). I maintained writing field notes and diaries by observing the environment and social interaction from the beginning of my field works. At the beginning, I used a notebook and ball pen to write up the field notes. But after completing almost one academic session, I reflected that using a laptop would be more convenient and economical to write up the field notes. Writing field notes seemed powerful evidence to reflect upon the major events that had happened in the field, particularly, while writing the chapters. Moreover, the data obtained from the field notes encountered the interview and focus group discussion offering contextually rich data to this study (Creswell & Creswell, 2018). In addition to this, since research participants of this study were the co-researchers, some of them also wrote scratch notes and journal writings. These scratch notes and journal writings enabled me to understand the research phenomenon through emic perspective.

Dialogue Conference. I used dialogue conference as a qualitative method to elicit a wide array of ideas and arguments of the school community regardless of their power and position. Ahmad et al. (2016) suggest using dialogue conference as a method to uncover the gap of traditional ways of problem-solving through research in PAR study. Dialogue conference is a participatory method of needs assessment, data collection and evaluation of the effectiveness of the program. It allowed me exchanging ideas and arguments among the participants based on mutual participation's guiding principles (Gustavsen et al., 2001). I employed this method while mapping out intervention action plan.

Intervention Strategies

This school-based nutrition education intervention approached by PAR methodology was conducted into four interlinked phases such as needs assessment, action plan development for intervention, intervention implementation, and outcomes evaluation. Though this study was intended to be completed within three consecutive academic years, it took five years to complete. Figure 9 outlines the schematic overview of the PAR intervention strategies.

Figure 9. *Schematic Overview of Intervention Strategies*



Phase First: Needs Assessment Phase

This is the problem identifying phase, which involved the school community orienting themselves on the school nutrition-related issue. It provided the school community with opportunities to increase their levels of awareness of the complexities of their surroundings and/or situational context to identify the school health and nutrition-related problems. The (research) problem is, thus, co-identified and co-defined. The needs assessment study was conducted in four schools in Chitwan and one in Nawalpur district. Based on needs prioritization process in five schools, one school was selected as the action school for the intervention and the

remaining four as the reference schools. The needs assessment study was over within the first six months of the year first i.e., 2018.

Phase Second: Planning Phase

This phase involved co-designing the intervention, action or change process, which was co-created together with the action school research stakeholders. Once the needs assessment was over, the research problems were narrowed down by involving the research stakeholders. Through bridging-the-gap workshop, the intervention action plan was mapped out (Chapter Four). The action plan was developed within the next six months of the year first i.e., 2018.

Phase Third: Intervention Phase

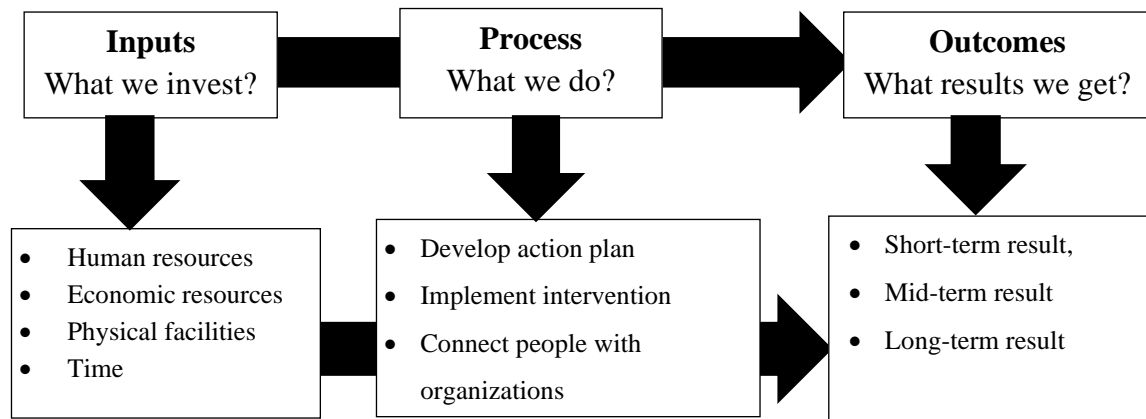
This is the core phase of the study consisting of three components (PAR cycles) of the intervention. They are 'Sensitization and motivation', 'Classroom-based NE' and 'Supportive school environment'. These intervention activities were implemented in the recursive cycle of PAR rather than in linear mode. Though it was anticipated to complete the intervention activities in one academic year (2019), it took three years (2019-2021) due to the global spread of Covid-19 pandemic. The details of the intervention activities are explained in chapter five.

Phase Fourth: Evaluation Phase

It is the last phase of the study. Evaluation is the continuous process in PAR, as it reveals in the form of reflection. The outcomes evaluation of this study was carried out in three different levels: short term, midterm, and long term. Short term evaluation was undertaken once the session activity under one PAR cycle was over. This immediate evaluation is called reflective evaluation in PAR, which helped to re-plan the subsequent session activities of the next cycle. Midterm outcomes evaluation was held after the completion of the second PAR cycle. And finally, long term

evaluation was performed after completing the entire PAR cycle in 2022. The outcomes evaluation was undertaken based on the theoretical assumption of the logical model suggested by Contento (2011). It can be presented in Figure 11.

Figure 10. *Logical Framework Model to Evaluate the SBNEI*



Data Analysis and Integration in PAR Mixed-Methods

Data analysis involves the process of inspecting, collecting, transforming, and modeling to discover the useful information, inference, and supporting conclusion (Creswell & Cresswell, 2018). Since this study utilized PAR mixed-methods design, I explain quantitative and qualitative data analysis procedure separately, followed by data integration strategies.

Quantitative Data Analysis

After collecting the survey data, they were carefully checked, rechecked, edited, coded to reduce the gravity of error, identified the incompleteness of the forms if any, checked duplication, and anonymized the personal identity of the respondents. The edited data were entered into the SPSS version 26 by creating a codebook. The rate of recurrences was tracked for all the variables. Where any uncommon records were found, it was rechecked comparing with the original records. Regarding open-ended items of the questionnaire, all categories were organized and re-coded before the data entry. Before generating the cross tables and custom tables, I checked the

data by generating the descriptive frequency tables and edited the missing and errors of the data entry verifying them with the survey questionnaires. Cross-tabulations were generated showing the relationship between independent and dependent variables and they were further re-categorized as per the necessity.

School consumption was one of the dependent variables of this study. Collecting the data about junk food consumption, students were asked what they brought as school snacks, which were categorized as homemade foods, canteen prepared foods, seasonal fruits, salad, and junk foods. Subsequently, homemade foods, canteen prepared foods, and seasonal fruits were recoded into 'no junk food consumption' and 'consuming junk foods' remained the same. The attributes were recoded into the dichotomous categorical scale, where 'consuming junk foods' was coded as 1, and 'no junk food consumption' was coded as 0. Main meals consumption at school, and snacks consumption at school were the other dependent variables. These variables had two attributes (dichotomy: yes and no).

Age, sex, knowledge of food and nutrition, attitudes towards healthy eating, educational outcomes in the last year's exam, type of family, sharing knowledge of food and nutrition with classmates and teachers, type of home, commute to school, availability of a school canteen, membership in the school club, grade level, parents' occupation, parental level of education (but it was missed to include during needs assessment time), religion, and ethnicity of the students were the independent variables. All independent variables were recoded into a categorical scale with two or three attributes.

Students' knowledge of food and nutrition was measured based on a scale comprised of ten items. The items were developed based on the contents included in the nutrition education curriculum for basic school education (Government of Nepal,

2063 BS) and food consumption guidelines recommended by the Government of Nepal (2012). Each item consisted of four response options, where only one was the correct. If students chose the correct answer, it scored '1', whereas an incorrect response was scored with '0'. Composite scores for the knowledge scale were calculated based on the above procedures. Following the mean score, the students were further categorized into two sub-groups: students with below mean score was labelled as 'low nutrition knowledge' and 'the students with above mean score was labelled as 'high nutrition knowledge'. This categorization allowed to investigate the associations between food and nutrition knowledge and junk food consumption practice. Similarly, students' attitude towards a healthy eating behavior was recoded into positive and negative categories, calculating a composite score based on 10 statements and using a three-point Likert scale ranging from 1 (agree) to 3 (disagree), with a higher score indicating negative attitudes. The nutritional status of basic children was measured utilizing anthropometric measurements based on the z-score of weight for age (WAZ), z-score of height for age (HAZ), and z-score of BMI for age (BAZ). HAZ, WAZ, and BAZ were taken through direct anthropometric measurement of bodyweight and height and calculated by using WHO's Anthro plus 1.0.4 software. The results were categorized into different levels: normal ($-1SD \leq z \leq +1 SD$), moderate ($-2 SD \leq z < -1 SD$; or $+1 SD < z \leq +2 SD$) and sever ($z < -2 SD$ or $z > +2 SD$) based on WHO's guideline of determining nutritional status (WHO, 2010).

Univariate analyses, including frequencies, central tendencies, and dispersion measures were carried out to describe students' background characteristics. Bivariate analysis, such as the chi-square test, was used to determine the association between the dependent and independent variables, and multivariate analysis such as logistic

regression was employed to see the net effects of independent variables into the dependent ones.

Qualitative Data Management and Analysis

As qualitative data management and analysis involves the meaning-making process of understanding a phenomenon of the study (Creswell & Creswell, 2018), I followed the stages of the qualitative research practice. Qualitative data analysis begins from preparing and organizing the data for analysis, then reducing the data into themes through the process of coding and condensing the codes into categories and themes, and finally representing the data in the form of quotation, dialogue

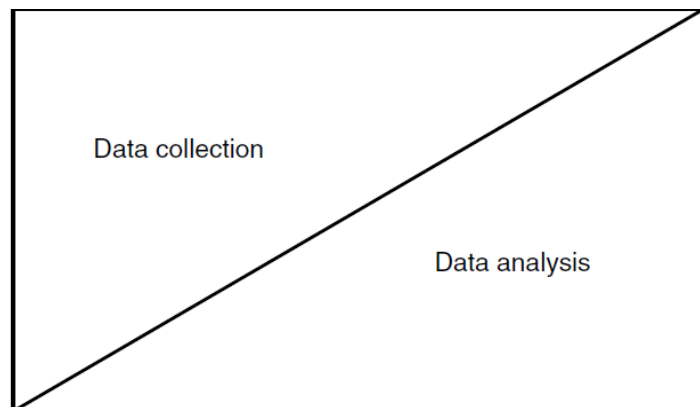
conversation, and vignette story (Creswell & Poth, 2018; Pope & Mays, 2020).

Qualitative data, in this study, included individual's lived experiences, their

action, and the pictures which reveal the action of the people in their practice setting. I followed an iterative approach which is referred to as an interplay between the collection of the data from the field and data analysis. In so doing, I applied back and forth (non-linear) strategy of data analysis, also called as 'hermeneutic cycle'(Kristiansen, 2020). This can further be well depicted through the figure 12 (Pope & Mays, 2020, p. 114).

After collecting the qualitative data, I transcribed them without losing the original essence of the audio-recordings in local language (Nepali). Then, I translated the documents into the English before I uploaded the file documents in my PC after

Figure 11. *Continuum of Data Collection and Analysis*



installing the Atlas.ti, a computer-assisted qualitative data analysis software (CAQDAS), creating a project name of [Yadu PhD: SBNEI].

Interpretive Phenomenological Analysis. I used interpretive phenomenological analysis (IPA) approach to analyze the qualitative data (Pope & Mays, 2020; Van der Merwe & Habron, 2020), which is closely associated with dialectical hermeneutics described by Jurgen Habermas (Forte et al., 2017). This approach allows the PAR researchers to understand how the research stakeholders make the sense of their lived experience while co-working with the researcher participants (Pope & Mays, 2020). Moreover, IPA approach explicitly involves double layer of interpretation, also called ‘double hermeneutic’, where a PAR researcher can add his reflective accounts on the interpretation of the events and/or lived experiences of the participants. Following the IPA approach, I have analyzed the qualitative data in three underlying phases viz initial reading, critical reading, and appropriation (Forte et al., 2017; Pope & Mays, 2020), which is portrayed in the Table 7 below.

Table 7. *Data Analysis Procedures Using IPA*

Phases of IPA	Description of phases	Working steps in ATLAS.ti
First phase: Initial reading	Getting familiar with the data by reading the documents	Created the project Added documents and grouped them Read the documents in a part and whole
Second phase: Critical reading	Identify primary codes through deductive or inductive ways	Critically read the text, selected data segments and created the codes either through applying the existing codes or new codes Wrote memos and comments if necessary Reviewed the coded data, split, merged and renamed them necessarily
Third phase: Appropriation	Theme development by merging the codes in the same families for meaning making process.	Grouped codes (theme generation) Refined themes necessarily Wrote memos and comments Linked quotations, codes, and themes Extracted code book reports and saved in the PC Analyzed the data and involved in report writing

I analyzed qualitative data manually in the needs assessment stage since I had no idea of handling the CAQDAS. I used matrix analysis as described by Miles and Huberman (Pope & Mays, 2020) and I developed a thematic framework based on the topic guide set in the interview and focus group. After doing this, I got immersed in the raw data to get familiar with the text. Then after, I labelled the data segments assigning them into the respective thematic framework using the spreadsheet following the deductive approach. Once I kept the data segments into the thematic framework using a matrix table, the data were analyzed and interpreted integrating them with the quantitative data, which I explain in below section.

Data Integration Strategy

The integration of the quantitative and qualitative data was ensured based on the research questions in multi-directional ways and the methodological orientation i.e., mixed-methods intervention design under the PAR methodology. The results obtained from the quantitative tools were integrated into the information obtained from the qualitative methods. The integration of data was ensured into the two stages of the study. At first, the data were integrated in the needs assessment for program development stage (Chapter 4), where I presented the quantitative results in the table and described them with the help of statistical analyses. After doing this, I presented the chunk of excerpts (quotation, dialogue conversation, and Vignette) of the qualitative data under the themes in the subsequent paragraphs and/or sub-sections. Later, the integration was ensured following the ‘side-by-side comparison approach’ (Creswell & Cresswell, 2018) and joint displays method (Fetters, 2020) under the convergent parallel model of mixed-methods design. The same strategy was employed to integrate the quantitative and qualitative data in outcome evaluation of the program (Chapter 6). Whilst no data were integrated in the implementation of the

intervention stage (Chapter 5) because this chapter has been developed using only qualitative data. In the discussion chapter, the quantitative and qualitative data were integrated by comparing the results of two databases followed by theorizing the results using contemporary empirical literature and relevant theories (Chapter 7).

Table 8 displays data integration strategies used to the mixed-methods participatory study design.

Table 8. *Data Integration Stages and Strategies in PAR Mixed-Methods Design*

Chapters' Name	Integration stages	Integration strategy
Chapter 4: Needs assessment	Quantitative analysis (Separate) Qualitative analysis (Separate) Integration of data under the convergent parallel design	Side-by-side comparison approach
Chapter 5: Program development and implementation	Qualitative analysis only (thematic analysis)	No integration of quantitative and qualitative data
Chapter 6: Outcomes evaluation	Quantitative analysis (Separate) Qualitative analysis (Separate) Integration of data under the convergent design	Side-by-side comparison approach Joint displays method
Chapter 7: Discussion	Comparing and contrasting (constant comparison) quantitative and qualitative results	

Quality Standards of the Study

Since this study utilized mixed-methods participatory design, I maintained the quality standards of both quantitative and qualitative research practice. This integralism perspective enabled me to enhance the quality standard (credibility) of the study. Participatory validation, a process of validating the study findings with participants and other societal stakeholders, was utilized to ensure the validity of the present study (Hennink et al., 2020).

Validity of the Quantitative Study

The validity is central concept within quantitative research which is based on measuring what it was anticipated to measure (Willis, 2007). Validity identifies the degree of correlation between the study's outcomes and the developed criterion of the

study. In this study, the questionnaire was reviewed and refined based on the research purpose and questions to ensure the content and face validity. It was then modified and reviewed based on the existing literature and suggestions of the supervisory team of the TU and NMBU. After doing this, the survey questionnaire was pretested in a nearby school, which was not included in the study. Pre-test of the tools was done to gather information on their understandability, time consumed by each question, and consistency among related variables and acceptability. Based on the pre-test, necessary modification was made. Moreover, to minimize the social desirability bias, students' responses were kept confidential and/or maintained anonymity of them. Moreover, no strange people were allowed during the survey (Grimm, 2010).

Rigour and Trustworthiness of the Qualitative Study

Rigour and trustworthiness are the methodological soundness and adequacy of the study (Creswell & Miller, 2000). Giving credible accounts that represent the participants' realities of the social phenomenon is an important part of maintaining the quality standard of the qualitative study (Creswell & Miller, 2000). In the PAR, 'truth' is deeply rooted in the historical and socio-political context of the study (Unluer, 2012). In line with this, Greenwood and Levin (2007) define workability, seeking the solutions for context-specific research problems through the integration of action and reflection, to gain credibility for the (participatory) action research. Credibility and validity, alongside trustworthiness in this study, were maintained as the 'quality standards' (McNiff & Whitehead, 2002). As Creswell and Miller (2000) and Finlay (2006) articulated, I followed the criteria of credibility, transferability, dependability, and confirmability to maintain the quality standards and trustworthiness of the study. Table 9 provides a schematic overview of maintaining the quality standards of this study.

Table 9. *Methods Used to Ensure the Quality Standard and Trustworthiness*

Criteria	Methods
Credibility (truth-value of the study)	Engaged in prolonged field work for four academic years. Worked with school community through collaborative action inquiry. Involved co-researchers in the member checking. Triangulated data from multiple methods: interviews, focus groups, field notes. Allowed researcher's reflexivity in writings.
Transferability (applicability of the results)	Provided a thick description of the research context in writings. Involved co-researchers from needs assessment to outcomes evaluation of the study.
Dependability (reliability of the results)	An audit trail was established by submitting journal writings to the project office for the documentation purpose of field work evidence. Ensured transparency in the writings. Included data from multiple methods: interviews, focus group discussion,
Confirmability (objectivity)	observational field notes. Demonstrated critical reflection and self-reflexivity in the writings.

Credibility. I ensured the credibility (truth-value) of the study through various ways. For instance, I spent rigorous field work spending four academic years in the school. Working with the school community 'day in and day out' for a long period of time contributed to building trust with the stakeholders and establish rapport and participants were comfortable sharing information in a natural setting. The information obtained in the natural setting provided credible accounts of the study that could be acceptable in wider social settings (Creswell & Miller, 2000). Being in the field over a time as a PAR researcher, I solidified the evidence of field comparing one source of data i.e., interview with another source like observational field notes. By using such pluralistic perspectives, I was able to collect a wide array of lived experiences about how the school community perceived the world.

As Creswell and Miller (2000) argue '...credible data come from close collaboration with participants throughout the process of research' (p. 128). In so doing, I allowed my research participants to be actively involved as the co-researcher(s). I collaborated with them in multiple forms of meaningful participation throughout the study. For example, I provided school community with opportunities

to increase their levels of awareness of complexities of their surroundings and/or situational context to identify the problems, worked together to map out the action plan for interventions and implemented intervention activities together. I worked with them sharing my professional qualities, which further helped to maintain the power relations to each other. This kind of power sharing relationship leveraged the credible accounts of the study.

Transferability. We (PhD co-researcher and school community) worked on collegial environment creating a space for probing to foster the hidden and deep-rooted ideas to maintain the thick description of the research phenomena. In so doing, I used analytical tools to describe the results. I also used narrative accounts, anecdotes, classroom vignettes, performative (art-based) genre, and social semiotics, and pictures which depict the multiple realities for representing the world. The analogies represented the phenomena as the combinations of person, context, and event, which further explained the story of the human conditions to offer better sense to the readers. And dialectical logics facilitated me to represent many contrasting realities upholding contradictions together, giving equal consideration like two sides of a single coin (Taylor et al., 2012).

Dependability. I maintained dependability (consistency) through the conversion of data collected through varied sources and multiple perspectives (Doyle et al., 2016). In so doing, the triangulation method was adopted. I used different sources of quantitative and qualitative data, which enabled me to search for convergence of juxtaposed nature of data to compensate the data collected from a single method. The quantitative data explained the situation in numbers and qualitative explored the lived experiences and deeper insights of the co-researchers.

Confirmability. I maintained confirmability (neutrality) through offering multiple sources of data and being reflexive in-text writings (Creswell & Miller, 2000) and getting my co-researchers involved in every stage of the PAR cycle from the time of need assessment to the outcome evaluation of the intervention. Further, I argue that demonstrating critical reflection and self-reflexivity throughout the phases of the study also optimized the confirmability of the study.

Within the framework of the PAR methodology, I followed some other criteria such as praxis, pedagogical thoughtfulness, and reflexivity to maintain the quality standards (credibility) of the study and I explain them in the following sub-sections.

Praxis

PAR is a highly rigorous process that goes beyond the ‘cook book’ methods and becomes a form of praxis (McNiff & Whitehead, 2002). The present study resulted in harmonious relationship between theory and practice to form praxis in the practice setting. Self, as a co-researcher of this study, was involved regularly together with the co-researchers from the time of needs assessment to the outcome evaluation of the study. In so doing, I reflected upon the actions enquiring myself about our practices since reflection on action is inherent part of the action research methodology (McNiff & Whitehead, 2002), which further develops a form of praxis. I used a communicative action inquiry to empower the school community. My endeavour was founded on Freirian principles, a philosophy of praxis, in which theory was formulated through action and further refined it by reflective practices, is called praxis (Denzin & Lincoln, 2018; Willis, 2007). As Lather (1986) defines research as praxis, a democratized inquiry process characterized by negotiation, reciprocity, and empowerment, I frequently negotiated with my co-researchers to orient them to consciously aware of their real world problems, develop action plan, implement it to

get the solution and reflect upon if it really works to solve the problem. The ideas of reciprocity between the co-researchers offered with productive fieldwork for a balanced pattern of sharing ideas among the co-researchers.

Pedagogical Thoughtfulness

Transforming children's nutritional behaviors through participatory nutrition education approaches (these innovative pedagogical approaches are vividly explained in chapter five) is one of the main research agenda of this study. The participatory pedagogical approaches were implemented by active involvement of the school community, particularly teachers, students, parents, and the local farmers. After they involved in the participatory classroom environment, I encouraged teachers to reflect critically on their own complicity in uncritically reproducing pedagogical thinking and practice (Taylor et al., 2012), called pedagogical thoughtfulness (Van Manen, 1991). It is a way that grow, change, and deepen themselves due to reflecting on the pedagogical actions (Molla & Nolan, 2020). In so doing, I shared my field notes with the teacher co-researchers about the actions we spent together. Teachers who participated in classroom teaching reflected on replicating participatory classroom teaching methods in their classroom setting. In the subsequent days, some of the teachers instantly implemented participatory classroom practices in their mathematics and science classes. In addition to this, they made a team of students to publish the school nutritional wall magazine, where students published self-generated creations through the magazine. They have also linked nutrition education with school gardening activities and school feeding programs (Chapter 5). I believe that transformative pedagogical thoughtfulness seems to be a hallmark to ensure the quality standard of this study.

Self-Reflexivity

Self as a (co)researcher of this study, I demonstrated critical self-awareness and understanding of the complexity of my surroundings and/or situatedness (Rai, 2017). I continually reflected upon my way of seeing, being, and becoming throughout the study. I believe that criticalism allowed me to adopt critical reflexivity as a key quality standard of the study. I continually questioned my thinking, contested beliefs and assumptions, taken for granted positionality, and the ways they connect to my action as a paradox of insider and outsider perspectives. As an outsider, I reflected on behalf of PhD researcher and as an insider, I acted as a co-researcher to contextualize SBNEI activities to transform students' nutritional behavior. As a researcher, I demonstrated critical self-awareness and understanding of the complexity of my research world (Taylor & Medina, 2013). I generated and interpreted the lived experiences visible to readers and reflected critically upon my evolving false consciousness throughout the process of communicative action inquiry. I have articulated my personal lived experiences, beliefs, values, and interpretations of the world. I was reflexive on my orientations, norms, and values shaped by my familial, socio-cultural, professional context. I understood the self through writing accounts framed by personal reflexivity and others through examining their perceptions undergoing communicative action inquiry. The below section allows the readers to understand my multiple positionalities and roles while undertaking this PhD project.

Figure 12. *Image of Self-Reflexivity*



My Positionality and Role in the Study

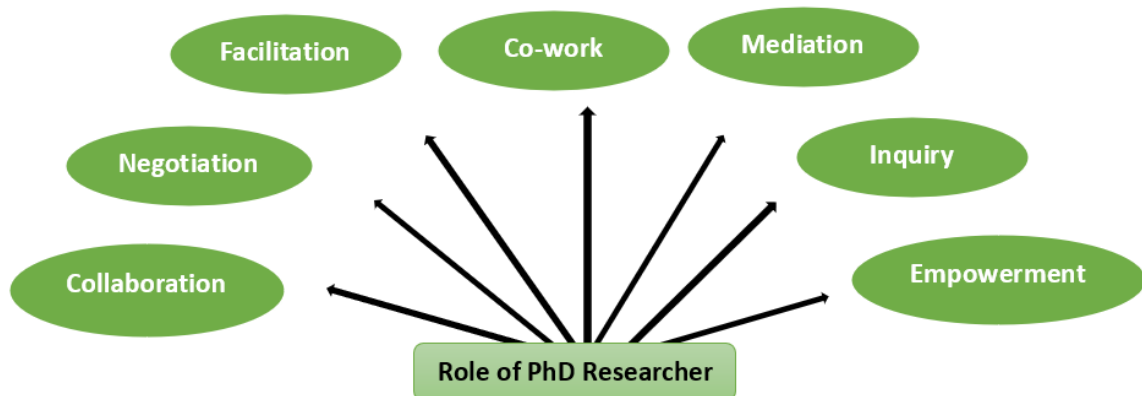
Before I immersed myself in this study, I was not fully aware of my multiple identities that I embodied. Once I became aware of it, I found myself as: a PhD researcher, a full-time faculty of the TU, PhD fellow researcher of NORHED Rupantaran, a curricular resource developer (particularly co-author of school and university level health education and promotion related textbooks and reference books), a Brahmin, a cultured vegetarian masculine family member, and an outsider of the research context. My taken-for-granted identities did not allow me to box out from the potential social desirability bias unless I became transparent. As a result, I tried my best to bracket all these entitlements through collaboration with the research stakeholders by performing multiple roles as necessitated. Moreover, since this study employed multi-paradigmatic space within a PAR mixed-methods research design, which assumes that researcher(self) should have multiple roles within the socio-cultural context (Rajbanshi & Luitel, 2020). Though I was not philosophically aware of understanding the multiple roles of the PAR researchers before I immersed into the field, I was involved to perform multiple roles at different stages of the study based on the complex nature of the research agenda. Though I am a lead researcher of this study, where my views, opinions, experiences, and the practices are subjected to influence the study, I believe that the multi-paradigmatic space offered me to bracket potential social desirability bias.

From the very beginning of my field work (needs assessment study) I was oriented with viewing the research context through straightforward postpositivist (objective) worldview. As a result, I observed the research context with hypothetico-deductive worldview. For that, I used structured questionnaire and non-participant observation tool to understand the world. This kind of straightforward role did not

allow me to understand the contextualized social interaction of the school community. I realized this when I engaged with the school community to prioritize the needs. This kind of epistemological paucity encouraged me switch my role towards viewing research agenda with interpretivism worldview. As a result, I followed “open-ended research design process that allowed me to use emergent research questions, inquiries, and reporting” (Taylor et al., 2012, p. 378). In so doing, I talked, walked, and lived with the research stakeholders (Flick, 2019) to understand their thoughts, beliefs, and values associated with social action through interview, focus group, informal conversation, and participant observation. Though interpretivist worldview allowed social interactions to understand the thoughts, beliefs, and values of the stakeholders, it could not allow me to understand how the power relations and socio-cultural context shape their thoughts, beliefs, understandings, and practices. This kind of epistemological gap encouraged me to switch my role towards viewing the research agenda with a critical perspective. Criticalism worldview helped me to borrow dialectical logic to understand the social interactions in the socio-political context. As a result, the worldview enabled me to envisage the research world with “pedagogical thoughtfulness” (Van Manen, 1991) and “critical self-reflexivity” (Kemmis et al., 2019) allowing the dialectical relationship among the co-researchers. Pedagogical thoughtfulness, critical reflectivity, and self-reflexivity further empowered to view the wider social settings through postmodernism worldview. With the postmodernism worldview, I was involved in co-generating artistic genres to describe the complicity of the research world. I used multiple artistic genres: i) poetic genres such as nutrition poem and songs, ii) performative (art-based) genres such as nutrition games, role play, storytelling, and nutrition drama show, and iii) nonlinguistic social semiotic genres such as pictures, drawings, artifacts, and participants-generated text to

understand how the people make the sense of their feelings and experiences. Hence, I performed multiple research positionalities that extend from post-positivism to the postmodernism worldview. My multiple personal and research identities empowered me to perform multiple roles (Figure. 14) while undertaking this study.

Figure 13. *Multiple Roles of Participatory Action Researcher*



Ethical Considerations

Being a PAR researcher, I spent prolonged field work collaborating with the school community following the ethical guidelines set by the Nepal Health Research Council (NHRC) since this study has received an ethical approval letter from the Ethical Review Board (ERB) of the Nepal Health Research Council (NHRC) on behalf of NORHED Rupantaran TU reference no. 733/2018 (Appendix N). As the PAR study was carried out in the real-world situation, I paid close attention to keep ethical integrity of this study (O'Brien, 2001). Being a PAR inquirer, I believe that PAR is rooted in an ethic of respecting the action and reflection on participation (McNiff & Whitehead, 2002). Maintaining the ethics in PAR, I followed Richard Winter (1987) ethical consideration in the conduct of the present study.

Before I was involved in carrying out my study in the field, I talked to the school administration, SMC, PTA, and local government about my research agenda. We had an informal meeting to get familiar with the complexities of their

surroundings and/or situational context to identify the school health and nutrition-related needs/problems. The school community agreed upon involving themselves in PAR-approached study to get contextualized ways forward to solve the school health and nutrition-related problems.

To respect an individual's autonomy, written informed consent was obtained from school administration, teachers, and parents. Moreover, verbal informed consent was also obtained from the parents, local farmers, canteen service providers, local storekeepers, and vendors. In the same fashion, children provided us with oral assent before they were involved in the study. I ensured participants' voluntary involvement offering freedom of anytime withdrawal if they did not wish to be a part of the study. They were always free to share their experiences. In addition to this, they were well informed regarding their participation in the study, nature of the study, procedures of the study, rights to participate in the study, potential harmful risks and benefits of the study, and confidentiality to reduce the social desirability bias (Grimm, 2010) before they involved to the study (Appendix O-Q).

As this study has utilized photographs as the sources of qualitative information, oral consent was timely taken from the school administration and the participants. In addition to this, in the later phase of this study, most of the photos and videos were taken by the teachers using their own cell phone and students also took the photos and videos using my cell phone. The consent was also taken from them regarding the use of photos and videos for the purpose of academic sharing.

Protecting the welfare of the individual and/or group of people is the concern of PAR-based study (Brydon-Miller, 2008). For that, I have considered this issue carefully by maintaining the confidentiality of the co-researchers' shared opinion, experiences, and practices. I have not directly mentioned the personal identity of the

co-researchers and the name of the school has also been anonymized to protect the potential social desirability bias.

Since this study is approached by PAR methodology, the study participants were not just taken as a subject of the study; rather, they were participated as the co-researchers of the study. McNiff and Whitehead (2002) argued that PAR always exists in a real-world problem setting, where people spend their lives. Therefore, to maintain the principle of beneficence or non-maleficence, I was fully aware of promoting human rights and increasing cultural competencies of the research participants. Moreover, my frequent classroom engagement with students, collaboration with teachers for classroom practice, close conversation with SMC, and frequent home visitation for parental interaction and local farmers spending four consecutive academic years in the action school also strengthened ethical integrity of the study.

Moreover, extended field work longer than 230 days in the action school allowed me to share a power relation within and among the co-researchers. As McNiff and Whitehead (2002) asserted, I was consciously aware of my taken-for-granted positionalities while understanding the shared opinions and observed practices of the co-researchers. I have also respected the socio-cultural beliefs, norms, values, way of living, and the practices of the co-researchers and the research participants. Nevertheless, connecting with Denzin (2013) in his seminal paper titled 'the death of data?', the data and evidence used to this study were not completely neutral from biases since self (PhD researcher) was not just acted as the observer and the subject of the study, moreover, I worked as a transformative change agent in the real world problem situated context of the study.

Limitations of the Study

Every study has its own limitations, and the present study is not an exception to this. There are some potential theoretical, methodological, and empirical limitations of this study that are important to consider here.

Methodological Limitation

Though I engaged in prolonged fieldwork around 250 days, completing four consecutive academic years from mid of 2018 to 2022, the PhD researcher was an outsider (university faculty) to the research context, which may not necessarily reflect the emic perspectives of the school community being in their shoes. This may create some methodological bias to the study.

Similarly, though the needs assessment study was conducted among the five public schools in Chitwan and Nawalpur, the PAR intervention was conducted only in one action school based on the prioritized needs. Therefore, the findings of this study may not necessarily be generalized in the wider social context since the replicability and generalizability are no longer seen as appropriate criteria for participatory action research. PAR focuses on solving the research problems through applying the co-created knowledge in a particular setting.

Five PhD researchers, including myself and masters' students, were involved in the action school where this study was conducted. The findings derived from the study may not necessarily represent the effectiveness of the present study alone; rather, there might be the synergizing effects of the other intervention studies, which might create the confounding bias of the study.

Though this study has involved the school community as the co-researchers, they were not involved in the meaning making process (data analysis and interpretation) of the study. As a result, the study missed incorporating their critical

emic perspective in dissertation write up. However, they were involved in presenting the paper in the national and international conference and seminar and also became a part of the paper publications being as the co-authors.

Since this study is funded by the research grants received from the NORAD portfolio NORHED Rupantaran project to implement innovative teaching and learning practices in the classroom settings with technical, financial, and human resource support in the action school, a freelancer researcher without research grant may find difficulty to adopt PAR methodology-based study since it demands long journey fieldwork, and budget for accommodation.

Due to global suffering of Covid-19 from the beginning of 2020 in Nepal, I could not continue my fieldwork as we anticipated since intervention activities were paused for almost one academic year. As a result, the outcomes of the study were relapsed and could not complete the anticipated intervention activities on time. Thus, I faced some administrative challenges to extend my PhD journey to complete.

Theoretical Limitation

There are a couple of health behavior change theories that explain nutritional behaviors of people from individual to environmental levels; however, the present study has utilized the SEM to understand the nutritional behaviors of basic school level children, designing and implementing the SBNEI. The PhD researchers missed perceiving the world underpinning with other theoretical lenses.

Nutritional behaviors can be explained through different perspective like physical science, medical science, nutrition epidemiology, nutrition biochemistry, health promotion, and education; however, the present study has explained the nutritional behaviors of children navigating through socio-educational perspective.

Empirical Limitation

Until the proposal development and needs assessment phase of the study, I was committed to compare the outcomes of the SBNEI between action school and four reference schools, but due to time and resource constraints, I could not include the data in this dissertation; otherwise, the findings of the present study would be more generalizable in the wider social context.

The results of the outcome evaluation study in 2022 were not obtained from the same students who were included during needs assessment in 2018. It is because after the four years upper basic level students who were included in the needs assessment study were already have reached secondary level. Similarly, lower basic school students who were involved in the outcome evaluation were not included in the needs assessment time since they were too young to be included in the study at the time. Moreover, there has been a fluctuation in the number of students at every new academic session. This is more so common in the public schools of Nepal. The Covid-19 pandemic badly hit action school's students since considerable number, particularly low-income families' children, left the school and migrated elsewhere.

Chapter Summary

This chapter has been outlined to explain the philosophical and methodological underpinnings of the study. In the beginning of the chapter, I explained philosophical worldview with respect to ontological, epistemological, methodological, and axiological assumptions connecting with my research agendas. I have explained how PAR methodology fitted as an emergent approach to this study along with rise of multi-paradigmatic space in the study. I have explained about the mixed-methods participatory intervention research design and its underlying data collection methods, data analysis, and integration strategies. To this chapter, I also

explained the intervention strategies under the four interlinked stages: needs assessment, intervention planning, intervention implementation, and outcome evaluation. Afterwards, I discussed quality standards of the study under the validity and credibility section. Before I discuss ethical consideration of the study, I have explained about the researcher's multiple positionalities extending from post-positivist to postmodernist and multiple roles such as collaboration, negotiation, facilitation, mediation, empowerment, and co-work. At the end of the chapter, I included methodical, theoretical, and empirical limitations of the study. The coming chapter, needs assessment and intervention development, discusses about how I involved to explore the school health and nutrition-related needs, prioritize them, and develop an intervention action plan to solve the real-world problems undergoing PAR approach in the practice setting in collaboration with the school community as the co-researchers.

Chapter Four

Needs Assessment and Intervention Development

This chapter offers the details of how a university researcher as a participatory action research (PAR) inquirer collaborated with school community as the co-researcher to explore and prioritize the school health and nutrition-related needs to co-develop a school-based nutrition education intervention (SBNEI) using a PAR methodology. This chapter responds to the three research questions: i) What are the existing nutritional behaviors in children before SBNEI? ii) What multi-level determinants influence (un)healthy nutritional behaviors in children? iii) How can a SBNEI action plan be co-developed in collaboration with the school community? At the beginning of the chapter, I explain the needs assessment and prioritization process, followed by developing the SBNEI by involving the school community throughout the research process. Finally, I explain the pros and cons factors, a decisional balance for implementing SBNEI.

Exploring the Needs

Needs assessment involves data gathering process from varied sources to identify the research problem or the issue(s) in (participatory) action research (Gillis & Jackson, 2002). Further, it explores organizational [school] priorities [needs to be solved] through collaborative efforts between the researcher(s) and the co-researchers (Ledwith, 2020; Ross, 2006). Needs assessment, in this study, refers to exploring the real world needs to develop school health and nutrition intervention program through collaborative action inquiry between researcher and co-researchers as asserted by Minkler (2000) and Şandru (2014). We explored school health and nutrition-related needs through participatory process—a beginning step of the PAR (Minkler & Wallerstein, 2011). In so doing, we used survey questionnaire tools, 24-hour food

recall diaries, and observational checklists involving them in the study in the beginning stage of the study. We followed qualitative methods like focus groups, interviews, and observation. As these methods did not allow the school community to engage fully in the needs assessment procedure, I used participatory methods to explore the real needs of the school such as conversation with teachers outside the classroom, teachers' room, school canteen, school garden, school ground, and even sometimes in the *Chiyapasal*. I also talked to the students beyond the classroom like playground and their home. I talked to child club members in the library hall and ICT room of the school. I along with teachers visited parents' households and even in their working field such as brick kilns and farming fields. We also used a transect walk method to analyze the socio-economic condition of the community resided near the school's catchment area. Dialogue conference and bridging-the-gap workshop were used to involve SMC, PTA, and PAR committee members. These participatory methods empowered the school community to analyze their real-world problems through their own engagement for a long time, which took six months to complete.

The needs assessment procedure revealed following school health and nutrition-related needs. They are presented under the following sub-sections.

Food and Nutrition Knowledge

In this study, nutrition knowledge refers to students' basic understanding of foods, their functions, nutritional values in the food, and malnutrition-related diseases. Students' nutrition knowledge was measured based on a scale of ten items. The items were developed based on the standard nutrition education curriculum for basic school education (Government of Nepal, 2063 BS) and food consumption guidelines for Nepali people recommended by (Government of Nepal, 2012). The quantitative results from needs assessment study revealed that nearly half of the basic school

students (44 %) had a low nutrition knowledge. The study revealed a significant association between existing nutrition knowledge and junk food consumption at school. Results also demonstrated that students with below mean scores (low knowledge) were more likely to consume unhealthy snacks (junk foods) than those of having above mean scores (high knowledge). Near to three-fourths (73.2 %) of students did not wish to share their food and nutrition knowledge with their classmates.

The qualitative data also indicate that basic children were unaware of the nutritional value of the locally available foods, the importance of a balanced diet, the effects of junk food, ways to preserve the nutritive values of foods, and ways to find out their nutritional status based on anthropometric measurements. Students argued that they learned food and nutrition lessons from reading a textbook for the purpose of preparing themselves for exam rather than linking the knowledge with their day-to-day life. She opined, *“I have neither learned the harmful effects of junk food nor did the teachers teach us; nor do we share our learning with classmates”* (7th Grade Girl, Focus Group).

The teachers also argued that they were tightly scheduled to finish the targeted lessons for the exam. As a result, they could not link the nutrition education classes with learners' daily life.

We are often in a hurry to finish the targeted course of study and get the students ready for exams. We must complete the given course breakdown before exam(s). That's why I agree that our students may not have practical knowledge of food and nutrition. (Science Education Teacher, Focus Group)

Health education teachers also argued that applying learner-centered participatory classroom teaching methods seemed to be challenging due to the large

number of students in the classroom. A health education teacher who taught in the upper basic classes (grades 6-8) opined, *“I have to handle around 70 students in the class. Controlling them is challenging to me. Though I am aware of using participatory methods to teach health education, I am compelled to use lecture and question-answer methods”* (Health Education Teacher, In-depth Interview).

The school leaders also argued that unhealthy nutritional behavior among students resulted from poor nutrition knowledge. The head teacher shared that exam-oriented teaching never develops healthy nutritional behavior in young children. He urged to apply participatory methods in the classrooms, *“I have realized that we could not provide behavioral-focused lesson studies to our students since teachers strictly adhere to completing the targeted course of study. Now, we need to focus on behavior-centric nutrition pedagogy”* (HT, Focus Group).

The above results suggest that students did not have an adequate level of nutrition knowledge and knowledge-sharing culture with classmates, which further results in increased unhealthy dietary behaviors, particularly junk food consumption. The needs assessment study also revealed that traditional classroom teaching methods did not allow students to get practical knowledge of nutrition education. The above results demanded action-oriented classroom teaching to increase practical knowledge among children so that they can improve their dietary behaviors.

Dietary Intentions and Attitudes

The needs assessment study reported that close to cent percent students (96.2%) had a positive attitude towards healthy dietary behaviors. They would like to eat green veggies, seasonal fruits, and cow milk. More than four-fifths of them also wished to engage in gardening activities, and an equal proportion of students were willing to consume healthy school meals. Though the quantitative survey results

revealed students' positive attitude towards healthy meal consumption, the qualitative results showed contradictory findings. Most of the students, in the conversation, expressed their keen interest in consuming readymade instant foods (junk foods) compared to home or canteen-cooked foods. Students argued that they prefer to eat readymade instant foods such as noodles, biscuits and crunchy foods like potato chips and cheese balls. Sixth to eighth grades students were less interested in eating homemade foods than the students from grades 4-5. Fourth to fifth-grade students reported that they would bring homemade lunch boxes regularly if their teachers encouraged and parents managed the lunch boxes. However, grades 6-8 students were reluctant to bring homemade food since none of their classmates brought homemade foods. They argued that unless the school forced them, they would continue eating what they were doing. They also argued that due to the hot temperature in summer, cooked foods get spoiled quickly. Due to this, students did not prefer to bring homemade food. The excerpts below show the potential reasons behind the unwillingness to bring homemade foods.

I am not particularly interested in bringing homemade foods because my classmates tease me if I do the same. But I used to do that when I was at another school. (6th Grade Boy, Focus Group)

I like a noodle to eat. It is my best snack because it is yummy in taste, cheaper to buy, and more convenient to carry than homemade and canteen-cooked foods. (7th Grade Girl, Focus Group)

We do not prefer bringing homemade foods to school because it is difficult to store our lunch boxes in the classroom. (8th grade boy in Focus Group)

We do not prefer to bring a lunch box from home in the summer seasons as the temperature goes high and the food gets smelly. (6th Grade Boy, Focus Group)

We have only the option of eating canteen-cooked snacks and/or readymade junk food here. But we prefer packed foods as they are cheap. (7th Grade Girl, Focus Group)

Though the quantitative results indicate positive dietary intentions and attitudes of children towards healthy eating behaviors, the qualitative findings showed that students had a preferred attitude towards consuming readymade packed (junk) foods and had a poor interest of eating homemade and/or canteen-cooked foods. As a participatory action researcher, I argue that there might be some reasons behind such a contradictory finding. It could be due to sample selection bias in the qualitative study since the student participants for focus group were confirmed based on recommendation of the teachers. The judgmental sampling might not ensure the voices of students left behind. The second reason could be, though the composite score on dietary intention and attitude was positive, there was favorable attitude towards 'junk food consumption' and unfavorable attitude towards 'homemade and/or canteen-cooked foods'. Students had a mindset that junk food was good for them. Moreover, consuming junk food for them was the best option because of the taste, time, convenience, and economic factors. On the other hand, students did not like to repeatedly consume the same food at home and school. It is; therefore, they did not have a positive attitude towards 'home cooked and/or canteen cooked healthy meals' at school. The needs assessment results suggested developing a positive intention of students, particularly towards 'homemade and/or canteen prepared healthy meals'.

School Meal Consumption Behaviors

The needs assessment results revealed that around one in ten (6.7%) students attended school without morning meal; the morning meal is considered the main course of Nepali cuisine. Similarly, nearly one-third of students (31.1%) did not eat

midday meals at school. Among the school meal consumers, more than two-thirds (67.9 %) consumed canteen-served deep-oil-fried snack foods such as *Samosa*, *Pakauda*, *Jeri*, *Chowmin*, *Doughnut*, *Aaluchap*, and *Nimki*, which are considered unhealthy for children. They spent an average of 20 rupees (\$ 0.15) pocket money for school snacks. Sixth to eighth grades students spent more pocket money than grades 1-5. Furthermore, only one-fourth of them brought homemade lunch boxes to school.

Similarly, more than half of students (52.5%) reportedly consumed junk foods such as noodles, potato chips, crackers, popcorn, biscuits, cookies, bakery products, and sweetened beverages like juice, soda, cola, and confectionery. The bivariate results of this study (see Appendix) suggest that students' knowledge of food and nutrition ($p<0.05$), sharing food and nutrition knowledge among classmates ($p<0.01$), the grade level of students ($p<0.05$), and the occupation of parents ($p<0.05$) are important determinants in explaining junk food consumption among children. Further, multivariate analysis (Appendix R) showed that students' knowledge of food and nutrition and sharing knowledge with classmates at school appear to be stronger predictors of junk food consumption. The result revealed that students with high knowledge of food and nutrition were less likely to consume junk foods than those with low knowledge (aOR=0.352, $p<0.05$, CI= 0.132-0.936). Similarly, the students who did not share knowledge of food and nutrition with classmates were 15 times more likely to consume junk foods than those who shared knowledge to their classmates (aOR=15.198, $p<0.05$, CI= 1.528-151.119).

The qualitative findings also confirmed the results. Students shared that most of them consumed rice (*Bhat*), lentils (*Dal*), and curry (*Tarkari*) at home. *Bhat*, *Dal* and *Tarkari* are typical Nepali cuisine. However, students who participated in the

focus group discussion replied that some attended school without eating a morning meal.

I come to school without a morning meal. We have a hotel, and I must clean several dishes early in the morning. I do not get time to eat my morning meals (Bhat) as I rush to school. [F... do not have time to eat in the morning?] I eat a slice of bread and a cup of tea in my morning meal. (7th Grade Girl, Focus Group)

Most participants mentioned that they bought snacks like *Samosa*, *Pakauda*, *Aaluchop*, and *Chowmin* in the school's canteen. They bought noodles, biscuits, crackers, potato chips, bakery products, and confectioneries from the school's tuck shop. But none of the students brought homemade lunch boxes. A boy during one the focus groups reported, "*None of my classmates bring homemade food to the school. Most of them get pocket money instead. They mainly eat Pasta, Samosa, Pakauda, noodles, and biscuits. I also do the same*" (8th Grade Boy, Focus Group).

Though the school administration was aware of the existing situation of the unhealthy dietary behaviors of children, they did not take action to solve the problems since the school administration did not realize that unhealthy dietary behaviors of children could impede their health and educational outcomes. I talked with the headteacher about the same. He stated that unhealthy dietary behaviors in children are common in the public school of Nepal, and the government should fix the problem. He did not realize that it was a context-bound problem of the school.

Eating unhealthy school snacks is ubiquitous in community schools of Nepal, including ours, as most community school children come from working class (low-income) families. The main problem is not of the students; instead, it is

deeply rooted in the family's source of income. (Head Teacher, In-depth Interview)

Students from grades 4-5 claimed that a noticeable number of their classmates eat nothing during lunchtime. One of the boys in the focus group replied that he never feels hungry during school hours since he has no habit of eating school snacks from his early classes. He opined, *“I neither manage homemade food nor bring pocket money to buy snacks. Instead, I eat the leftover morning meal when I return from school. [F... don't you get hungry at school?] I usually don't feel hungry”* (4th Grade Boy, Focus Group).

During a conversation with the sixth-grade class teacher, he shared that students find difficulty storing the lunchboxes in the classroom due to the congested classroom setting and crowded students in the class. Moreover, he argued that students feel shy about bringing homemade foods. Corresponding with him, a girl from upper basic class also opined similarly, *“We feel bored if we bring homemade snacks to school since no one brings lunch boxes to our classroom. I also do not bring a lunch box from home since I find myself strangely in the classroom”* (7th Grade Girl, Focus Group).

Similarly, lower-basic students had unhealthy and irregular school meal consumption practices. Fewer of them brought homemade lunch boxes, some students bought canteen-served snacks, whilst the majority did not eat anything. Vignette #1 describes the story of low-income students about their snacking practices at school.

Vignette #1: Low-cost Snacking Practice by Low-Income Students

Once I was with grade one students talking about their snack consumption practice during lunchtime. In the meantime, students took out food items from their bags that were brought from their homes. One student took out boiled potatoes from the

bag; another did tomato and onion; one did radish, coriander leaves, and lemon juice. One of them took out sprouted whole grains, while one boy and another girl took out noodle packets from their bags. And the rest of the students collected five rupees from each and handed them over to the class captain. The captain collected cash and rushed towards the grocery store near the school locality. He returned carrying a packet of Bhujia (puffed rice). They mixed Bhujia with the home-brought food ingredients and quickly prepared Chatpat (a mixture of puffed rice, pieces of boiled potatoes, noodles, onion, coriander leaves, and lemon juice) and served to all. I came to know that they often make such a practice in the school since they cannot buy the snacks with Rs. 5 individually. The leader replied to me, 'the pocket money is not enough to buy snacks in the canteen. That is why; we often prepare Chatpat in our classroom since it costs less in the group than we buy individually in the canteen'.

The findings from the needs assessment study reveal that the school canteen could not serve a cost-effective menu to the children, especially students from poor families. It is against the spirit of the midday meal regulation guidelines for community schools (Government of Nepal, 2073 B.S), which explains that the school canteen should serve food to all students regardless of their caste, religion, and income source.

The needs assessment results suggested that eating irregular and unhealthy school meals, particularly junk foods, is common in children. Poor income-family children could not have regular access to meals in the school. Moreover, the canteen could not serve healthy meals to students. The findings suggested implementing a school feeding program by reorienting the school's canteen service system.

Serving Snack Foods Through the Canteen

I observed the snack foods service system of the canteen inside the school premises and the tuck shop attached to the canteen. I was there as a participant

observer to watch a week-long food serving system through the canteen and the tuck shop. It was held in October 2018. Based on my week-long observation, I found deep-oil-fried snack foods were commonly served from the canteen and junk foods from the tuck shop. Table 10 displays the snack foods served by the canteen and tuck shop.

Table 10. *A Week-long Snack Foods Serving through the Canteen and Tuck Shop*

Days	Foods served from the canteen	Foods served from the tuck shop
Sunday	Samosa, Pakauda, Chowmin, Jeri	Doughnut, Noodles, and Juicy
Monday	Samosa, Pakauda, Nimkin, Cooked noodles, Chowmin, Jeri	Noodles, Biscuits, Chocolates, and Juicy
Tuesday	Samosa, Pakauda, Nimkin, Jeri	Doughnut, Noodles, Biscuits, and Juicy
Wednesday	Samosa, Pakauda, Chowmin, Fried beaten rice and cooked whole grains	Noodles, Biscuits, Potato chips, Chocolates, and Juicy
Thursday	Samosa, Pakauda, Cooked noodles, Chowmin, Jeri	Doughnut, noodles, biscuits, cheese balls, and juicy
Friday	No students consumed snacks since school remained closed at 2 pm	

The above table reveals that *Samosa, Pakauda, Chowmin*, and cooked noodles were the common snack foods served from the canteen over a week. Similarly, noodles, biscuits, doughnuts, cheese balls, chocolates, and juice were commonly served as junk foods from the tuck shop. Most students and teachers consumed the same buying from the canteen and the tuck shop. However, on the contrary, most of the female teachers managed homemade foods since they were not satisfied with the quality of the canteen served foods. They argued that snacks served through the canteen and the tuck shop were not healthy enough to eat.

During the lunch break, I discussed with a group of female teachers who would bring their homemade foods and shared a table with them. In the meantime, I asked them why they were not joining others in the canteen instead of carrying a

homemade lunch box. Many of them had a reply that the canteen served unhealthy food. One of the female teachers (with anger face) replied, *“We do not like eating at the canteen since canteen personnel prepare snacks with business motives, ignoring our health. I wonder why the school takes no action against it”* (Basic School Female Teacher, Informal Talk). Another teacher agreed and added, *“Last month, I got a gut disorder after I ate in the canteen. Since then, I stopped eating there. Nowadays, I manage my lunch boxes. It is healthy and economical”* (Secondary School Female teacher, Informal Conversation).

I also interacted with teachers who regularly consume snacks in the canteen. In so doing, I started eating snack foods in the canteen, sharing a table with teachers. In the meantime, I asked them about the healthy quality of snacks. Many of them contended that they were not satisfied with the quality of the food. One teacher replied.

We are lazy guys to manage snacks ourselves from home. We wished not to eat such foods longer in the canteen. But we are compelled to do the same since the school administration does not permit us to go outside of the school.

(Basic School Level Male Teacher, Informal Conversation)

Aligning with him, the next teacher argued critically:

‘We do not immediately pay the price of the foods we eat at the canteen since we pay it back once we receive our salary. This could be one of the reasons why we do not complain about the quality of the food served in the canteen’.

(Non-teaching Staff of the School, Informal Conversation)

I also interacted with students to get their observations. Students had a different perspective on the canteen service system. They complained about the choice of foods made available in the canteen. They argued that the canteen does not

offer food choices. They seemed unhappy eating the same snacks throughout the weeks. An eighth-grade boy, who was eating noodles in the classroom, replied to me when I reached out to him. He replied, *“Nowadays, I do not like to eat canteen-prepared foods as it does not offer various food choices; instead, it serves the same kind of snacks all school day. Due to this, I eat noodles and sometimes biscuits”* (8th Grade Boy, Informal Classroom Conversation). In line with him, another girl complained the same. She opined, *“I stopped eating at the canteen since it offers only Pakauda and/or Samosa. I got a stomach problem due to these foods. I eat noodles and biscuits, but sometimes I bring homemade food too”* (7th Grade Girl, Informal Classroom Conversation).

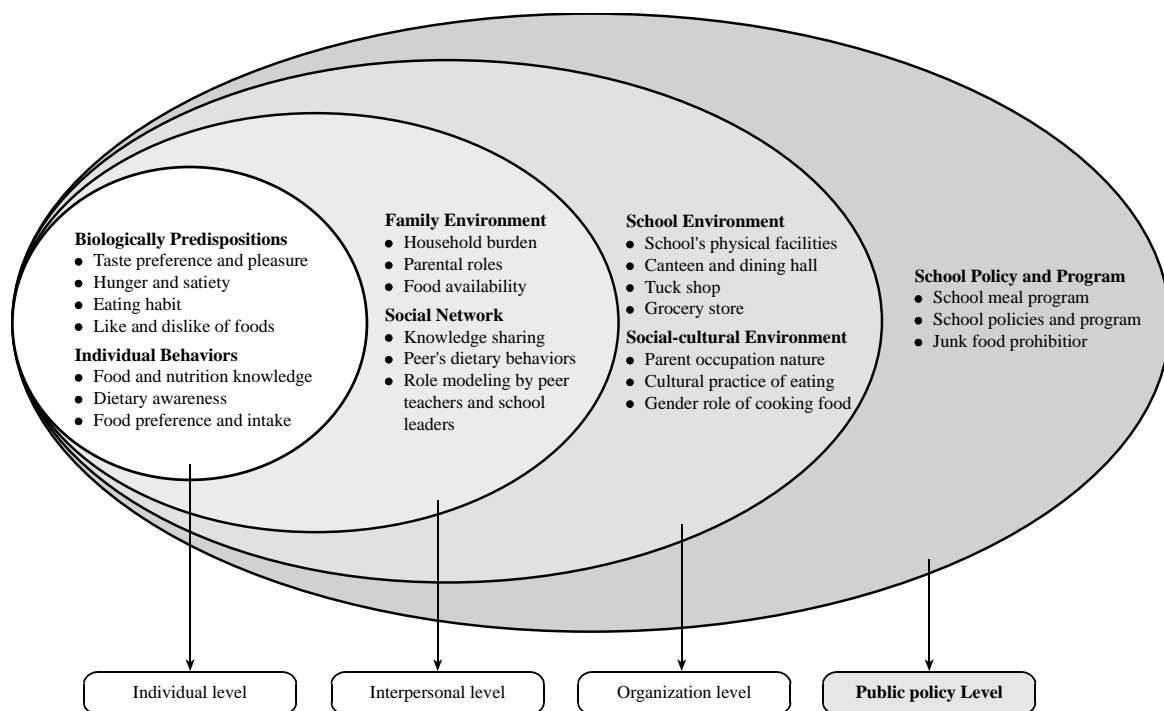
My week-long observation made it clear that most of the canteen-prepared foods were deep-oil-fried foods. The scientific research findings report that if the oil is repeatedly used for cooking, it produces a hydrogenated toxic acid called *trans-fat*, resulting in life-threatening diseases among school-aged children (Bauer & Waldrop, 2009; Milan, February 20, 2018; Te Morenga & Montez, 2017). Surprisingly, the school administration did not take action against the issues raised by students and teachers. However, school administration's role is considered important to improve students' dietary behaviors by creating a supportive environment for healthy eating at school.

Multilevel Determinants of Nutritional Behavior

Young children's food choices and dietary behavior are influenced by multilevel determinants. The findings of the present study suggests that nutritional behaviors of children are influenced by multitude level of determinants, which include biological predisposition, individual behaviors, familial environment, social supports and interactions, school environment, sociocultural environment, and school policy

and practice. This finding is substantially corroborated with a couple of existing studies (Gedrich, 2003; Melnick et al., 2022; Monterrosa et al., 2020; Sobal & Bisogni, 2009; Townsend & Foster, 2011) This can further be discussed from the socio-ecological model (McLeroy et al., 1988), ecological theory (Bronfenbrenner, 1979), and socio-ecological framework (Contento, 2008) perspectives. Three constructs such as individual (microsystem), interpersonal (mesosystem), and organizational (exosystem) of the ecological model, has been used to discuss the multilevel determinants of food choice and dietary behavior of children. These interconnected multilevel determinants can be illustrated in the three concentric circles of the socio-ecological framework (Figure. 15).

Figure 14. *Socio-Ecological Framework of Food Choice and Dietary Behaviors*



The socio-ecological framework explains seven determinants of children's food choice and dietary behavior under the three constructs of the socio-ecological framework that I explain in the following sub-sections.

Biological Predispositions

Humans are born with an innate biological predisposition, which refers to the genetic endowment that passes from the old to the new generation (Contento, 2011). The findings from the needs assessment study indicate some potential biological predispositions influencing the food choices and dietary behaviors of children.

Taste and Pleasure of Foods. Human beings are born with embodied biological predispositions such as liking the sweet taste and disliking the sour and bitter (Contento, 2011). Genetic differences exist in taste sensitivity among people, due to which the pleasure of eating varies (Story, Neumark-Sztainer, et al., 2002). Connecting to the present study, students reportedly consumed junk food at school. They argued that they prefer to consume junk food due to the unique taste of the foods. Students were enthusiastic when talking about the taste of noodles, crisp, and chowmein; however, they expressed unpleasant taste experiences concerning homemade foods.

Habit of Eating Junk Foods. The habit of eating junk food is another biological predisposition that influenced students' dietary behavior. Students shared that they consumed junk food at home and school in breakfast and mid-day snacks regularly. Parents also shared that they prepare noodles for their children since children love to eat junk food. Eating junk food at home and school develops a habit among young children.

Hunger and Satiety. Hunger and satiety are another biological predisposition which could influence children's preference for unhealthy snack foods. Students argued that eating junk food is meant to quench their immediate hunger since such foods quickly supply high energy. The needs assessment study revealed that students who come to school without a morning meal or have lunch early in the morning

consumed junk food more than others. The reasons could be manifold; however, junk food quickly quenches the immediate hunger of students with energy supplements.

Age Factor. The age of students also influenced food choices and dietary behaviors, where upper children (grades 6-8) preferred to consume junk food compared to younger ones. This might be why older-aged children are independent in choosing their foods. Moreover, they tend to follow their peer's decisions rather than their own (Upreti et al., 2021).

Individual Behaviors

Individual behaviors are agency-level determinants that ultimately affect decision-making power concerning food choice and intake (Caperon et al., 2019). Everyone is unique in exhibiting food choices and dietary behaviors independently. This study indicated that food and nutrition knowledge, dietary intent and awareness level, food preferences and intake, and perceived barriers are potential factors that influence children's food choice and dietary behavior.

Nutrition Knowledge and Awareness. The needs assessment study suggested that poor nutrition knowledge and understanding are significantly associated with unhealthy snacking behaviors (consuming deep-oil-fried foods and junk foods). This finding is consistent with a couple of studies like Cha et al. (2014), Kolodinsky et al. (2007) and Seo et al. (2011). Nevertheless, a study conducted in Kathmandu, Nepal (Poudel et al., 2018) shows the converse relationship stating that nutrition knowledge has no relation with junk food consumption. This contradictory finding indicates the need for further research to explore the relationship between nutrition knowledge and snack consumption practice.

Food Preference and Intake Behavior. Motivational factors like food preferences, values of likes and dislikes are strong factors for individual food choices

and dietary behaviors. The study found that children commonly consumed junk foods and they dislike consuming homemade and canteen-prepared foods as they do not value homemade foods. They argued that homemade foods (*Gharakō khājā*) are boring because they experienced apathy towards consuming such foods; instead, they wish to consume appealing foods. Students were motivated to consume junk food at school.

Perceived Barriers. Perceived barriers to making healthy eating choices of students also influence their nutritional behaviors. Students reported that they were forced to buy junk food due to insufficient pocket money. On average, students spent 20 rupees on buying school snacks. However, many students, especially from poor-income families, could not invest 20 rupees daily. Poor-income parents in the focus group reported that their children receive low pocket money ranging from 10 to 20 rupees. Parents do not know what their children buy with such an amount of money. Students from poor-income families contended that the cost is the main barrier against healthy meals practice at school. The teachers argued that buying fresh and healthy foods always demands higher costs than junk foods, due to which students consume junk foods. A group of teachers stressed that students could not invest their pocket money to buy healthy foods at the canteen. Some students also reported the time factor acts as a barrier to managing healthy foods at school. They discussed that lack of time to prepare snack foods would hamper them from consuming healthy foods at school. Children from poor-income families engage in household chores before they come to school. These findings are consistent with a study conducted with Ecuadorian rural school adolescents (Verstraeten et al., 2014) and urban Indian secondary school students (Rathi et al., 2016).

Family Environment

Parents could play an important role in shaping the dietary behaviors of young children and adolescents since parents' influence the availability of food within the home and encourage or control the food-eating pattern of children (Pearson et al., 2010; Pearson et al., 2012). Family meal patterns can impact young children's food choices and dietary behaviors (Story, Neumark-Sztainer, et al., 2002).

Household Burdens. A group of parents reported that they are busy from early morning with daily household chores, like engaging in farming fields and looking after cattle in the shed. Some parents who were involved in daily wage-earning claimed that they could not prepare morning meals to feed their children before school since they had to attend their jobs (most of them worked in the brick kiln) early morning and come back at noon. Consequently, neither their children could carry snack foods, nor do they manage pocket money. Some students attended school without having morning meals; some were involved in domestic chores like feeding cattle, working with parents in the farming field, and helping the parents in their self-run businesses such as tea shops, tailors, and home-based hotels before they come to the school. Due to this, such students are unable to manage their school snacks daily. Thus, household burdens create a barrier to preparing homemade foods.

Role of Parents. The role of parents also influences children's nutritional behaviors. The needs assessment study suggests that parents' dietary behavior heavily influenced students' nutritional behavior, especially grades 4-5. Students reported that their parents usually serve them with noodles and biscuits instead of homemade foods for midday meals when they stay at home with family. However, some students stated

that their parents prepare homemade foods like *Khinchadi*⁸ (salty porridge), beaten rice, chapatti, curry, and fried rice instead of instant foods. Results indicate that the eating behavior of young children is influenced by the familial environment since they cannot prepare their meals themselves. A group of teachers also explained that parents are the main agents of shaping healthy eating behavior of young children. For example, children get persuaded to eat homemade food if their parents send them with school lunch boxes. But on the contrary, if parents provide pocket money, they may entrap into unhealthy snacking behavior.

Food Availability and Accessibility. For some children in the school, food availability and accessibility at home was the next underlying factor influencing young children's dietary behaviors. Students reported that they prefer to eat foods that are available at home. Some students also reported that they eat leftover foods when they return home. The result is consistent with a study conducted among Ecuadorian rural and urban adolescents (Verstraeten et al., 2014), urban Indian secondary school students (Rathi et al., 2016), and children of Eastern Finland (Tilles-Tirkkonen et al., 2015).

Social Network

Social support appeared to be a crucial determinant in explaining the nutritional behavior of students. Social network, in this study, includes interpersonal relationships with family members, peers, nutrition champions, teachers, school leaders, and other societal members. The needs assessment results of this study affirmed that knowledge-sharing culture among classmates; peers' dietary behavior;

⁸ It is a common Nepali dish made from rice, lentils, and ghee.

and role modeling behavior of peers (nutrition champion), teachers, and leaders could influence the dietary behaviors of children.

Knowledge Sharing Culture with Classmates. It was observed that sharing food and nutrition-related knowledge with classmates in a school setting was significantly associated with junk food consumption in students. Students with low nutrition knowledge were more likely to consume junk foods than those with high scores. Furthermore, qualitative data indicated that peers' behaviors heavily influenced snacking behavior of children at school. A group of female students reported sharing their snacks in the group, no one would remain hunger when one cannot manage the snacks in the school. A couple of studies also indicate that peer influence determines young children's dietary behaviors (Lee et al., 2020; Yip et al., 2016).

Role Modelling by Teachers. Although teachers have little control over whether their students perceive them as role models, the possibility of vicarious learning in and outside of the classroom is always appreciative (Yager & O'Dea, 2005). The study demonstrated that teachers rarely exposed themselves as role models to their children regarding healthy eating behavior. A group of students reported that teachers also consume junk food in the tuck shop and canteen. They opined that teachers rarely asked them not to consume junk food. However, some students replied that teacher(s), particularly females, encouraged them to bring homemade foods. My observation also indicates that most of the female teachers managed snacks themselves. However, few male teachers were self-conscious about role modelling to their students.

Role of School Leaders. The needs assessment study revealed that the role of school leaders (HT, SMC, and PTA members) was not different from the teachers.

The HT was a regular school meal consumer at the canteen. However, he did not raise the issue regarding the quality of food served in the canteen. The SMC chair said that he tried to ban junk food and plastic bags inside the school when he was appointed as the school chairperson. He served as a role-model for students by not eating junk food publicly. However, this was not sustained in the long-term. The findings from previous studies also conclude that teachers and school personnel could play a valuable role in influencing dietary behaviors in the school setting since they are the change agents (Yager & O'Dea, 2005).

School Environment

Schools constitute conducive settings that influence young children's behaviors (Centers for Disease Control Prevention (CDC), 2011; World Economic Forum, 2020), particularly nutritional behavior (Contento, 2008). Schools also provide an optimal setting to practice healthy eating and lifestyle by creating an enabling environment (Harake et al., 2018). The school environment can have a dominant influence on food choices and dietary behavior. The school serves a large portion of snack foods to many students. At school, both physical and mental environments influence behavior. Following the needs assessment study results, I explain how the school environment influences students' nutritional behaviors.

Foods Availability at Canteen and Tuck Shop. Due to the growing trend of neoliberal capitalism and free-marketing policy, the availability of junk foods in and outside the school area is pervasive in the context of Nepal (Uprety, 2012). In this study, junk foods like noodles, biscuits, chips, crisps, crackers, candy, ice cream, and soft drinks were commonly served through the tuck shop. Teachers repeatedly emphasized that junk food is available everywhere at the canteen and outside the school. The previous study conducted among Indian adolescents also focused on the

increased availability and accessibility of healthy foods at the school canteen (Rathi et al., 2016).

On the other hand, deep-oil-fried snack foods (Table 9) were commonly served in the school canteen. Most students and teachers complained about the quality of food served in the canteen and the tuck shop. A group of students viewed the school food environment as a key factor influencing snack consumption since they eat what is available rather than their preference. However, canteen personnel indicated that the food available at the canteen and tuck shop reflects the students' preferences and demands. Further, they emphasized that students stopped eating junk foods if *Puri* and *Tarkari*, *Chiura* and *Tarkari*, rice pudding, and fresh fruits were available at the canteen.

Price and Quality of Foods. The price and quality of foods influence students' dietary behaviors. In this study, more than two-thirds of students were from poor-income families and students from these families could not manage even five rupees for a school meal. On the other hand, the minimum price of the school menu was ten rupees (in October 2018). However, students could buy junk food for five rupees from the tuck shop or nearby vending and grocery stores. These discrepancies indicated that the price of snack foods was a detrimental factor.

However, canteen service providers had a different voice on the quality of food. They claimed that the price of the school menu was very nominal compared to the surrounding. The cost of food always determines the quality of food. If quality increases, the prices will surge up. As a result, most students could not afford the canteen served food. The school HT viewed that selling junk foods through school tuck shops is a must unless school runs school feeding program. The SMC and ward

chair also argued that the school feeding program could minimize the gaps of unhealthy eating practices and hunger stomach.

School's Physical Environment. The present study found that there was no space to store the lunch box in the classroom, the hot temperature during summer spoils the cooked foods, and the lack of a dining hall were barriers to healthy dietary practices in the school. A group of students complained that they were unwilling to carry the lunch box from home due to having no space for storing the lunch box. The teachers also argued that there was not enough place to store the lunch box in the classroom. This might have stopped bringing homemade lunch boxes by the students. Students complained that they had to eat in the classroom since there was no dining hall.

Nutrition Education at School. Nutrition education at school can play a determining role in establishing healthy food choices among the schoolchildren (Contento, 1995; Jadgal et al., 2020; McCaughtry et al., 2011). At the time of needs assessment, the nutrition education curriculum at school was incorporated with science from grades 1-5. But it is integrated with health and physical education subjects from grades 6-8. The needs analysis results revealed that nearly half of the students had high knowledge scores on nutrition. The results reveal that students with below-average knowledge about nutrition scores were more likely to consume unhealthy dietary behaviors.

Sociocultural and Environmental Norms and Practices

Sociocultural norms and practices can largely influence individual food choices and dietary behaviors (Monterrosa et al., 2020). The social support and interaction within the family, peers, relatives, and societal people occur based on the sociocultural context of children. Sociocultural context, to this study, is a macro level

determinant which underpins occupational status, cultural practice, group meal practice, and gender role in determining the nutritional behaviors in children that I explain in the below subsections:

Educational and Occupational Status of Parents. The results revealed that parents' educational and occupational status have a powerful association with the nutritional behavior of children. Results suggest that children would bring pocket money for school snacks if their parents were employed in jobs instead of farmers. But, on the other hand, parents involved in household chores like farming field, poultry farming, cattle farming, their children would bring homemade meals more frequently. Similarly, results also demonstrate that parents who had school level and below educational level seemed to be interested in managing pocket money, whilst the parents having graduated and above could have managed homemade lunch to their children. A group of students representing low-income families shared that they also join their parents in the working field on in-school days. This result can be corroborated with studies conducted in Sri Lanka (Rathnayaka & Wang, 2012) and Bangladesh (Turin, Rumana, & Shahana, 2007), demonstrating that dietary behaviors are positively associated with parent's income.

Cultural Practice of Eating. Cultural practice, a sociocultural determinant, influences the eating behavior of children. Pierre Bourdieu has explained the role of cultural practice, *habitus*, in reproducing the people's behavior (Bourdieu, 1977). Some students said they do not eat food between two main meals (lunch and dinner), stating that they feel no hunger between the two meals. They developed a habit of not eating snacks in between the two meals. A group of parents also shared that their children rarely eat midday meals in school, instead they waited for the evening course of meals. I triangulated these results with data collected from teachers who shared that

most children who recently migrated from hilly regions rarely consumed midday meals. It is because they do not have practice of eating midday meals. The study also showed that working class parents daily move on to earn daily wages in the brick kiln early morning. Due to this, children from low-income families reach school without meals.

Group Meal Practice. Low-cost snack consumption practice among low-income ethnic minority children is common. The results from needs assessment study showed that students from low-income families could not manage either homemade lunch boxes or pocket money. These children could not purchase even a low-cost snack which costs ten rupees (\$ 0.07). As a result, they consumed low-cost snack foods using home-brought (no cost) food ingredients in the group (see vignette story #1). This kind of group meal practice can prevent students from immediate hunger at school and thus could prevent young children from malnutrition.

Gender Roles. Socio-culturally constructed gender roles influence the dietary behaviors of children (Caperon et al., 2019). The female students argued that daughters play an important role in household chores by cooking and providing food for their families. They can prepare homemade foods for school snacks. Many female participants know how to prepare healthy lunch boxes. However, on the other hand, male participants conversely reported that they could not prepare snack foods themselves as they had never been exposed to preparing lunch box. Boys were hesitant to bring homemade foods as also shown in a study that gender difference can have an influence in meals consumption behaviors (Caperon et al., 2019).

School Policy and Program

School policy and program, a macrosystem influence, is a powerful determinant of children's nutritional behavior (McLeroy et al., 1988). The present

study indicates that school feeding, junk food prohibition at school, school policy and program, and media exposure and strategies influenced children's food choice and dietary behaviors.

School Meal Policies and Programs. Policy environment is strongly featured as enabling factors for promoting school meal behavior in children. School meal policies and programs influence students' snacking behavior as a macro-level determinant to this study. The SMC chairperson reported that the school took the initiative role to stop junk food consumption before this study. However, they were not successful. While students argued that the school administration never managed healthy food choices at the canteen, the administration just enforced not to consume junk foods without meal policy and guidelines.

Moreover, the school administration was unaware of the existing guidelines of the school meal policies and program implemented by the MOEST, which prohibits junk food consumption within the school premises (Government of Nepal, 2073 B.S). Similarly, the role of local government is crucial in promoting healthy eating in children. The ward chairperson, SMC member of the school, was also unfamiliar with the school midday meal policy and program implemented by the federal government of Nepal; however, he was keenly interested to initiating a subsidy-based school midday meal program for children.

Roles of Local Media and Advertisements. Today's young people live in media-saturated environments that heavily influence their dietary behavior (Story, Neumark-Sztainer, et al., 2002). Several studies have found that the politics of advertisement via mass media is likely to increase junk food consumption among young people (Bohara et al., 2021a; Kearney et al., 2021; Khalil et al., 2020; Rathi et al., 2016; Sogari et al., 2018). This study's results reveal that mass media and

advertisements have an influential role in nutritional behavior of students. Many students raised concerns about the significant role of the mass media on junk foods, articulating that they are tempted to consume junk foods due to appealing advertisements on TV and other electronic media.

Needs Prioritization: Negotiation with the School Community

As we found that the nutritional behaviors of children were influenced by the multilevel determinants extending from the individual to the policy level, all the school community were involved in the needs prioritization process to contextualize the needs. In so doing, I as a lead researcher negotiated with the school community through regular dialogue and informal discussion to gain a deeper understanding of how they prioritized the needs related to nutritional behaviors of students.

Negotiation with Students

Using a PowerPoint presentation, the list of needs, which emerged through the needs assessment study, was presented to the students in their respective classes. I along with the teacher co-researchers encouraged students to prioritize the needs from the list with which they closely identified. Among the needs presented in the list, students chose the problems of irregular school meal consumption behaviour, unhealthy snacking behaviours, poor hand washing practice before meals, limited food choices in the canteen, limited ability to bring homemade lunch boxes, and content- focused and exam-oriented nutrition pedagogy.

In the beginning, students were not fully cognizant about junk food consumption behavior, rather they focused on reorienting the canteen service system to offer them healthy food choices. They argued that they would stop eating junk food if the canteen offered them healthy food choices. One boy opined that he is ready to stop eating junk food if the canteen provides him with healthy food choices.

Connecting to this, A boy opined, *“I am ready to stop eating noodles and biscuits if the canteen provides us with healthy food choices”* (Sixth-grade Boy, Informal Conversation).

Further, they argued that they were unwilling to bring homemade foods because their peers do not bring homemade lunch boxes and teachers do not encourage them to do so. A girl shared, *“I do not prefer to bring homemade foods because no one brings in my class. If I did, I would be like an outsider in the class”* (8th Grade Boy, Informal Conversation).

Negotiation with Parents

It was not feasible to involve all the parents in the school in a discussion since most parents were busy working in different places. Therefore, I and the teachers reached the parents in their homes after school hours (generally after 4 pm). We covered almost 50 households in a week. Through informal talks, we discussed the results of the needs assessment study. Most parents focused on improving unhealthy snacking behaviors of children. Some parents also focused on the need for school rules and regulations to stop unhealthy snacking behaviors. A female parent argued, *“I have been telling my child to take a homemade lunch box, but he never listens to me. If the school required them to bring homemade foods, I am sure my child would ask for a lunch box”* (Female Parent, Dialogue Conference)

Parents also focused on effective nutrition education in the classroom teaching. They urged strengthening the teachers' role in encouraging students toward healthy eating behavior. Lower-income parents strongly suggested initiating a school meal program to promote healthy eating behavior since the needs assessment study also revealed that most students attend school without eating morning meals at home.

Negotiation with Teachers

The school canteen was the particular problem most teacher co-researchers complained about. During the conversation, a teacher argued, “*Nowadays, I do not like eating canteen-prepared foods since the canteen service providers prepare the foods with business motives, ignoring our health. I wonder why the school administration takes no action against it*” (Female Teacher, Dialogue Conference).

They also focused on seeking awareness and commitment from students and parents, arguing that the familial environment of students is decisive in shaping their dietary behaviors. During the negotiation, a teacher opined, “*Young children could not manage their snacks themselves. It depends upon how their parents interact with them. We must negotiate with the parents to develop healthy nutritional behavior among children*” (Male Teacher, Dialogue Conference).

Further, the teachers discussed the role of nutrition education in developing healthy food choices among students. We discussed how teachers could implement participatory nutrition education to motivate students towards healthy nutritional behaviors. Most teachers argued that they strictly adhere to exam-focused classroom teaching, relying on textbooks. A health education teacher claimed, “*Still, I practise exam-focused classroom teaching because we have to give good results to the parents*” (Male Teacher, Dialogue Conference).

Further, we discussed utilizing participatory methods to teach nutrition lessons. Initially, the teachers were unwilling to accept the suggestion; however, we continued to discuss the pros and cons of participatory nutrition pedagogy to develop healthy dietary behaviors in children.

Bridging-the-Gap Workshop

A bridging-the-gap workshop was held to prioritize the needs using a communicative action inquiry (McNiff & Whitehead, 2002) among the PAR committee members. The PAR committee consisted of multidisciplinary members like students, teachers, SMC and PTA members, local farmers, community people, health personnel, community forestry members, social workers, political activists, female representatives, and local government bodies. The name 'bridging-the-gap workshop' was given to this study because the workshop mediated the gaps, as revealed by the needs assessment.

The PAR committee members were involved in the bridging-the-gap workshop to prioritize the needs through the participatory learning and action (PLA) method (Chambers, 2008). The school community was involved in the need prioritization process through the PLA involving the teachers and child club members to present the list of the needs identified from the needs assessment study. Once the presentation was over, the group was reshuffled into five sub-groups for further discussion. Each subgroup included five to seven multidisciplinary group members who prioritized the needs. Two members (one male and one female) from each subgroup presented their needs based on priority. Further, the prioritized needs as suggested by the subgroups were merged (Table 11). Finally, the shared needs were classified under the major constructs of the SEM that extend from the intrapersonal (micro) to the public policy (macro) level (McLeroy et al., 1988).

Table 11. *Overview of Needs Prioritized by the School Community*

Stakeholders	Prioritized needs	Common prioritized needs under the SEM
Students	Awareness and commitment against junk food consumption Upgraded school canteen service system A supportive environment for healthy eating	Intrapersonal level: Awareness, motivation, and commitment towards healthy eating at school
Teachers	Awareness and commitment against unhealthy snacking behavior Participatory nutrition education Upgrading the canteen service system	Interpersonal level: School nutrition education (classroom teaching)
Parents	Effective classroom teaching Role modeling by teachers School meal program for needy students School policy against junk foods Healthy eating attitude and practice among students	Setting (Organizational) level: Periodic anthropometric (height and weight) measurements School meal program for underprivileged children A supportive environment for healthy eating
PAR committee members	Classroom-based nutrition education Periodic anthropometric (Height and weight) measurements School meal program for underprivileged children A supportive environment for healthy eating Upgrading the canteen service system School meal policy	Upgrading the canteen service system School meal policy

Developing Intervention Activities

Addressing the unhealthy nutritional behavior of children is complex as there are multilevel influences to consider. A PAR-based study conducted in Nepal also suggested that the school community in developing the intervention activities can ensure their active involvement (Rajbanshi et al., 2021). Thus, the school community from the entire school, from students to the PAR committee, were involved in developing the intervention activities based on the prioritized needs.

Students' Involvement in Developing Intervention Activities

A series of group discussions were held among the five groups of students in their classroom settings, or sometimes in the library room and the ICT hall. Students' selection for group discussion was based on their voluntary participation. All the interactions were held either during off-school hours or at leisure periods to ensure regular classes were not disturbed. Initially, students were hesitant to share their

opinion and ideas in the presence of the teachers. Later, the mode of inquiry was customized to exclude the presence of teachers. After discussing with each group, they suggested a list of intervention activities. It took almost two weeks to collect this information from all five groups. We merged the lists of intervention activities and selected the shared ones (Table 12).

Teachers' Involvement in Developing Intervention Activities

Reflecting on the prolonged fieldwork, I realized that obtaining teachers' time was quite difficult since they had no free time during the school day. They were usually engaged in and focused on classroom teaching and learning activities throughout the school day. Generally, teachers teach at least five out of seven periods (one period is 40-50 minutes) daily in the public schools of Nepal. On the other hand, booking their time during, after school hours, and public holidays was difficult because teachers might feel overburdened. Realizing the contextual limitation, I carefully scheduled the teachers' leisure time for discussions. In the beginning, I explored teachers' perspectives on intervention activities. Once I completed the individual inquiry, a group discussion was subsequently held. The group discussion among the teachers suggested a list of intervention activities (Table 12)

PAR Committee Involvement in Developing Intervention Activities

Aligning with the (Freire, 2000) empowerment model, 'dialogue conference' as a discursive tool was used to foster the contextual understanding of the PAR committee members to develop a list of intervention activities based on the prioritized needs. Following the democratic norms, each participant's opinions and ideas were solicited (Ahmad et al., 2016). The dialogue conference was organized based on the Engelstad (1996) three-stage procedure: 1) short briefings about the theme of conversation, group formation modality, and dialogue procedures; 2) norms for intra-

group discussion; 3) presentation followed by inter-group discussion. After completing the inter-groups discussion, the PAR committee members proposed a list of intervention activities (Table 12).

Table 12. *Overview of Intervention Activities Suggested by the School Community*

Stakeholders	Intervention activities	Common activities
Students	Awareness raising activities such as drama shows, home visitations, audio-visual sessions, and nutrition wall magazine promotions	Awareness, motivation, and commitment sessions Classroom-based nutrition education sessions Peer teaching and role modeling session Homemade foods promoting sessions Junk food prohibition sessions
	Commitment session	
	Peer teaching and role modeling session	
	Homemade foods promoting sessions	
	Monitoring snacking behavior of students	
	Upgrading canteen service system with healthy food choices	
	Awareness and commitment sessions among students and parents	
Teachers	Homemade lunch box promoting sessions	Monitoring and supervising snacking behavior-related sessions Anthropometric measurements with counseling session School meal program Developing school meal policy Upgrading school canteen service system
	Classroom-based nutrition education sessions	
	Junk food prohibition sessions	
	Upgrading school canteen service system with healthy food choices at affordable prices	
	Supervising snacking behaviors partnering with local government to run school meal service	
	School meal policy	
	Awareness and motivation sessions among students, teachers, and parents	
PAR committee	Behavior-focused nutrition education	Upgrading school canteen service system School meal program School meal policy
	Activities promoting junk food's negative consequences	
	Monitoring and supervising snacking behavior within school's premises	
	Anthropometric measurements and counseling	
	Upgrading the school canteen service system	

Mapping the Intervention Action Plan

Effective implementation of the intervention action plan depends upon careful planning by the research team (Bartholomew et al., 2006). The effective way to map out the intervention action plan is to involve every research stakeholder throughout (Kok et al., 2011). Based on a proposed list of the intervention activities suggested by the school community, I, in collaboration with a team of co-researchers, involved in mapping out an intervention action plan. The plan detailed the performance objectives, intervention activities, appropriate methods and materials, anticipated

outcomes, evaluation tools and methods to assess the outcomes, and the timeline. The intervention mapping matrix (Bartholomew et al., 2006; Rajbanshi et al., 2021) was finalized (Table 13) after obtaining insights from the literature and supervisors' feedback. The finalized intervention activities were further grouped under three cycles of PAR consisting of the recursive components such as plan, act, observe, and reflect (Heslop et al., 2017; Walter, 2009) for effective implementation of the SBNEI.

Table 13. School-Based Nutrition Education Intervention Action Plan

Prioritized Needs	Performance Objectives	Intervention Activities	Target Groups	Methods	Materials	Anticipated Outcomes	Evaluation Methods	Timeline	PAR Cycle
Awareness, motivation, and commitment towards healthy eating	<p>PO1: Sensitize towards healthy eating.</p> <p>PO2: Motivate towards healthy eating.</p>	<p>Audio-visual session</p> <p>Home-visitation</p> <p>School nutrition fair</p> <p>Commitment session</p> <p>School assembly nutrition message</p>	<p>Students</p> <p>Parents</p> <p>Teachers</p> <p>School leaders</p>	<p>Demonstration</p> <p>Interaction</p> <p>Drama show</p> <p>Explanation</p> <p>Goal setting</p>	<p>Information education and communication materials</p> <p>PowerPoint slides</p> <p>YouTube videos</p> <p>Sample food</p>	<p>Motivated towards healthy eating</p> <p>Improved attitudes towards healthy eating</p>	<p>Observation (field notes)</p> <p>Conversation (field notes)</p>	January to March 2019	Cycle: I Sensitization and Motivation
School-based nutrition education	<p>PO3: Contextualize nutrition education standard curricula.</p> <p>PO4: Develop nutrition education key messages.</p> <p>PO5: Develop nutrition education teaching and learning resources.</p> <p>PO6: Empower teachers' capacity for nutrition education pedagogy.</p> <p>PO7: Develop a positive attitude towards healthy eating.</p> <p>PO8: Increase knowledge on healthy eating through nutrition education.</p>	<p>Contextualization of nutrition education standard curricula</p> <p>Teaching and learning resources development for nutrition education</p> <p>Development of key messages for nutrition education</p> <p>Teachers' professional development for nutrition education pedagogy</p> <p>Implementation of nutrition education pedagogy</p>	<p>Teachers</p> <p>Students</p>	<p>Q/A</p> <p>Group discussion</p> <p>Inquiry-based learning</p> <p>Experiential learning</p> <p>Field visits</p> <p>Simulation and role-playing</p> <p>Storytelling</p> <p>Rhyming and singing</p> <p>Group quiz</p> <p>Co-operative learning</p>	<p>NE curricula</p> <p>HPE textbooks</p> <p>AVAs</p> <p>Posters</p> <p>Flex prints</p> <p>Flip charts</p> <p>Meta-cards</p> <p>Wallcharts</p> <p>Models</p> <p>Specimen collections</p>	<p>Enhanced teachers' capacity to contextualize and implement NE curricula</p> <p>Increased knowledge, attitude, and practice on healthy eating</p>	<p>Observation (Field notes)</p> <p>Conversation (Field notes)</p> <p>survey questionnaire</p>	April to September, 2019	Cycle: II Classroom-Based Nutrition Education

Anthropometric measurements	PO9: Develop capacity for anthropometric measurements.	Capacity development for anthropometric measurements	Students	Demonstration Experiential learning Co-operative learning	Weighing machine height measuring tape	Increased anthropometric measurement skills for BMI calculation	Observation (Field notes) Conversation (Field notes)	October-2019 to April, 2020	Cycle: III Supportive School Environment
A supportive environment for healthy eating	PO11: Stop junk food eating at school premises. PO12: Develop a habit of carrying homemade foods. PO13: Active role model for healthy eating.	Carrying homemade foods at school Role modelling by students and teachers Nutrition champion session	Students	Demonstration Experiential learning Role modelling Peer education	Diaries and pen Drawing and pictures	Stopped junk food eating at school Increased number of students with homemade snack foods	Observation (Field notes) Conversation (Field notes) Survey questionnaire		
School meal program	PO14: Formulate school meal sub/committee. PO15: Manage school meal program for basic school students.	Subsidy-based school meal program Collaborative school meal service	Students	Group discussion Q/A	Minute books and pen Printed policy documents	Run school meal services for 1-5 students	Observation (Field notes) Conversation (Field notes)		
Upgrading canteen service system	PO16: Offer healthy food choices at the school canteen. PO17: Prohibit junk food at the canteen and tuck shop.	Healthy food choices at the canteen Junk food prohibition at school	School leaders Canteen personnel	Group discussion Counselling Peer education	Notebooks and pen Printed policy documents	Offered healthy food choices at school's canteen	Observation (Field notes) Conversation (Field notes) Survey questionnaire		
School meal policy	PO18: Expedite the school meal sub/committee's role. PO19: Advocate and lobby for developing school meal policy. PO20: Implement school meal policy	School meal sub/committee formation School midday meal policy implementation	School leaders Local Govt.	Advocacy and lobbying Group discussion	Minute books and pen Printed policy documents Mass media	Implemented school meal policy	Observation (Field notes) Conversation (Field notes) Document analysis		

Pros and Cons: A Decisional Balance for Intervention Implementation

I believe that ‘weighing the pros and cons of decisional balance’ (Glanz et al., 2008, p. 102) for successfully implementing the action plan is crucial. While implementing the action plan, it is wise to consider the intervention's benefits and costs. Based on the trans-theoretical model of behavior change as explained by Prochaska et al. (2015), I involved students in group discussion in order to weighing the benefits and costs of change. Basic school students were involved in the decisional balance process because they were the main target group of the intervention of the study. They discussed in the group and listed the benefits of the change while adopting healthy behavior and the costs of the change while continuing the old behavior. Table 14 portrays the decisional balance in detail.

Table 14. *Decisional Balance for Action Plan Implementation*

Decisional balance	Adopting healthy behavior	Continuing unhealthy behavior
Benefits of change (Pros)	Maintains good health	Good taste to eat
	Fulfills nutrients requirements	Easy access to buy
	Reduces pocket money expenses	Convenient to carry
	(Cost-effectiveness)	Available at a low price
	Promotes homemade foods	Appealing looks with an attractive scheme offer
	Could be a role model in the school	
	Gains ideal body weight and height	
Cost of change (Cons)	Develops life skills to become a self-reliant	
	No time and idea to prepare	Demand high pocket money
	Hassle to carry all day	Feeling quick hungry
	Constraints to store the lunch box in the classroom	Exhaustive and tiredness
	Less palatable	Stomach pain and bowel disorder
	Boring to eat the same foods at home and school	Feeling weak and dizzy
	Environmental pollution due to junk foods' wrapper	

Table 14 reveals that the pros (benefits of change) factors indicating healthy nutritional behavior are heavier than the cost of change. It suggests that students are motivated towards adopting healthy behavior though some pooled factors remained active to reverse the old behavior. Further, students opined that the costs of the change were no time to prepare homemade food, extra-burden of purchasing lunch carrying

boxes for carrying homemade foods, need space for storing the lunch boxes in the classrooms, and the boring taste of homemade foods. They also reasoned that poor health conditions, increased pocket money, feeling quickly hungry, stomach disorder, environmental pollution, feeling weak and dizzy were the cons for carrying existing nutritional behaviors.

Chapter Summary

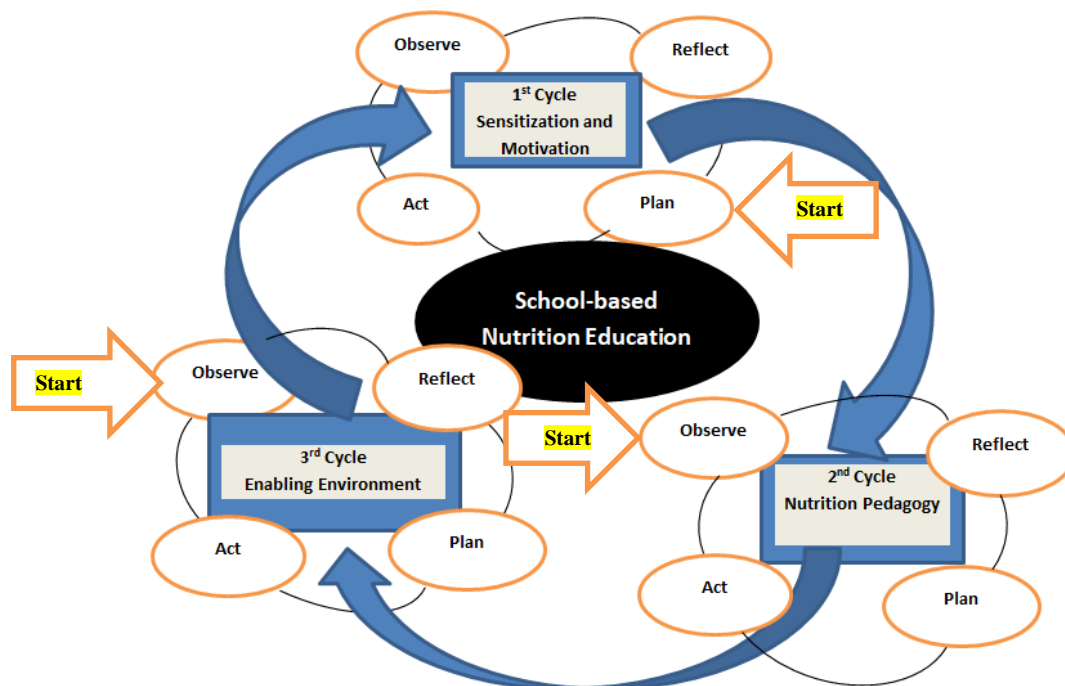
This chapter presented the details of how university teacher collaborated with the school community as the co-researchers to explore and prioritize the school health and nutrition-related needs and co-develop the intervention action plan undergoing participatory framework. The study suggests that children's food choice and dietary behavior are influenced by multilevel determinants extending from individual to environment. The study co-developed a three-dimensional intervention that includes 'sensitization and motivation', which focuses on increasing awareness and enhancing the motivation of the students towards healthy nutrition outcomes; 'nutrition pedagogy' which focuses on strengthening students' food and nutrition knowledge, developing positive attitudes and healthy dietary practices; and 'supportive school environment' which focuses on creating a supportive school environment to sustain healthy nutrition outcomes. A decisional balance for action plan implementation shows that benefits of change for adopting healthy behaviors are weighed than continuing unhealthy. Similarly, the cost of change for adopting healthy behaviors is less weighed than unhealthy behaviors that encouraged implementing intervention. In the next chapter, I discuss how I collaborated with the school community while co-implementing the intervention activities following the PAR cycles.

Chapter Five

Implementation of School-Based Nutrition Education Intervention

This chapter seeks to answer the research question, i.e., how can a school-based nutrition education intervention (SBNEI) be co-implemented? The SBNEI activities were co-implemented undergoing three participatory action research (PAR) cycles: ‘sensitization and motivation’, ‘classroom-based nutrition education’, and ‘supportive school environment for sustainability’ following the planning, acting, observing, and reflecting components of the PAR cycle, in a cyclical model (McNiff & Whitehead, 2002). Though we (university researcher and school co-researchers) intended to implement intervention activities from January 2019 to April 2020, the duration was extended until 2022 due to the emergent nature of the PAR cycle activities based on the context and the unprecedented conditions created by the Covid-19 pandemic. The forthcoming sections explain how I collaborated with the school community while implementing the SBNEI undergoing three PAR cycles.

Figure 15. *PAR Cycle Intervention Activities*



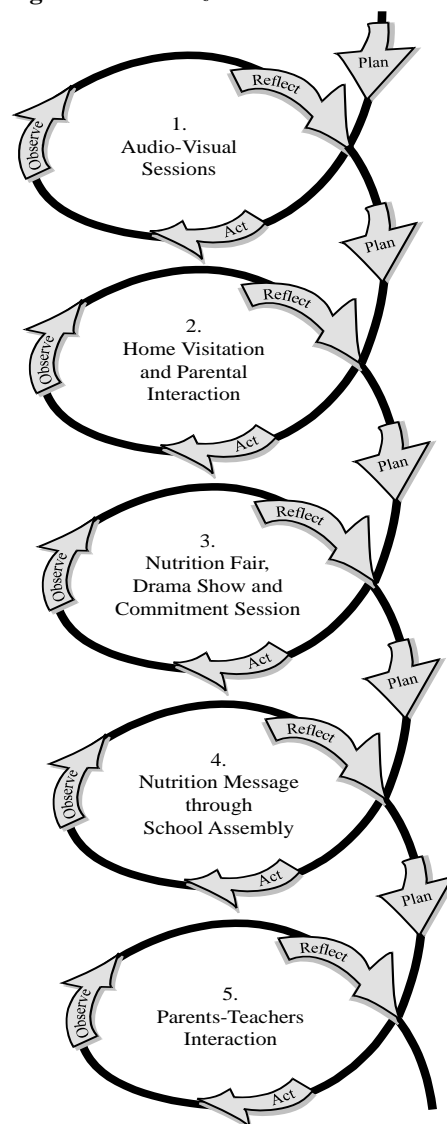
PAR Cycle-I: Sensitization and Motivation

The intervention activities under this PAR cycle were co-designed to sensitize and motivate the basic children and their parents against unhealthy nutritional behaviors. We co-implemented five intervention activities such as i) audio-visual session, ii) home visits and interaction, iii) drama show, nutrition fair, and expression of commitment, iv) short speech on nutrition, and v) parent-teacher interaction under the sensitization and motivation PAR cycle. We used local media and materials such as information education and communication (IEC) and locally available low-cost or no-cost resources while implementing the session activities. These intervention activities primarily targeted the basic children and their parents. The intervention activities under this PAR cycle were co-implemented between January and March 2019. We planned, acted, observed, and reflected on each activity before we switched to the next (Figure 17). Based on the insights and reflections on each action, we co-implemented subsequent intervention activities with necessary modifications.

Audio-Visual Session Activities

Audio-visual session activities could best motivate young children towards healthy food choice and dietary behavior (Hedaoo & Vali, 2015) and they are considered effective in motivating children since they offer multiple learning

Figure 16. *Sensitization and Motivation*



opportunities in the classroom. We co-implemented various activities under the audio-visual component. The audio-visual component further included three session activities (Table 15).

Table 15. *Audio-Visual Session Activities*

Activities	Learning lessons	Learning materials	Source of materials
Use of IEC materials	Name of healthy foods	Picture Illustrations	Prepared by students
	Name of junk foods		Prepared by students
	Benefits of homemade foods	Play cards	Prepared by students
	Effects of junk foods		Obtained from NHEICC
	Nutrition requirements	Flip charts	
	Cause and prevention of malnutrition		
	Importance of a balanced diet Prevention against malnutrition Ways to promote healthy eating	Posters	Obtained from NHEICC, NTAG and SUA AHARA Nepal
PowerPoint presentations (PPT)	Health hazards of junk foods	Brochures and leaflets	Obtained from health post and NHEICC
	Utilization of foods		Obtained from NHEICC
	Nutrition and adolescent health	Booklets	Prepared by researcher and co-researchers
Motivational video show	Homemade foods for school meals	PPT on junk foods PPT on alternatives to junk foods	
	Effects of junk foods on young children's health	Video sharing against junk foods Video sharing against homemade foods	Archived from YouTube

Use of IEC Materials. We used IEC materials like picture illustrations, play cards, posters, flip charts, leaflets, brochures, and booklets conveying the food and nutrition messages to students and their parents. The IEC materials used for audio-visual session activities were managed at low and/or no cost. We involved children of grades 6-8, in developing the IEC materials. Teacher co-researchers were also involved in developing the materials and helped students with basic guidelines (themes of the pictures) for preparing IEC materials. In addition to them, we also collected learning materials from the health post near the action school; SUA AHARA

Nepal, Lalitpur; Nepali Technical Assistant Group (NTAG), Kathmandu; National Health Education Information and Communication Center (NHEICC), Kathmandu.

We implemented theme-based communication strategies for students of different ages to motivate them towards healthy dietary behaviors. We used picture illustrations and placards among grades 1-3 students. Similarly, picture illustrations, placards, flip charts, and posters were used among grades 4-5 students. And placards, posters, flip charts, brochures, leaflets, and booklets were used among grades 6-8 students. We used ‘nurturing communication strategies’ to motivate students towards healthy dietary behaviors and ‘fear communication strategies’ against unhealthy dietary behaviors. Besides, we also involved students in the question-answer sessions using IEC materials. We divided students into sub-groups and asked them to share their feelings reflecting on the IEC materials. Most session activities were held in the ICT and library halls since the rooms were larger enough to undertake activities other than classroom settings.

PowerPoint Presentation. We used PowerPoints Presentations (PPTs) to motivate students to healthy school meal consumption. In so doing, the teacher co-researchers selected the key messages of learning, and I designed PPTs accordingly. We made PPTs more pictorial with fewer text messages and organized presentation sessions for children. After every single presentation, we involved students in reflecting on PPTs. Middle and upper-basic students shared their learning experiences on PPTs, whilst lower-basic students could not entertain. The presentation sessions were held in the ICT hall, where the hall was equipped with multimedia facilities (laptop, project, and a screen to reflect). I continually supported teacher co-researchers in preparing and using the PPTs. This kind of collaborative action inquiry empowered the teachers using PPTs in classroom teaching.

Motivational Video Show. We used motivational YouTube videos that could reflect the message of the health effects of junk food consumption and the health benefits of homemade foods. We retrieved ten videos in the initial phase. We filtered the videos based on the inclusion criteria such as videos should convey the message against junk foods or giving value on homemade foods, time length no longer than ten minutes, language script developed either in Nepali (most preferable) or Hindi or English (least preference) and having the high definition (HD) quality. Finally, we downloaded five videos that met the above criteria, amongst which two were in Nepali, two in Hindi, and one in English script. Though the selected videos targeted children, we also used the same videos for parents.

It took five weeks to share all five videos with students since we showed one video to a class once a week so that students could understand a single message in a week and discuss it with their friends and family members. The video show sessions were held in the ICT hall of the school. During the video show, I helped the teacher with technical support and explained the video's message as needed. Such a collaborative effort empowered the teacher to develop the skills of using videos in classroom teaching.

Home Visits and Parental Interaction

The needs assessment study suggested that familial environment plays a crucial role in determining students' nutritional behavior (Upreti et al., 2021). In collaboration with parents, we utilized home visitation—a pedagogical tool to promote healthy eating behavior in children. In so doing, we reached home during school off-hours. Home visitation and parental interaction strategy effectively sensitized and motivated both parents and their children in forming healthy dietary behaviors. I involved teachers from the same community in visiting homes after

school hours and on Saturdays and also in public holidays. This collaborative effort between the PhD researcher and the teacher co-researchers made me feel comfortable interacting with parents.

With the parents we talked about their children's daily routines at home. Many parents complained about their children's daily routines and requested us to help them reduce their screen time on mobiles and TV. We also involved children in parent-teacher-interaction and talked to them on these issues. Parents, who engaged in PPTs presentations and video show sessions, proactively dialogued with us. We also discussed with parents about children's dietary behavior at home. We encouraged them to manage homemade lunch and send it to the school. We also discussed harmful effects of junk foods on children's health with evidence. Most parents agreed to manage homemade lunch for their children. We also encouraged children to prepare their lunch by seeking parental support. Most students, who were already involved in PPT and video show sessions, showed keen interest in carrying homemade lunch.

Figure 17. *Home Visit and Interaction with Parents*



Nutrition Fair, Drama Show and Commitment Session

Nutrition fairs, drama shows, and commitment sessions were implemented to motivate students towards healthy dietary behavior. Such session activities also sensitized parents and school community to improve their dietary behavior. We

involved parents, school management committee, parent-teacher association, community people, political leaders, social activists, and local media personnel in participating in the intervention activities on the occasion of the 59th School's annual and Parents' Day, which was held on 22 February 2019 at school, we organized a nutrition fair, drama show, and commitment session activities on the day.

School Nutrition Fair. A nutrition corner was set up on the school's ground floor, next to the program stage and we (university researcher, teacher co-researchers, and student co-researchers) displayed IEC materials, which were prepared for audio-visual sessions, to sensitize the visitors against junk food consumption and motivate them towards healthy meal selection. Some students supported the visitors by communicating the nutrition messages conveyed through the displayed IEC materials. We (PhD researcher and health education teachers) were also involved in communicating with visitors if students could not explain the message rightly.

Figure 18. *Nutrition Corner on the School's Annual Day-2019*



We also displayed a model nutrition plate of a balanced diet, made up of locally grown and available foods managed by students. Students collected locally grown rice grains, potatoes, yam, Colocasia, banana, and bee-honey under the energy-giving food group. Similarly, they collected whole beans, milk, mushroom, and eggs

under the bodybuilding group. The body-protective group consisted of green veggies, leaves, and seasonal fruits.

The samples of homemade lunch boxes were another attraction of the nutrition fair. Students demonstrated homemade lunch boxes as sample models. The sample lunch

Figure 19. *Sample of Homemade Lunch Boxes*



boxes consisted of boiled potatoes and yams, boiled and fried eggs, fried rice, curry and beaten rice, seasonal fruits like guavas, apples, bananas, and fried and boiled maize. The showcases of homemade lunch boxes could convey the message to the visitors about the importance of locally available foods.

Drama Shows. Drama shows, another method of sensitizing and motivating the students, can be promising in promoting the healthy dietary behaviors of young children (Parker, 1997). We developed a theme for a drama titled “*बानि ब्यबहार आचरण हुन्छौं हामी रुपान्तरण*” meaning to ‘we transform through our conduct and behavior’. We engaged students in writing the script for the drama show. The teachers reviewed the script and added some text and finalized it. Teachers selected the characters for drama based on their interests and voluntary participation. Students were involved in the rehearsal practice for a couple of days. We observed students’ rehearsal practice and provided them with feedback to improve their roles. Students demonstrated a drama show on the annual day of the school. The length of the drama show was ten minutes. Students, teachers, parents, school leaders, community people, and the invited

delegates observed the drama show. The drama transmitted the message of promoting homemade lunch at school and discouraged the use of junk food.

Figure 20. *Students Performing Drama show on the 59th School's Annual Day*



Commitment Expression. On the occasion of school's annual day, we asked all the teachers, school leaders, parents, community people, and guests of the program to put their signatures on the flex print just below the commitment dialogue box. The participants read the message and put their signatures. The written message for commitment was 'we will send homemade lunch boxes to our children'. We collected around five hundred signatures from the visitors.

Figure 21. *Parental Involvement in the Commitment Session*




After involving the visitors in the commitment session, parents suggested involving children in the commitment session against junk food consumption. Following the parents' suggestions, we organized students' commitment sessions in the subsequent days. For this, we gave them a pledge card (Figure 22) to commit against junk food consumption by putting their signature. Participation was optional; however, most students signed on the card and returned us except a few (mostly from seventh and eighth grade). Students committed that they would not eat junk food as their school lunch; instead, they would consume fresh and healthy foods.

Figure 22. *Sample of Pledge Card*

Junk Food Pledge Card

I am..... I study
in grade..... at school. I live in
..... municipality of
district. I hereby would like to commit that today onwards I eat only home
prepared, or canteen-made snack foods at school. I shall never eat junk
foods at school premises.

.....
(Date)



.....
My Signature

Brief Speech on Food and Nutrition

Children delivered a short nutrition speech in the morning assembly once a week (mainly on Sunday but in the case of public holidays, on the subsequent days). Students were independent in choosing the theme for speech without repeating the previous ones. The grade teachers selected students' name lists for speech. Teachers helped them prepare a short speech to deliver. Some upper-basic students arranged memorized speeches to deliver, while others preferred written speeches. Table 16 displays the theme of a nutrition speech delivered by students.

Table 16. *Themes of Speech on Food and Nutrition*

Week	Themes of speech	Speakers
First	Introduction, source, and functions of the foods	6 th grade, Boys
Second	Importance of a balanced diet	6 th grade, Girls
Third	Health hazards of junk foods	7 th grade, Girls
Fourth	Alternative option of junk foods	5 th grade, Boys
Fifth	Role of local media on junk foods selection and consumption	8 th grade, Boys
Sixth	Importance of homemade foods	5 th grade, Girls
Seventh	Role of the canteen to promote healthy eating behavior	8 th grade Boys
Eighth	Healthy school meals	7 th grade, Girls
Ninth	Utilization of locally grown and available foods	7 th grade, Boys
Tenth	Linking gardening activities with school nutrition	8 th grade, Boys

Parent-Teacher Interactions

We held a parent-teachers meeting of grades 1-3, 4-5, and 6-8 separately in the school. The parents' presence was overwhelming, where the female parents' participation was higher. They were housemakers, followed by farmers; the least were daily wage earners and service holders. At the beginning of the interaction, we discussed children's classroom learning behaviors, followed by students improved dietary behaviors. Most parents complained about the unhealthy eating behaviors of children. The teachers encouraged parents to manage homemade lunch boxes for their children. But parents were focused on reforming the school's canteen service system. They argued that children do not like to carry homemade lunch boxes to school; instead, they ask for pocket money.

Figure 23. *Parents-Teachers Interaction at School*

Based on the parents' request, we involved needy students, who were unwilling to bring homemade lunch boxes. Teachers encouraged them to bring homemade lunch boxes instead of pocket money. In the meantime, I also encouraged parents and students to manage healthy lunch boxes from home through art-based performances like nutrition poems. After all, we asked some parents and students to share their feelings after listening to us. Many of them were positively encouraged. However, they argued that carrying homemade lunch boxes during the summer was risky since the cooked foods get quickly spoiled. Therefore, the parents focused on reforming the canteen service system with affordable and healthy food choices. The parent-teacher interaction program proved to be a cornerstone for reforming the canteen service system because the canteen reforming work got priority after this program.

Once the students, teachers, and parents became critically aware of the unhealthy dietary behaviors of children and their jeopardizing effects on health, they committed towards promoting healthy dietary behaviors in children. As a result, I connected with the school community, particularly teachers, towards classroom-based nutrition education pedagogy.

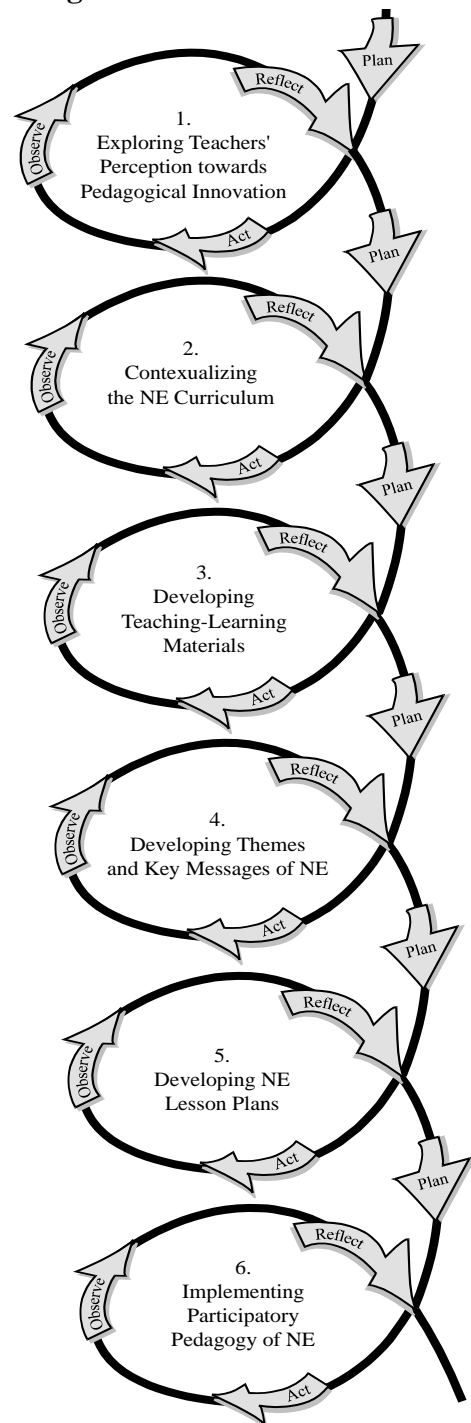
PAR Cycle-II: Classroom-Based Nutrition Education

Studies suggest that classroom teaching of nutrition education promotes healthy dietary behaviors among young children (Jadgal et al., 2020; McCaughy et al., 2011). The findings from the needs assessment study (Chapter 4) also focused on implementing nutrition pedagogy with transformative thinking and acting to strengthen students' food and nutrition knowledge and dietary intention and attitudes to bring positive changes in dietary behaviors. Given the context, the second PAR

cycle, ‘pedagogies of nutrition education’, was co-implemented. Implementing the pedagogies of nutrition education had two aims. The first was to increase food and nutrition knowledge, develop a positive dietary intention and attitude, and develop healthy dietary practices. And the second was to empower basic school science and health education teachers to use participatory pedagogies in classroom teaching to transform nutritional behaviors of children.

The 2nd PAR cycle-related session activities were implemented in two phases. The first was implementing participatory nutrition education pedagogies for grades 6-8, and the second for grades 1-5. Though we (researcher and teacher co-researchers) were planned to implement nutrition education pedagogy from lower grades, it could not happen because the school calendar suggested us to begin from the upper basic classes. According to the school calendar of 2075 BS (2019), the food and nutrition-related lessons were scheduled for the first term course for grades 6-8. I collaborated with basic school science and health education teachers to contextualize nutrition education curriculum integrating with science education from grades 1-5 and health education from grades 6-8.

Figure 24. Classroom-Based NE



We implemented activities aimed at: i) exploring teachers' intention towards pedagogical innovation, ii) contextualizing the nutrition education curriculum, iii) designing the themes and key messages of nutrition education, iv) developing the teaching-learning materials of nutrition education, v) designing the nutrition education lesson plans, and vi) implementing the nutrition education lessons undergoing the PAR cycle. We implemented the 2nd PAR cycle-related session activities from April to September 2019. We planned, acted, observed, and reflected upon each session activity before switching to the next one.

Exploring Teachers' Perception towards Pedagogical Innovation

I discussed with the teachers how they taught nutrition education lessons in their classes. Teachers offered me to observe their classes before we co-implemented nutrition education classroom teaching. They discussed that they have been using traditional teaching methods (teacher-centered) to teach nutrition education contents. But some of them argued that they have been teaching nutrition education contents by connecting students with real-world problems. However, they mainly concentrated on preparing students for the exam. They minimally followed the teaching-learning activities suggested by the curriculum guidelines. Most teachers used traditional teaching materials such as whiteboards, markers, and textbooks. However, fewer of them have used audio-visual aids and locally available materials to teach nutrition education lessons. They have commonly applied teacher-centric pedagogies like question-answer, discussion, and lecture. However, some teachers organized field visits, dramatization, and problem-solving methods. Teachers argued that they were afraid of some contextual challenges like large class size, time and resource constraints at school, examination-focused tradition of teaching, and divergent socio-cultural backgrounds of students to uptake participatory methods in classroom

teaching. One of them argued, *“In our case, it is quite challenging to teach nutrition education-related lessons using participatory teaching methods since we are asked to finish the course within a given time frame”* (Male Basic School Teacher). Another teacher opined that she had no time to prepare teaching materials, *“It is troublesome for us if we involve in developing teaching materials for participatory classroom teaching since we have fewer leisure periods”* (Female Basic School Teacher). The next teacher added that he feels more comfortable using teacher-centric teaching methods than others, *“We are compelled to use teacher-centric teaching methods because these methods are convenient to apply in a large-sized class. We cannot finish the course on time if we offer student-centric methods”* (Male Teacher).

It was evident that teachers adhered to traditional teaching methods, they had no time to adopt student-centric teaching methods, and they did not get exposure to participatory teaching methods yet. They believed that having a large-sized classroom could impede implementing participatory teaching methods. But, after having frequent discussions about fostering the possibilities of pedagogical innovation within the given context, they were ready to be involved in the transformative journey of classroom learning.

Contextualizing the Nutrition Education Curriculum

After reviewing the curricula of nutrition education, we (PhD researcher and teacher co-researchers) explored a gap between the curricular expectations and the existing needs of children. The curriculum mainly focused on learners' cognitive domain but less on real-world problems. We reflected that the existing NE curriculum

could not transform students' nutritional behavior if it was not contextualized further. Thus, we co-worked to contextualize the curriculum.

Figure 25. *Teachers' Involvement in Contextualizing the Curriculum*



We contextualized the curriculum by keeping the learners' socio-cultural context in the center, as explained by Gay (2002). I frequently discussed with the teachers about making the curriculum culturally inclusive and responsive by reflecting on students' family backgrounds like ethnic and religious diversity, parental occupation, and locally cultivated foods in the farming field. Home visitation and parental interaction also enabled us to make the curriculum culturally inclusive and responsive. Further, teachers involved in the curriculum contextualization process were familiar with students' socio-cultural diversity because most teachers belonged to the same communities from which students represent. I also interacted with school leaders to get their perspectives about students' socio-cultural backgrounds and help us make the curriculum culturally inclusive and responsive. The team of teachers redefined the learning objectives, content specifications, teaching-learning materials and methods, and evaluation techniques. A bridging workshop held among the PhD researcher, teacher co-researchers, and the school leaders (HT, SMC, and PTA) enabled us to finalize the curriculum. Finally, the school administration approved the

contextualized curriculum of NE (Appendix S) for the basic school level to implement for the academic year of 2076/77 (2019/20).

Developing Teaching-Learning Materials

Teaching-learning materials are the effective means to teach NE lessons since these materials enable to learn the message with visual perceptions (Halliday, 2020).

We developed teaching-learning materials to implement the contextualized NE curriculum for the basic school. These curricular resources are pivotal to nudging students' nutritional behavior by fostering knowledge and behavioral intention. For this, we maximally utilized the local resources as teaching materials. Besides, teachers were involved in developing the classroom teaching materials like picture illustrations, wall charts, play cards, flip charts, pocket charts, and meta-cards.

Figure 26. *Involvement in Developing Teaching-Learning Materials*



Students also collected real specimens such as staple foods, legumes, pulses, vegetables, and fruits, including eggs and milk. Besides, we developed printed materials like posters, charts, meta cards, and picture illustrations. We also reused IEC materials which were used during sensitization and motivation cycle. We mobilized local human resources (students, teachers, parents, local farmers, and health workers), physical resources (classroom, ICT, and library halls), socio-economic capital (locally grown foods, kitchen garden, health post), and ICT resources (projector, screen board, laptop) as the teaching-learning materials to implement contextualized nutrition education curriculum.

Developing Themes and Key Messages of Nutrition Education

The teacher co-researchers and I were involved in developing the major learning themes of nutrition education. We first categorized the similar nature of lessons under a theme. We labelled them with unique names: ‘basics of food and nutrition’, ‘locally grown and available foods’, ‘healthy foods for a healthy life’, ‘adolescent’s nutrition’, ‘junk foods’, ‘malnutrition’, and ‘self-appraisal of nutritional status’. Following the themes, the key messages were developed. Students were also involved in developing the key messages of nutrition education. Students received proper guidelines from teachers to develop the nutrition education messages under each theme. A sample text was presented in the classroom, encouraging them to create messages. We collected NE messages from students and finalized them, considering the nature of learning themes. The key messages were prepared in the local (Nepali) language since teachers and students could easily understand the message (Table 17).

Table 17. *Lessons, Themes and Key Messages of Nutrition Education*

Nutrition lessons	Major themes	Key nutrition messages
Daily eating foods		
Raw edible foods	Basics of food and nutrition	Carbohydrates, protein, fat, vitamin, fiber No doubt they’re the human body’s driver
Introduction to food, nutrition, and nutrients		
Need, sources, classification, and function of food		
Nutrients and their functions		
Locally grown and available foods		
Organic foods	Locally grown and available foods	Flour of wheat, maize, millet They make many dishes, so sweet
Harmful effects of agrochemicals		
Kitchen garden and nutrition		
Healthy and nutritious foods		
Healthy ways of eating	Healthy foods for a healthy life	A healthy, nutritious, and balanced diet This is nutrition for all of us, right?
Water for life		
Fruits and vegetables		
Balanced diet: concept, need and importance, selection, preparation, and consumption		

Healthy school meals		
Nutrient's preservation		
Meaning and characteristics of adolescence	Adolescents' nutrition	Eat healthy food to keep your body healthy Listen, friends, learn it for your healthy body
Need for nutrition during adolescence		
Meaning, sources, conducive factors, effects, and alternatives to junk food consumption	Junk foods	Those who eat junk foods Decreasing their life expectancy
Malnutrition: concept, causes, signs and symptoms, and preventive measures	Malnutrition	May cause night blindness, marasmus, kwashiorkor
Effects of malnutrition		Think disease may worsen health badly.
Malnutrition and diseases		
Anthropometric measurements	Self-appraisal of nutritional status	Let's measure weight, height regularly and keep a balance to become healthy

Developing Nutrition Education Lesson Plans

We developed classroom-based nutrition education lesson plans following the major themes and key messages of nutrition education. In so doing, I discussed with the teacher co-researchers in their leisure time how to prepare nutrition education lesson plans. We discussed how nutrition education lessons could be taught using participatory methods. We spent a couple of days discussing how nutrition education pedagogies can foster students' meaningful engagement in learning, which could effectively anticipate their healthy nutritional behavior through increased knowledge and behavioral intention. Keeping these concerns in mind, we drafted model lesson plans and shared them with each other. We did that in the teachers' leisure time and after school hours. We merged the concepts and modified the lesson plans based on our reflective discussion. Besides, we also discussed how parents, local farmers, and health (nutrition) professionals could be mobilized in nutrition education class. In so doing, we talked with parents, local farmers, and health professionals about their role in implementing nutrition education lesson plans in the classroom. They were interested in being a part of participatory classroom teaching. The SMC also

suggested incorporating the role of the school leaders in classroom teaching. After collecting the school community feedback, we developed lesson plans to teach.

Implementing Participatory Pedagogies of Nutrition Education

We implemented participatory pedagogies to teach NE lessons from sixth to eighth grades in the first trimester of the 2076/77 BS (2019/20) academic year, which was extended from Baishakh (April) to Ashad (July). But in the lower grades (first to fifth), we did it during the second trimester, extended from Shrawan (August) to Ashoj (October). We implemented three lesson plans weekly at every class (if there were no public holidays). Each lesson was taught under the Science and Health Education subject without interrupting the regular schedule of the school. Each class consisted of 40-50 minutes (50 mins for the first period, 45 mins for the second to the fourth and 40 for the fifth to the seventh period).

I co-worked with Science and Health Education teachers to implement the lesson plans. The teacher(s) worked as a lead facilitator, and my involvement was just as a co-facilitator to help them. Besides, we also collaborated with school leaders (HT and SMC), parents, local farmers, health workers, and nutrition professionals while implementing the lesson plans.

We implemented nutrition education pedagogy, assuming that the local place is the learning arena for the learners and the local experts like parents, farmers, and health workers are the teachers. For the delivery of the lessons, we used various participatory methods such as arts-based learning, small-group learning, experiential learning, multimodal learning, and home visitation and counselling.

Arts-Based Learning. This approach allowed artistic skills, processes, and experiences to foster students' learning capability through their active participation in the learning process. Arts-based pedagogy is considered an effective means of achieving positive outcomes in learners' behaviors. Children learned artistic endeavour through art-based learning. These artistic endeavors developed creativity, confidence, non-verbal cues of action, collaboration, dedication, and accountability skills. Under the arts-based learning, we included drawing and colouring, gameplay, storytelling, rhyming and singing, and role-play methods.

Figure 27. *Arts-Based Learning Among Young Children*



Drawing and Coloring. As integrating the elements of visual arts (drawing, painting and colouring) develops transformative learning behaviors among children (Bynoe, 2017; Dhanapal et al., 2014), we integrated drawing and coloring elements of visual arts into the nutrition lessons from the first to fifth grades. Since young children enjoy their learning with drawing and colouring activities, we got them involved in the drawing and coloring activities. First to third-grade students filled out natural color on the dotted figures, whilst fourth and fifth-grade students sketched themselves and colored the pictures of fruit and vegetable that they liked most. Drawing and colouring activities increased students' creativity, concentration, and culture of collaboration.

Gameplay. We used nutrition gameplay as a participatory learning method under the arts-based approach. We involved students in the word and picture puzzles games, match the food groups using meta cards, and quiz contests activities under the gameplay methods. For instance, while we taught a lesson of healthy food, we involved students in identifying if the foods demonstrated via models, pictures, and natural specimens if they were healthy to eat. Similarly, while teaching basic food groups, students were involved in classifying the foods under the energy-giving, bodybuilding, and body-protecting foods. For that, meta cards were given to students. After observing the food name displayed on the meta cards, they answered the name of basic food groups turn by turn. All the participants actively participated in the learning process.

Figure 28. *Learning Through Gameplay Method*



Rhyming and Singing. The literature suggests that rhyming and singing would highly motivate young children if the songs were related to their real-world situations (Millington, 2011; Sevik, 2011). The teacher co-researchers and I were involved in composing nutrition poems and songs to teach nutrition education-related

lessons. However, students also composed nutrition poems. Using poems and songs-based pedagogy among the young children effectively engaged students in learning the word vocabulary of the locally grown and available foods, their nutritional value, and functions. Young children, mainly grades 1-3, enjoyed the nutrition poem. Shehadeh (2014) also exemplified that child songs could play a significant role in the cognitive development of learners.

Storytelling. Storytelling is an innovative approach to stimulate young children in the learning process with active participation (Catala et al., 2017). We used a dilemma storytelling approach, as explained by (Taylor et al., 2013) allowing the learners to reflect individually on dilemma question(s), engaging them with their self-reflection on taken-for-granted assumptions grounded in personal values. We told culturally sensitive and locally relevant

Figure 29. A Showcase of Nutrition Poem



Figure 30. Storytelling with Students



stories. The stories were co-composed by the researcher and the teacher co-researchers. Students patiently listened to the stories and raised questions with teachers in between the stories. This study found that storytelling developed logical power among the learners. A teacher co-researcher who implemented the storytelling method explained that it developed argumentative power among the learners. He opined, “*Storytelling is an effective method to allow learners’ argumentative decisions towards the given situation in classroom teaching. I would choose such a participatory method in my classroom teaching*” (Basic School Science Teacher, Focus Group). Through the storytelling method, it was helpful to draw learners’ active participation with critical thinking, self-reflection, social interaction, emotional learning, and problem-solving attempts towards the given situation to the learners.

Roleplaying. Roleplaying, a participatory teaching strategy applied in nutrition education, is a game-like activity based on the performance of one or more characters in a story that allows learners to interact between participants and a simulated situation. Through roleplaying, participants put themselves in someone else’s place, and feel and see the world through the eyes of others (Tsergas et al., 2021). This study integrated roleplaying as a strategy to teach NE in the classroom. We followed three phases of roleplaying, as explained by Tsergas et al. (2021). In the first phase, ‘preparing for roleplaying’, we selected the issue or problem, assigned the roles to students, and helped them prepare the scripts and subsequent rehearsals. In the second phase, ‘roleplaying’, classroom management was arranged adequately in a way as to accommodate the requirements of the roleplaying (furniture, demonstration materials like flashcards, pictures, meta cards.) so that participating attendees could observe the performance. The teacher and educator facilitated students to perform

their roles as per the scripts prepared. At the final phase, ‘discussion and assessment’, we encouraged participants to express their feelings and thoughts upon their roles.

Figure 31. *Teachers’ and Students’ Involvement in Roleplaying Method*



Through the roleplaying method, it was helpful to develop collaborative skills among student participants, which further developed social interaction skills as it triggers individual participation in social interactions. Moreover, it also fostered the active involvement of learners in the learning process. Besides, it is a friendly, playful, and appealing method, which reinforces children to tap the power of personal responsibility in the learning process and further develop a sense of social responsibility.

Small Group Interaction Approach. A small group consists of 5-8 students who learn together (Mills & Alexander, 2013). Through this approach, students were encouraged to actively participate in the learning process and work together to support each other’s learning. Teachers’ role is to facilitate students to work through learning activities and tasks. The learning activities and tasks encourage students to think for themselves, share their provoked ideas and thoughts, and develop collaborative skills (Exley et al., 2019). The group learning approach assumes that learning is an inherently social phenomenon enabling learners to discover deeper meaning and critical thinking skills (Davidson et al., 2014). This study confirms that small-group

learning improves classmate relationships and learning achievement, solves problems, develops a deeper understanding, develops social and leadership skills, and promotes self-esteem more than the self-learning approach. Teachers used brainstorming, think-pair-share (TPS), turn-and-talk, group discussion and presentation, and jigsaw methods under the small group learning approach.

Brainstorming. We used brainstorming to explore students' creative and critical thinking based on the questions posed to students in the classroom. We involved students to reflect upon the questions: How do foods help our body function? What could be the alternative to consuming junk food? How can junk food consumption be discouraged at school? We posed such questions to develop their cognitive abilities like creative imagination, reflective thinking, and problem-solving. Initially, students were hesitant to respond to the questions as they were not frequently exposed to brainstorming methods early. But we continually encouraged and inspired them to reflect on the queries. We received various ideas and thoughts from each group. We put their ideas and thoughts into the whole class for further discussion in a free and fearless manner, focusing on if the reflected ideas and thoughts could be applied. This study reveals that brainstorming strategies improve students' creative and critical thinking skills. This result is corroborated by a couple of studies conducted among children in Bahrain (Taleb et al., 2013) and Saudi Arabia (Al-Shammari, 2015).

Think-Pair-Share (TPS). TPS is a small group participatory learning technique that increases students' participation by allowing a group of collaborators to interact and share ideas, leading to knowledge building among them (Azlina, 2010). We involved students in TPS activities, asking them the question of what food items were found in their locality that comes under the basic food groups. They answered

this question by involving themselves in three inherent learning phases of TPS, as Azlina (2010, p. 24) explained. In the first phase, each participant brainstormed on the given task within a given time. Afterwards, the teacher facilitator cued students to share their responses in a pair and discussed provoked thoughts. And at the last phase, each paired group shared their response with others. The results of this study reveal that TPS enabled students to think individually, talk to each other in pairs, and share responses in a larger group. It developed social learning skills for shared understanding between teachers and students. This result is very closely consistent with a study conducted by Azlina (2010) among web-based learners in Malaysia and experimental research which assessed students' speaking performance through the TPS (Cahyani, 2018).

Turn-and-Talk. It is a form of collaborative learning that promotes peer dialogue conversation to improve learners' communicative skills, vocabulary, and knowledge (Stewart & Swanson, 2019). Throughout the lesson, we involved students from grade five to eight in turn-and-talk opportunities to answer the questions (prompts) such as why are foods essential to human body? What diverse foods be included in a balanced diet? What snack foods can be managed at school to replace junk foods? We followed three steps of turn-and-talk as a learning method explained by Stewart and Swanson (2019, p. 4). First, the teacher facilitator gave students a written and spoken prompt to discuss the content. Second, students turned to nearby partners and answered the prompts while others listened. Thirdly, the partner switched roles, allowing the partner to respond to the prompts. The outcomes of the turn-and-talk learning strategy remained hallmarks to provide students with a multitude opportunity of developing communicative skills, ensure active engagement in classroom learning, sustain attention, and focus on the learning, and develop

collaborative skills to co-learn from peers. The results were positive like in a study conducted among middle school students in the US (Vaughn et al., 2017) and a study that used a turn-and-talk template to teach nutrition-related content via web-based learning during the Covid-19 crisis (Cartwright & Filimon, 2020).

Group Discussion and Presentation. It is a brainstorming strategy where a small group of students discuss a specific topic or problem to generate common and shared ideas or solutions and present them to a larger group. This strategy provides an equal opportunity for all the participants to learn, where multiple discussions occur within and among the group. We involved sixth to eighth-grade students in the discussion to get their varied responses on the sources and functions of nutrients. The task was given in advance so that each group member prepared the lesson accordingly. Printed hands-out as supplementary reading resources were provided to each group to prepare for their task. All students were divided into five groups and asked each group to discuss per se the source and functions of any one among the carbohydrates, protein, fat, vitamins, and minerals. During the discussion, some group members continued to enlist the key points revealed by the group conversation. At the end of the class, two students (one boy and one girl) from each group jointly presented their task, turn by turn. During the discussion, the teacher co-researcher(s) played the role of guide and motivator. This study reveals that group discussion and presentation strategies among children improved creative and critical thinking, social learning, and communicative and collaborative skills in learning. A systematic review study demonstrated that small group discussions could effectively teach science education (Bennett et al., 2010).

Jigsaw Method. It is a cooperative learning technique that allows students to teach their peers in small groups and cultivates interdependence through learning tasks. It develops a self-regulated learning environment in the group. We used a jigsaw teaching strategy among eighth-grade students to teach the lesson about diseases caused due to malnutrition.

Figure 32. *Students Involved in the Group Discussion and Presentation Activity*



We divided the students into seven groups, each consisting of seven to nine members. Each group was assigned a different lesson and asked to prepare the lesson accordingly. After a week, the groups were reshuffled into seven mixed groups, where one member from each group was chosen to form a new group. Each student in the group presented and discussed the lesson. And their roles were interchanged, where students presented and discussed the lesson, and teacher facilitators moved from one group to another to assist the learners. It was found that the jigsaw teaching strategy improved learners' problem-solving, communication, negotiation, and cooperative learning skills in the classroom and confirmed the findings with the studies by van Leeuwen and Janssen (2019) and Chang and Benson (2020).

Experiential Learning Approach. The experiential learning approach stems from Kolb's experiential learning theory (Kolb, 1984), which was based on the theoretical groundwork of Dewey (1938), Lewin(1946), Piaget (1964), and Freire (1970). Experiential learning theory posits that learning is a continuous process rather

than output, through which knowledge is constructed from conscious experiences (Exley et al., 2019). Experiential learning is a critical reflection upon the carefully chosen real-life experience, further transformed into meaningful learning. We involved grades 5-8 students in garden-based, project-based, and experience-sharing-based activities to teach nutrition-related lessons into science and health education subjects under the experiential learning approach.

Garden-Based Learning. It is a commonly used experiential teaching and learning pedagogy that persists in science education; however, best practice is still lagging in Nepali schools, particularly in public schools (Acharya et al., 2020). School garden-based learning activity is a recent initiative of the Government of Nepal, which has prepared a draft policy of one garden in one school under the ‘Green School Guidelines Policy-2076 BS’. Based on the evidence explained in the policy, we involved basic school students in garden-based nutrition education in improving their nutritional behaviors.

Before the school garden was ready, we engaged students in the community gardens near the school with the active involvement of the teachers, school leaders, and local government representatives. Students observed seasonal vegetables, fruits, and herbal plants under the close guidance of the local farmers, who became the facilitators. Students interacted with the farmers. At the end of the observation, we explained the nutritional and economic value of garden products and encouraged students to get involved in gardening activities at home and school.

Observing the community garden, followed by interaction with the local farmers, proved to be pivotal in connecting garden-based learning to nutrition education classes after developing a garden in the school. The school gardening activities offered hands-on practical knowledge to learn nutrition lessons. For

instance, school gardening activities taught students practical knowledge about the importance of locally grown organic green vegetables and their nutritive values. The findings of the study is closely associated with a couple of previous studies, which affirms that garden-based activities play a pivotal role in increasing the meaningful engagement of students in the real-world learning phenomenon, which significantly improve their food and nutrition knowledge and healthy food choice and dietary behaviors (Kirkland et al., 2018; Monville-Oro et al., 2020; Schreinemachers et al., 2020; Talavera & de Juras, 2020).

Project-Based Learning (PBL). PBL is an experiential learning approach linked to social constructivism theories, where learners are given a project of their real-world problems (Kokotsaki et al., 2016). A set of project-based activities offer hands-on opportunities to work with curricular activities, discuss in peer groups, and present their work collaboratively. Thus, students can learn the lesson through their own experience guided by the philosophy of students' perspective 'I need to know' than teachers' perspective 'you should know' (Lenz et al., 2015, p. 68).

We involved students in project-based activities through a balanced diet preparation project using home-prepared foods and anthropometric measurement activities. While involving the students in balanced diet preparation activities, the class was divided into three groups: energy-giving, bodybuilding, and body-protective foods. Students belonging to each group brought locally prepared cooked foods which were prepared at their homes. All students were involved in preparing a model of a balanced diet plate using homemade foods they brought. In so doing, they combined at least three food items from each group. Finally, they prepared five sets of a balanced diet.

Similarly, students were also involved in the project with anthropometric measurement activities. We applied a train-the-trainer model (cascade) to equip students to learn anthropometric measurement skills and analyze the results to measure nutritional status. Using anthropometric measurement tools like measuring tape and weighing machines, students acquired behavioral skills to find out their nutritional status.

PBL activities promoted learners' social learning behaviors like communication, negotiation, team spirit, and collaboration. The evidence revealed by previous studies also concludes that PBL positively affects students' academic achievement and improves creativity, critical thinking, use of technology, and collaborative learning behaviors among learners (Bell, 2010; Chen & Yang, 2019).

Experience Sharing-Based Learning. Experience-sharing-based learning has always been a social learning practice since it frequently occurs at school that continually works as a building block of learning. The power of social interaction remains crucial for students' learning. Social learning occurs through various means, such as leading discussions by sharing photos and/or recorded or archived audio videos (G-Cube Webwide Software, 2015). Under the experience sharing pedagogy, we arranged classes sharing the experiences of the teachers, parents, local farmers, and nutrition professionals. For instance, the female teachers shared their practices concerning preserving the nutritional value while preparing, cooking, and storing the foods. Similarly, grades 1-3 female teachers were involved in sharing their experiences on keeping the foods safe and fresh in the kitchen. We also involved grades 1-3 parents to share their experiences about making healthy food choices, preserving the nutritional values of the foods, and feeding their children with homemade foods. In the same fashion, students learned practical knowledge of food

and nutrition by sharing their experiences with local farmers, health workers, and nutrition experts in the school.

This study indicated that experience sharing is a potent social learning practice that creates an active learning environment in the classroom. This kind of practice ensured the meaningful engagement of students to pose their questions and reflect critically in a free and fearless environment following the inquiry-based tasks (Chu et al., 2017).

Multimedia-Based Teaching. Rapidly growing technological advents have maximized the use of multimedia in classroom teaching as a pedagogical innovation (Khoiriah et al., 2016). Multimedia, in this study, includes combinations of text, picture images, graphics, PowerPoints, and videos that have been digitally edited to display. We used multimedia to teach the lessons about healthy food choices, adolescents' nutrition, and junk food-related lessons. We used picture images, graphics, and videos to teach grades 1-5 students, while the text and PPTs were used for sixth to eighth-grade students. I helped the teacher co-researchers to teach the lessons using PPTs by searching, selecting, and editing the picture images, graphs, and videos. Students were involved in interactive discussion beginning, during, and at the end of the audio-visual sessions.

Figure 33. *Students Learning through Multimedia-Based Teaching*



This study suggests that multimedia in NE classes cultivate innovative pedagogical innovation among teachers. It also develops meaningful engagement of students in learning and enhances student-teacher interaction in the classroom. Besides, multimedia contributed to delivering the lessons efficiently and thus helped the learners learn the content proficiently in an interesting and exciting environment. Multimedia-based pedagogy also developed teachers' digital literacy skills as learning resources. Teachers were able to transfer their digital literacy skills to online classes during the Covid-19 lockdown. The Technological Pedagogical Content Knowledge (TPACK) framework also asserts that the successful integration of technology in learning with content and pedagogy optimizes the teachers' classroom performance and students' learning capacity (Koehler & Mishra, 2009). Previous studies also reveal that multimedia-based teaching develops a third paradigm of thinking among learners (Al Hashimi et al., 2019; Khoiriah et al., 2016).

We used participatory pedagogy—a vehicle for transformative learning to promote healthy nutritional behaviors in children. These transformative learning approaches developed meaningful engagement of students in the realm of classroom learning; increased the opportunities for interaction within and between peers and teachers; and developed social learning practice through cooperation, collaboration, problem-solving, negotiation, leadership, team working culture, 21st-century digital skills, and tackling with the real-world problems. I co-worked with science and HE teachers to implement participatory NE pedagogy. Besides, I collaborated with the school leaders, parents, and local farmers to implement participatory NE pedagogy. Local places like classrooms, library and ICT halls, canteen, and home kitchen gardens were used as the learning spaces for NE. Locally grown and available foods were used as cost-effective teaching-learning resources for NE classes.

Based on the critical reflection on pedagogical practices, the teachers shifted their roles from the traditional *chalk-and-talk* method to the *participatory approaches* such as art performance-based learning, collaborative learning, experiential learning, inquiry-based learning, project-based learning, and small group work learning. While implementing the participatory approaches to classroom teaching in nutrition education, local farmers, housekeeping mothers, and local health workers were involved as the key facilitators. In addition to the classroom setting, the community kitchen garden, school garden, and school canteen were used as the learning space for healthy nutritional behaviors in students. Once the nutrition pedagogy-related intervention sessions were completed, we (the lead researcher and school community) reflected on our classroom teaching practices. The reflective practices pushed us towards creating a supportive school environment to sustain the improved nutritional behaviors in children.

PAR Cycle-III: Supportive School Environment for Sustainability

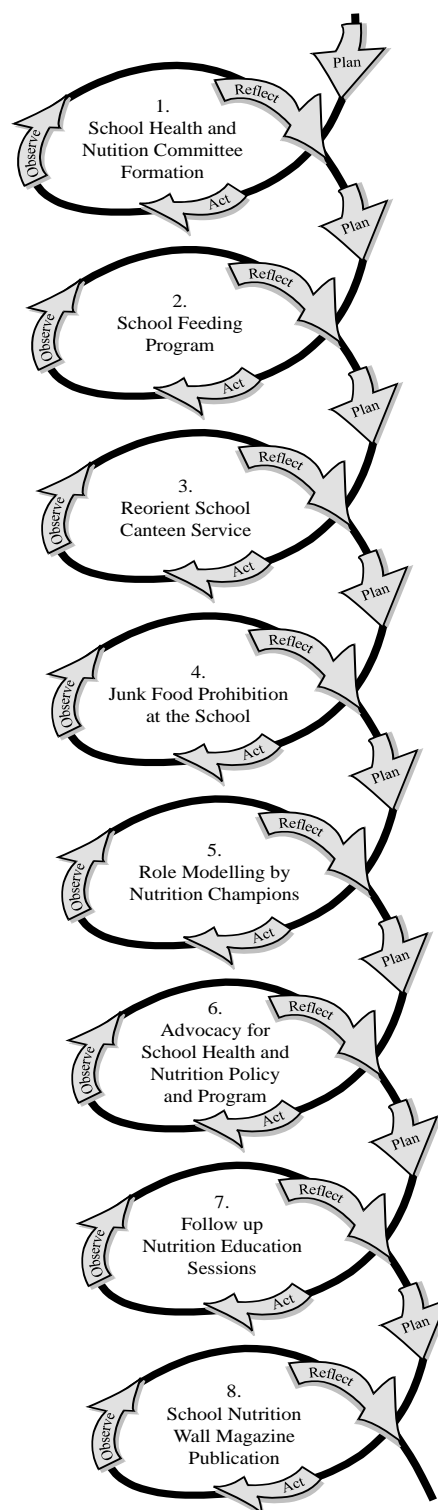
The environmental component is crucial to improving the dietary behaviors of young children (Contento, 2008). Rolling and Hong (2016) argue that the school environment provides an ideal setting to promote healthy eating behaviors in students. WHO's global strategy of health-promoting schools also focuses on creating a supportive school environment to achieve healthy lifestyles conducive to health promotion (WHO, 1997). A supportive school environment offers opportunities to provide a safe and health-enhancing physical and psycho-social environment (Stokols, 1996; WHO, 2003).

Under the supportive school environment for sustainability, the third PAR cycle activities were implemented to create a supportive school environment to sustain healthy nutritional outcomes in children. In so doing, I co-worked with the

teachers, school leaders, PAR committee members, municipal health workers, and the local body constituents. Supportive school environment for sustainability, 3rd PAR cycle, includes: i) school health and nutrition committee formation, ii) school feeding program, iii) reorienting school canteen, iv) junk food prohibition at school, vi) role modeling by nutrition champions, vii) advocacy for developing school health and nutrition policy and program. All these intervention activities were implemented in a cyclic design. We anticipated completing the third PAR cycle-related intervention activities from September 2019 to March 2020. But due to the unprecedented condition created by Covid-19, we could not complete the intervention activities within a given time. Hence, the study duration was extended until 2022.

Moreover, we implemented post-Covid session activities. Due to the Covid-19 pandemic, physical (face-to-face) classes were stopped for longer than a year; this has created an obstacle to transforming nutritional behavior in children. We also observed significant numbers of newcomer students joining the school after the pandemic. Most

Figure 34. Components of Supportive



of them were shifted from private schools due to economic crises in the family. These students were unfamiliar with the SBNEI activities run inside the action school. Even noticeable numbers of smart students relapsed their behavior. Given the context, we added two post-covid session activities: ‘follow-up school nutrition education’ and ‘school nutrition wall magazine publications’.

Formation of School Health and Nutrition Committee

We formed a ten-member school meal committee under the leadership of the SMC chairperson. The committee was formed to manage resources to implement a school feeding program and develop a school nutrition policy and program to sustain healthy dietary behaviors in children. The committee constantly coordinated with the local government to seek support for SBNI. The committee received financial support from the local government to run the school feeding program for grades five and below from the academic year of 2076/77 BS (2020/21). When the school began running a school feeding program, the school meal committee decided to form a subordinating committee. Under the leadership of the primary-in-charge, a seven-member sub-committee was formed to supervise and regularize the school feeding program. Later, the School Meal Committee was renamed School Health and Nutrition Committee (Appendix T), and the School Meal Subcommittee was renamed into School Midday Meal Management and Supervision Committee (Appendix U) in 2078/79 BS (2021/22) academic year.

School Feeding Program

The needs assessment study revealed that many students, especially the ethnic minority groups, were deprived of eating midday meals at school. Most students consumed unhealthy meals and reportedly consumed junk food (Upreti et al., 2021). The needs assessment study further suggested implementing a school feeding program

for underprivileged and unserved students and access to healthy meals for all students. Given the context, the school feeding program was begun in the fiscal year of 2076/77 BS (2019/20) under financial support from the local government and technical support from NORHED Rupantaran, TU. But, after one year, the school feeding program was owned by the Government of Nepal, and thus school received a budget from the federal government of Nepal.

The midday-meal committee had agreed with the canteen service providers to feed healthy school meals at 20 rupees cost per head of the student. The school meals were prepared following the menu list recommended by the midday meal committee. The menu includes rice pudding, beaten rice and cooked legumes, *Haluwa*, and *Khichdi*. The canteen updated the menu list from time to time depending upon the availability of the foods in the school garden and farms and in the locality at different seasons based on the recommendation of the school meal subcommittee. The school feeding program from the fiscal year of 2077/78 BS, has been in practice in the action school.

Figure 35. *Basic Schoolchildren Involved in School Feeding Program*



After scaling up the school feeding program for grades 1-5 students, we observed snacking behaviors of grades 6-8 students. In so doing, we observed students' day to day snack consumption behavior during lunch break time. The

observation revealed that a noticeable number of the students neither brought food from home nor did they manage to pocket money for school meals. The results indicate that many students did not have access to midday meals in school. In this context, we organized a school-parents meeting and discussed how we could ensure social justice and inclusion through equal access to school midday meals for all children. To uncover the gap, the SMC proposed collaborative school meal program (सहकार्य बिद्यालय दिवा खाजा कार्यक्रम) to provide equal access of healthy school meal to all basic school level children up to grade eight. The school organized tripartite interaction with parents, school administration, and the local government to discuss implementing the collaborative school meal program. The ward chairperson—an SMC member—proposed to share one-third (NPRs.10) of the total cost (NPRs. 30) by every stakeholder. Most of the parents agreed to pay one-third of the total cost. But working-class parents were hesitant to accept since they could not pay even one-third of the cost. The ward chairperson proposed involving poor-income parents in the mainstream of the school feeding program by waiving their headcount cost on behalf of the local government (ward office). After implementing a collaborative school meal program, all children consumed healthy meals at school's canteen. Now, after this program, no children shall return home during lunch break time due to their hunger stomachs. We also worked to reorient the school canteen to serve healthy school meals.

Reorienting School Canteen Service

As the school canteen served deep-oil-fried foods such as Samosa, *Pakauda*, Chow mein, Doughnut, *Aaluchap*, and *Nimki*, including packed foods such as noodles, chips, crackers, popcorn, biscuits, cookies, confectionery, bakery products,

and sweetened beverages like juice, soda, and cola (Upreti et al., 2020), there was a need to improve the canteen which had a dominant role in influencing students' food choices and dietary behaviors.

Figure 36. Grades 6-8 students Involving in Collaborative School Meal Program



The school midday meal committee discussed with students and their parents developing a menu to offer healthy food choices in the canteen. The committee prepared a weekly menu list and recommended it to the school administration. The school administration discussed offering healthy food choices through the canteen at affordable cost. But the canteen personnel seemed reluctant to implement the menu with a price list, arguing that preparing midday meals following the menu requires additional workforce and time to prepare, which demands a high cost. Because of this, the canteen personnel quit their tenure. As a result, the canteen was unable to operate for the time being. However, one of the local residents agreed to resume the canteen service as per the school's standard rules and regulations. The canteen service provider became ready to serve the foods following the menu list with a marked price.

The canteen offered beaten rice and cooked legumes, fried rice, chow mein, pasta, rice pudding, and *Puri Takari* for grades six and above students. But the teachers' menu was different, consisting of *Roti* and *Tarkari*; beaten rice, chard and fruits; chicken and beaten rice with Salad; rice pudding and curry; and Chowmein.

The canteen updates the menu list from time to time following the recommendation made by the school midday meal committee.

Figure 37. Canteen Menus for Basic Schoolchildren

बार	खाजा	कक्षा	समय
आइतवार	तरकारी चिउरा	नर्सरी, के. जी.	१:२५०
सोमवार	खिर	१	१:०५
मंगलवार	दुध चिउरा	२	१:१५
बुधवार	तरकारी चिउरा	३	१:१५
बिहीवार	खिचडी	४	१:२०
शुक्रवार	फ्राई राईस	५	१:२०

प्रा. वि. इन्वार्ज

शुक्रवार = पुसि + तरकारी
 सोमवार = खिर
 मंगलवार = समोसा + अचार
 बुधवार = चिउरा + तरकारी
 बिहीवार = चरना + अण्डा
 शुकवार = फ्राइ राइस

शुक्रवार
 टिप्पण: प्रा. जनजीवन माध्यमिक विद्यालय
 कैलाली - ३, चिनामल

शुक्रवार दिवा रवाजा कार्यक्रम
 कक्षा (६-८) साताहिक मेनुअल

Junk Food Prohibition at School

Once the school institutionalized a school feeding program for children, including the teachers, through the school canteen service system, the school administration officially prohibited junk food consumption inside the school premises. The school completed a couple of proactive activities before prohibiting junk food inside the school. First, the school administration dialogued with parents and requested them not to send pocket money and junk food. Second, a weeklong advocacy session was held in the school facilitated by a group of nutrition experts (Dr. Aruna Uprety and her associates), where they encouraged both students and parents to eat healthy and fresh foods in the school. Third, the class teachers counseled students to consume healthy school meals and avoid junk food by bringing homemade lunch boxes or obtaining the meals from the canteen. And finally, the school administration implemented students' bags searching strategy at school's arrival time to check if they had brought junk food. After undertaking these steps, the school's administration formally announced the school as a junk food prohibited area amidst 2076/77 BS (2020/21) academic year. The Government of Nepal prohibited

junk foods consumption in the school from the academic year of 2077/78 BS (2021/22).

Role Modelling by Nutrition Champions

Bandura argued in his social learning theory that a person could learn new behavior by observing role models (Bandura, 1977). Vine and Elliott (2014) also argued that role-modelling behavior from students could create a conducive learning environment to adopt healthy eating behavior. This study also intervened through role-modelling sessions led by the nutrition champions from grades 6 to 8. The grade teachers selected two boys and two girls as the nutrition champions from each class. The selection process was ensured with students' voluntary participation. Nutrition champions in this study refer to the role models who proactively exhibit healthy eating behavior to their classmates. The role of nutrition champions was to influence their classmates by acting as role models in the classroom and observing their classmates' daily school meal behaviors and recording them in the diary. They also encouraged their classmates to develop healthy eating habits.

Figure 38. *School Policy Against Junk Food*



Before they were involved in role-modeling behaviors, a one-day orientation session was provided to the nutrition champions encouraging them to perform their roles. Each champion was supplied with one diary and a pen to write daily notes. As per the orientation, each champion had to approach their classmate (at least one) every day, talked to them about their snacking behaviors, and encouraged them to practice healthy eating behaviors. Each champion wrote a daily diary (Figure 40) and

submitted it to their class teachers at the end of the week. Based on the weekly report, further strategies were made to counsel the students who skipped their meals. A diary and pen were provided to each class teacher to record their counselling. The

champions demonstrated

healthy eating behavior to

their classmates. In so

doing, the champions

managed lunch boxes from

home. They managed home

grown and/or locally

available foods like fruits;

salad, roti and curry; boiled

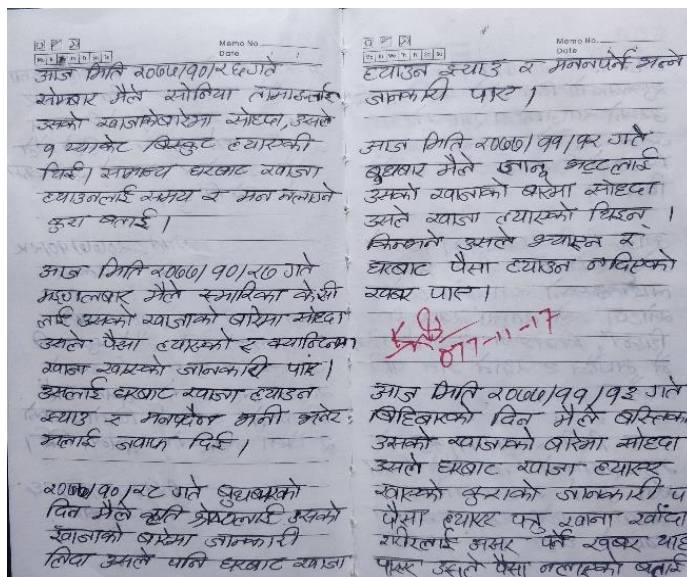
eggs; boiled potatoes; fried rice; rice, lentil and curry; and rice pudding alternatively.

The role-modelling behavior of the nutrition champions created a supportive environment to develop healthy eating behaviors. The role modelling sessions continued until they were involved in a collaborative school feeding program.

Advocacy for School Health and Nutrition Policy and Program

The needs analysis study indicated that the socio-political environment, like role modelling, media strategies, and school policies and programs, heavily influenced students' nutritional behavior. Therefore, SBNEI aimed to promote students' nutritional behavior with the help of implementing a school health and nutrition policy. To shed light on the importance of school health and nutrition policy, we organized a week-long advocacy session collaborating with local and outsourcing human resources. We mobilized the health post-in-charge, municipal health and education officers, local government authorities, and public health officers as the local

Figure 39. Journal Writings by Nutrition Champion



resources. Whilst we contracted nutrition experts as the outsourcing human resource. We involved students, teachers, parents, school leaders, community people, local leaders, and media reporters in the advocacy sessions. The advocacy sessions emphasized the need for a school nutrition policy to create a supportive environment to sustain healthy nutritional behavior among

Figure 40. Nutrition Advocacy through Local



जंकफूडले विद्यार्थीको स्वास्थ्यमा असर

बैरहनी, १७ पुस
बैरहनी नगरपालिका-२ मा रहेको जनजीवन माध्यमिक विद्यालयमा विद्यार्थी 'आलुभातिकाको पोषण व्यवहार परिवर्तनका लागि सरोकारवालाको भूमिका' विषयक पोषण पैरवी कार्यक्रम गरिएको छ ।

जनजीवन माध्यमिक विद्यालयको आयोजना भएको कार्यक्रममा बैरहनी-२ का वडाध्यक्ष टीकादत्त इटनीले जंकफूडका कारण विद्यार्थीको स्वास्थ्यमा प्रतिकूल असर परिरहेको भन्दै पोषणलाई ध्यान दिनुपर्ने बताए । सो विद्यालयमा विद्युत विश्वविद्यालयले सपान्तरण परियोजना सञ्चालन गरेर पोषणलगायत पाँच क्षेत्रमा अध्ययन गरिरहेको छ ।

"भाहिर पसलमा पाइने पोका बाजाबाट विद्यार्थीमा असर गरेको अध्ययनले समेत देखाएको छ", वडाध्यक्ष इटनीले भने, "विद्यालयमा स्वास्थ्यसहितको शिक्षा दिन जरुरी छ ।" सो विद्यालयमा दैनिक जनजातिका विद्यार्थीको बाहुन्यता रहेकाले उनीहरूले बाहिरका बाजा खाने गरेकाले स्वास्थ्यमा असर परेको उनको भनाइ थियो ।

कार्यक्रममा सहजीकरण गर्दै डा. अरुणा उप्रेतीले पोषणविज्ञानको खानेकुराले स्वास्थ्यमा दीर्घकालीन असर गर्ने बताइन् ।

यसमा विद्यार्थीका अभिभावकले चासो दिनुपर्ने डा. उप्रेतीले बताइन् । नगरका विभिन्न विद्यालयबाट सहभागी शिक्षकहरू, अभिभावक, व्यवस्थापन समिति प्रतिनिधिको सहभागिता रहेको कार्यक्रममा जनजीवन माध्यमिक विद्यालयमा पोषणका क्षेत्रमा परियोजनाले गरेका गतिविधिबारे शोधकर्ता यदुराम उप्रेतीले जानकारी गराएका थिए ।

विद्यालयका प्रधानाध्यापक गोपाल शर्माका अनुसार परियोजनाले पोषणसँगै ईकोसान शीचलय, सेन्टरी प्याड नियोग गर्न सिकाउने, तनाव व्यवस्थापन, सकारात्मक सोचको विकास गर्न सिकाउने गरेको छ ।

children. Similarly, we mobilized local media reporters to become a part of school nutrition advocacy to disseminate the school's advocacy session activities. In so doing, I, SMC chairperson, ward chairperson, and invited nutrition expert (Dr. Aruna Uprety) were involved in a talk program to the local FM radio to appeal to the parents and community to share their ideas by involving themselves in the advocacy program.

The program inspired the school community to develop a health and nutrition policy and program to sustain the students' and teachers' improved behaviors. To develop the school nutrition policy, we followed national-level policies and guidelines such as 'National School Health and Nutrition Strategy of Nepal-2006', 'School Health and Nutrition Program Guideline-2008', and 'Midday Meal Program Regulation for Community Schoolchildren-2076 BS and School Midday Meal Management Guideline-2077 BS'. We coordinated with the School Health and Nutrition Committee and School Midday Meal Management and Supervision Committee to develop the policy and program. The committees co-worked with the

health post and municipal health and education sections to draft the minimum package of the school health and nutrition programs. Further, the Rupantaran, TU and School Health and Nutrition Committee jointly requested the municipal office to include the minimum package of the school health and nutrition programs in its policy and program. For that, we coordinated with municipal health and education section offices.

Follow-up Nutrition Education

After involving myself in the group discussion with the teachers, school administration and parents, I realized that due to Covid-19, the school remained closed for a long time. Due to this, students were locked inside their homes, which pushed them towards consuming readymade packed foods since they had no more options during the lockdown as students from poor families did not have land to get food from their own farms. Even the parents could not stop their children.

We had no more options for healthy foods during the lockdown. Eating readymade junk food was the ultimate option for daily snacks. Now my children have resumed eating junk foods. They also desire to bring junk food to the school. We request to resume nutrition education classes again to fix the problems. (Female Parent, Focus Group)

Similarly, the SMC chair asked for resuming follow-up school nutrition education sessions. He pointed out that children relapsed into unhealthy nutritional behavior after Covid-19. We also observed classroom dustbins before and after the lunch break. Unlike in the past (before the covid pandemic), the dustbins were filled with junk food packets. We also learned that students who migrated from other schools created a problem concerning their behaviors.

Nowadays, students hardly bring homemade foods. Either they get pocket money or junk food. This problem is common among newly admitted students who come from other schools. They are unaware of the rules and regulations and lack adequate knowledge about the harmful effects of junk food. We must resume nutrition education sessions very soon. (Teacher, Focus Group)

Based on the given context, we implemented post-Covid follow-up NE sessions at the last trimester of the academic year 2078/79 (2021/22). We implemented two-stepped session activities. The first session targeted basic school students (grades 1-8), and the second was for secondary school students (9-10). The follow-up nutrition education sessions were implemented with basic school science and health education teachers.

School Nutrition Wall Magazine Publication

Based on my post-covid fieldwork experience, I observed that most students bounced back to unhealthy nutritional behaviors due to the Covid-19 pandemic. Given the context, I had a round of discussion held with the school community and nutrition committee about engaging students in the project work such as nutrition wall magazine publications. After completing a series of talks, we decided to publish a nutrition wall magazine. We believe students might become conscious and alert toward healthy nutritional behavior by engaging with nutrition wall magazine publication.

Figure 41. *Involvement in the School Nutrition Wall Magazine Activities*



The school began publishing a magazine named ‘Janajeevan Nutrition Wall Magazine’ in February 2022. Since then, it has been published every month. The wall magazine included the basic components, namely editorial message; drawings and pictures; nutrition songs, poems, stories, quotes, and messages; printed cut pieces and real specimens; Quiz on food and nutrition; my nutrition story (past and present); the recipe of the foods; and the nutritional value of the useful foods. The school nutrition wall magazine involved students actively through project works and created a supportive environment to sustain change in their nutritional behavior. An editorial team was formed to publish the magazine consisting of students, teachers, school leaders, and the PhD researcher (Appendix V).

Chapter Summary

The SBNEI was co-implemented to transform the nutritional behaviors of children. The intervention was implemented undergoing three PAR cycles: sensitization and motivation, classroom-based nutrition education, and supportive school environment for sustainability. The subsequent intervention activities under each PAR cycle were co-implemented following its cyclical components: planning, acting, observing, and reflecting.

The sensitization and motivation intervention activities focused on increasing awareness and enhancing motivation towards healthy nutritional outcomes. The sensitization and motivation cycle included audio-visual sessions, home visitation and interaction, drama show, nutrition fair and commitment, short nutrition speech, and parents- teachers interaction activities. Classroom-based nutrition education focused on strengthening students' food and nutrition knowledge, developing positive attitudes, and healthy dietary practices through a participatory classroom learning environment. The classroom-based nutrition education intervention also aimed to empower teachers to use participatory learning approaches to teach nutrition education lessons in the classroom. The pedagogies of nutrition education cycle included exploring teachers' intention towards pedagogical inventiveness, contextualizing the nutrition education curriculum, developing the themes and key messages of nutrition education, developing the teaching-learning resources for nutrition education, developing lesson plans and implementing them in the classroom. Supportive school environment for sustainability focused on creating a supportive school environment to sustain healthy nutritional outcomes in children. The supportive school environment included the formation of a school health and nutrition committee, a school feeding program, reorienting school canteen service, junk food prohibition at school, role modeling by nutrition champions, advocacy for school health and nutrition policy and program, follow-up nutrition education session, and school nutrition wall magazine publication activities. In the next chapter, I discuss outcomes of the SBNEI, focusing on the nutritional behaviors' of children and school community.

Chapter Six

Outcomes of School-Based Nutrition Education Intervention

This chapter attempts to provide the answers to the research question i.e., to what extent can a school-based nutrition education intervention (SBNEI) bring changes in nutritional behaviours in basic schoolchildren? Along with the changes in students' nutritional behavior, this chapter also presents the changes in teachers' and school leaders' nutritional behaviors. Both quantitative and qualitative results are intertwined to describe the results as the research design guided me. However, the outcome evaluation study largely includes the qualitative results to describe the nutritional behaviors of students, teachers, and the school leaders in the below sections.

Nutritional Behaviors of Basic Schoolchildren

Nutritional behavior is a broad term to define; however, in this study, nutritional behavior of children refers to the food and nutrition knowledge and sharing it in the interpersonal level, dietary intention and attitude, school meal consumption practice, and anthropometric measurements. A four-year long SBNEI has markedly improved the nutritional behaviors of basic children. The overall nutritional behaviors of children can be presented in a nutshell using a joint display table. This shows both quantitative and qualitative findings of the needs assessment and outcome evaluation together.

Table 18. *Joint Display of Transformative Changes in Nutritional Behaviors*

Descriptions/Themes	Needs assessment study-2018	Outcome evaluation study-2022
Knowledge of food and nutrition	5.18 (Mean score out of ten items) <i>I agree that our students may not have practical knowledge of food and nutrition.</i> (Basic School Teacher, Focus Group)	7.46 (Mean score out of ten items) <i>Students learn food and nutrition related knowledge through textbook, nutrition songs, drama show, experiential learning, and nutrition wall magazine</i>

Sharing food and nutrition knowledge with classmates	26.8 % <i>I have neither learned the harmful effects of junk food nor did the teachers teach us; nor do we share our learning experience with classmates. (7th Grade Girl, Focus Group)</i>	<i>publication related works (Field Note, Participant Observation)</i> 76.6 % <i>I talk to at least one classmate daily during lunch break time. I talk to them about the health benefits of healthy school meals. I also encourage them to bring a lunch box from home (8th Grade Girl, Focus Group)</i>
Attitude and Intention towards healthy eating behaviors	96.2 % (Positive attitude) <i>I like a noodle to eat. It is my best snack because it is yummy in taste, cheaper to buy, and more convenient to carry at school. (7th Grade Girl, Focus Group)</i>	98 % (Positive attitude) <i>I used to bring noodles and biscuits frequently to school. But these days, I do not like them because I know these foods are not good for my health. (5th Grade Girl, Focus Group)</i>
Midday meal consumption at school	68.9 % <i>Students, mostly from working class families, did not have access to school midday meals since their parents could not provide them with pocket money daily. (Headteacher, Fieldnote)</i>	79.2 % (But reached to 100 % after implementing collaborative school meal program) <i>These days, all children eat healthy and hygienic midday meals at school. (Headteacher, Fieldnote)</i>
Junk food consumption at school	52.5 % <i>We eat noodles, biscuits, bakery items, potato chips, Samosa, Pakauda in our school meals. (Grades 4-5 Students, Focus Group)</i>	1.3 % <i>I promised not to eat junk food for school meals after I got involved in the school nutrition program. (6th Grade Boy, Focus Group)</i>
Junk food consumption at home	96.2 % <i>My son frequently asks for noodles when he returns from school. (Female Parent, Focus Group)</i>	42.1 % <i>My children eat common food at home. They do not ask for money to buy junk food. (Male Parent, Focus Group)</i>
Healthy meals consumption at school	20.9 % <i>My son frequently asks for noodles when he returns from school. (Female Parent, Focus Group)</i>	98.7 % <i>These days, my children do not ask for junk food at home. (Male Parent, Focus Group)</i>
Morning meals consumption at home	93.3 % <i>I come to school without a morning meal because my parents go to brick kiln early morning. (4th Grade Boy, Focus Group)</i>	98.8 % <i>Parents prepare the morning meals. We come to school after eating morning meals. (4-5 Grades Boys, Focus Group)</i>

Food and Nutrition Knowledge

The quantitative survey results revealed that more than half of the students (52.8%) had high (above average) knowledge scores on food and nutrition. The result suggests that students' knowledge score was slightly decreased compared with the needs analysis result despite the three-year-long SBNEI. The reason might be due to the delayed outcome evaluation after a yearlong closure of the school due to the Covid-19 pandemic suffering. Because of this, students could not retain their knowledge and thus could not obtain high knowledge scores. Nevertheless, students' knowledge score was increased on particular items, for example, knowledge on healthy foods and junk foods. The mean score of students' knowledge of food and nutrition was also increased from 5.18 (± 1.72) in need analysis to 7.46 (± 2.36) in the outcome evaluation study (Table 19).

Table 19. *Food and Nutrition Knowledge of Children*

Descriptions	Needs assessment study- 2018 (in %)	Outcome evaluation study-2022 (in %)
Knowledge on FN		
High (above mean score)	56	52.8
Low (Below mean score)	44	47.2
	(\bar{X} =5.18, Z = 1.72)	(\bar{X} =7.46, Z = 2.36)
Sharing FN knowledge with classmates		
Yes	26.8	76.6
No	73.2	23.4

Table 19 demonstrates the proportion of students who shared food and nutrition knowledge among their classmates, was remarkably increased from one-fourth (26.8 %) to three-fourths (76.6 %). The qualitative results also articulated that after the SBNEI, children shared food and nutrition knowledge with their classmates. They talked to their classmates about the health benefits of healthy school meals and the health effects of junk food. The nutrition champions discussed that they talk to their friends about positive health outcomes due to healthy eating behavior. For

instance, a nutrition champion articulated that she talks to her friend about the selection and consumption of healthy school meals. *I daily talk to at least one classmate during lunch break time when we eat lunch. I talk to them about the health benefits of eating healthy school lunches. I also encourage them to bring a lunch box from home* (8th Grade Girl, Focus Group)

The results also suggest that students shared their knowledge with family members. A student from 8th grade reported that she talks to her family about food and nutrition information about what she learns at school, *“I tell my parents about the harmful effects of eating noodles that I learned from Dr Aruna Upreti, who came to our school back to two years”* (6th Grade Girl, Focus Group).

A parent involved in the parents-teachers meeting discussed that nowadays she prepares fresh and hygienic foods for her children, instead of preparing instant noodles. She mentioned that her school-going younger son communicated about the health benefits of homemade foods.

“One day, I was preparing instant noodles for my children. But my son asked me not to cook instant noodles; instead, he suggested preparing homecooked foods like Roti and Tarkari. He also shares health benefits of home-cooked foods and the harmful effects of junk food”. (Female Parent, Field Notes from Participant Observation)

The above results indicate that children can create a communicative learning space in their interpersonal environment where they can role model to their classmates and family members. But it is important to note that they must be empowered to perform the role model in their interpersonal setting.

Dietary Intentions and Attitudes

The quantitative results of the outcome evaluation study demonstrated that Basic school students have progressively improved their dietary intentions and attitudes. Close to cent percent of students have developed a favorable attitude towards consuming homemade foods as their school lunch, followed by vegetables, seasonal fruits, and milk. Similarly, cent percent students self-reported that they agreed to eat healthy and hygienic school lunches compared with 85 percent during the needs analysis stage of the study. More than 90 percent of students agreed that junk food was harmful to them (Table 20).

Table 20. *Comparison of Students' Attitude towards Healthy Dietary Behaviors*

Descriptions of the statements	Agree (%)	
	Needs assessment study-2018	Outcome evaluation study-2022
I enjoy eating healthy and hygienic foods	92.8	99.5
I like to prepare healthy foods myself	91.3	97.5
I like to eat vegetables	89.5	95.9
I like to eat seasonal fruits	86.1	95.4
I like to drink milk for my health	80.4	95.4
I like to homemade foods	48.3	98.5
Homemade foods are healthy and hygienic	85.6	100.0
Junk foods are harmful to our health	NA	92.9
School meals should be healthy and hygienic	85.6	97.0
I am conscious of eating my school meal	NA	79.7
Overall attitude score (composite score)		
Positive	96.2	98.0
Negative	3.8	2.0
	(\bar{X} =2.75, Z =0.19)	(\bar{X} =2.92, Z =0.15)

Note. NA denoted to not include the statement in the needs assessment study.

The results suggest that basic school students have developed a positive attitude towards healthy dietary behaviors. Positive attitude, in this study, refers to students' preference to choose homemade foods. The results also indicate that students became aware of consuming unhealthy school meals. The composite scores indicate that 98 percent of students developed a positive attitude towards healthy dietary behaviors compared with 96 percent during the needs assessment. The mean

value of the attitude score was also progressively increased compared with the needs assessment. The qualitative data also complemented the findings of the study revealed by quantitative study. I explain them under the two sub-themes.

Dietary Intentions. The outcome evaluation suggests that intervention session activities have increased awareness levels against unhealthy dietary behaviors among children, teachers, school leaders and parents. Students reported that these days, they would like to eat fresh and healthy meals at school as well as their home. They argued that they used to bring noodles and biscuits every day before they were involved in the SBNEI. But these days they are consciously aware of what to eat and what not. For instance, one boy involved in the focus group explained, *I used to bring noodles and biscuits frequently to school. But these days, I do not eat them because I know these foods are not good for my health.* (5th Grade Girl, Focus Group)

Before this study, students could hardly raise their voices against the quality of food being served in the canteen. But students became critically aware of complaining about the canteen served foods. For instance, a student from the upper basic class challenged the existing canteen service system. He complained, *there are no more options to eat in the canteen except Chowmein, Pasta and Nimkin. Are they good enough for our health? Are these snacks healthier than biscuits and instant noodles?* (8th Grade Boys, Field Note from Participant Observation).

After this study, students became consciously aware of their unhealthy nutritional behaviors. The teachers discussed that students search their friends' bags and get them back to throw in the dustbin if they find their friends bringing junk food and they would also report to their teachers. The quotation below exemplifies the same.

“Students search their friends’ bags sitting at the school’s entrance gate to check if anybody brings junk food. If they find junk food in the bags, either they proactively report it to the teachers or ask their friends to throw it in the dustbin”. (Male Teacher, Focus Group)

The teachers reported that students consciously discarded bringing junk food to the school premises. A basic school female teacher, during the focus group, replied, *“Nowadays, students have realized the benefits of healthy meals. They choose healthy foods from the canteen. (...) These days, no students consume junk foods openly in our school”* (Female Teacher, Focus Group).

During the focus group with teachers, one of them shared an interesting recall about how he got entrapped to eat chocolates in the classroom.

One day, a student provided me with a bar of chocolate on her birthday. Another student next to her immediately questioned me that if a teacher consumes junk food in the classroom, students will resume eating junk food. This incident embarrassed me. (Male Teacher, Focus Group)

Similarly, a group of parents also informed that their children were consciously aware of eating their meals at home. One of the mothers, involved in the parents-teachers interaction meeting, replied that her children are consciously aware of their dietary behaviors at home, *“One day, when I was preparing noodles, my daughter asked me not to serve noodles, arguing that noodles are not good for them”* (Female Parent, Field Note).

The SBNEI has developed positive awareness against unhealthy meal consumption among the parents. Before this intervention, many parents were unaware or unresponsive concerning what their children eat at school. The parents involved in the collaborative school feeding program raised the question concerning the quality of

food being served through the canteen, *"One day when I reached school during a lunch break, some students were eating Chowmein, Pakauda, Dhungro, and Chatpate around the canteen. To the best of my knowledge, these kinds of deep-oil-fried foods are unhealthy to eat"* (Male Parent and SMC Member, Focus Group).

The above results indicate that SBNEI has developed an awareness level among children against unhealthy dietary behaviors. The results also suggest that the SBNEI has increased a critical awareness level against unhealthy dietary behavior among the teachers, parents, and school leaders.

Self-efficacy to avoid Unhealthy Foods. Self-efficacy in this study refers to the confidence level of students in their ability to take action against unhealthy nutritional behaviors (Glanz et al., 2008). After being involved in the SBNEI, students have developed self-efficacy against junk food consumption and thus committed to bringing homemade lunch boxes to reduce the frequency of eating junk food. The excerpts below explain the same.

We are committed to eating healthy meals at school since we are consciously aware of the health effects of junk food consumption. We believe that healthy dietary behavior keeps us strong and healthy. (8th Grade Girl, Focus Group)

After becoming a part of the school nutrition program, particularly the session activities led by Dr. Aruna Uprety, thereafter, I promised not to eat junk food for school meals. For that, I will ask my parents to prepare my lunch box, or I eat in the canteen. If my parents have no time, I will prepare myself. (6th Grade Boy, Focus Group)

Similarly, a group of nutrition champions were found committed against junk food consumption and promised a strong belief towards bringing homemade lunch boxes.

After being a nutrition champion, I promised not to consume junk food at school. Though many barriers exist there, I make healthy friend circles in my class. I share with them the health benefits of homemade meals at school.

(Female Nutrition Champion, Informal Conversation)

The champions encouraged classmates to consume healthy meals by exhibiting themselves as role models in the classroom. In so doing, they regularly managed healthy lunch boxes from home, talked to their friends about the benefits of healthy meals, and shared ideas about preparing cost-effective (low cost and no cost) homemade lunch boxes utilizing the locally grown and/or available foods.

School Meal Consumption

The quantitative results demonstrated that the number of school meal consumers progressively increased from 68.9% in the needs assessment to 79.2% in the outcome evaluation. During the needs assessment, more than half (52.5%) of students consumed junk food, which was lowered to 1.3 percent at the time of outcome evaluation study. Similarly, needs assessment results revealed that more than half of the students (50.2%) consumed junk food regularly (more than 3-4 days), more than one-third (38.3%) did sometimes (1-2 days), and one in ten (11.5%) did not eat at all. But the outcome evaluation study demonstrated that only 5.5 percent of students regularly consumed junk foods; nearly one-third (29.4%) did sometimes, whilst two-thirds of them (65%) never.

Similarly, students consuming canteen-prepared foods markedly increased from 43.8 to 73.1 percent, while homemade food consumers marginally increased

from 16 to 17.3 percent. The reason could be school has initiated a school feeding program for early child development (ECDE) for fifth-grade students from the academic year of 2077/78 BS. Likewise, the proportion of fruit and salad consumers also increased from 4.9 to 8.3 percent (Table 21).

Table 21. *School Meal Consumption Behaviors of Children*

Descriptions	Needs assessment study- 2018 (in %)	Outcome evaluation study-2022 (in %)
School meal consumption on the survey day		
Yes	68.9	79.2
No	31.1	20.8
Types of school meals consumed		
Homecooked foods	16	17.3
Fruits and salads	4.9	8.3
Canteen made foods	43.8	73.1
Junk foods	35.4	1.3
Frequency of veggie consumption (per week)		
Always (all days)	77.0	40.1
Mostly (3-4 days)	9.1	39.1
Sometimes (1-2 days)	9.1	11.7
Rarely	4.8	9.1
Frequency of fruits consumption (per week)		
Always (all days)	13.9	18.3
Mostly (3-4 days)	9.6	38.6
Sometimes (1-2 days)	51.2	21.8
Rarely	25.4	21.3

Further, the qualitative results explain how SBNEI has increased healthy meal consumption behaviors among basic children in the following sub-themes.

Healthy Food Choices. The outcome evaluation results explained that students prefer to choose fresh and healthy foods either carried from home or served through the school canteen, whilst they used to prefer consuming junk foods before SBNEI. The classroom vignette below explains that after this study, basic school students would like to consume healthy school meals.

Researcher: Could you please tell us what you like to eat in your school meals?

Student 1: Puri and Tarkari are my favourites.

Student 2: I prefer to choose rice pudding.

Student 3: But I like Samosa.

Student 4: I choose fried rice.

Student 5: I like rice pudding.

Student 6 and 7: Puri and Tarkari are my best.

Student 8: I like to eat Samosa too.

Student 9: I prefer to eat Puri and Tarkari.

Most of the teachers argued that there is a change in the food choice behaviors of students. They discussed that in the early days of the school feeding program, a substantial number of students did not like to eat conventional foods like Haluwa, Khichadi, and rice pudding. But these days they like to eat conventional foods. These days, students have changed their behaviors. They like to eat Roti and Tarkari, Puri and Tarkari, Chiura and Tarkari, and Rice pudding. Last week, some students asked for fruit and Salad consumption. This all happened due to SBNEI. (Basic School Male Teacher, Focus Group)

The parents' voices have also changed. Before this study, parents preferred to provide pocket money to their children instead of homemade lunch boxes. Very few parents were committed to providing their children with lunch boxes since they used to reply to us that they had no time to prepare lunch boxes. But these days, their voices have changed. Parents argued that their children would like to eat fresh and hygienic foods.

My daughter likes to eat Jaulo, Rice pudding, Chiura, and Tarkari, but she does not like to eat Haluwa. [F: What's the reason?]. She never eats Haluwa at home; if she does, she will vomit. On the day of the menu of Haluwa, I send her a lunch box. Sometimes, I also send fruits and Salad since she prefers fruits and Salad most. (Female Parent, Focus Group)

The above results suggest that the SBNEI has created a supportive environment to offer healthy food choices for children.

Regularity in Midday Meal Consumption. The results from the outcome evaluation suggest that more than three-fourth of students regularly consumed school meals. But after implementing the collaborative school meal program for grades 6-8, all the children consumed midday meals regularly. The classroom vignette below explains if children regularly consume school meals.

Researcher: Do you take your school meals regularly?

All Students: Yes, we are doing that.

Researcher: Are you all doing that regularly?

All Students: Yes, these days, we eat our meals regularly.

Researcher: Did all your friends consume midday meals 2-3 years back (If you remember)?

Student 2: No, many of us did not consume every day since there was no midday meal program in our school.

Students 6: Nowadays, everyone from my class is having their meals at school. But in the past, we did not consume it regularly.

The teachers also discussed that these days all students consume their midday meals regularly. Further, they argued that a significant number of students had to stay in their classes with hungry stomachs before this study. But these days, no students remain hungry in class after a lunch break. A female teacher, who was also a primary school in-charge, shared about how basic school students can eat school meals regularly.

These days, every student regularly consumes meals at school through the school feeding program under two modalities in our context: i) a government-

funded school midday program for up to grade five students, and ii) a collaborative school meal program for grades 6-8 students. These days, no student shall live in the class with a hungry stomach after a lunch break, and no one returns home with a hungry stomach, which commonly happened before. (Female Teacher, Focus Group)

Teachers also argued that students home returning, meal skipping, and stomach aching problems have been gradually improved. However, some children come to school without morning meals since their parents move on to work (daily wage-earning in the brick kiln) early morning.

After the school feeding program, students stopped back home during the lunch break except in emergencies. Otherwise, at least 5-10 students used to go back home daily. But, nowadays, I have not observed such complaints. It is because they get midday meals at school. These are the marked changes that I found. (Male Teacher, Focus Group)

Students also argued that home returning, meal skipping, and stomach aching problems due to hungry stomach are rarely observed. The quotations explain the same. *“Sometimes some of my friends go back home if they have problems like domestic chores or menstruation-related problems with girls. Otherwise, I have not noticed my friends leaving school at lunchtime. Instead, all of them consume school lunches”.* (Girl Students, Classroom Discussion)

A boy from the upper basic classes also argued that the home returning practice of their friends has been markedly improved, *“Nowadays few numbers of friends return home at lunchtime. It is not due to their hungry stomach but due to some urgent work at home”.* (Boy Students, Classroom Discussion)

The above results suggest that students consumed school lunch regularly (all school days in a week) through the school feeding program, whilst it was very low before. The results also suggest that the school feeding program has reduced the rate of truancy and home returning practice after lunch break time.

Healthy Meal Consumption. A healthy meal, to this study, refers to the correct proportion of diet that serves students' nutritional requirements and helps them protect against malnutrition in all its forms and non-communicable diseases (NCDs). According to WHO, a healthy meal includes diverse foods consisting of whole grains, legumes, vegetables, and fruits in their right proportions but excludes any processed foods (WHO, 2020). This study revealed that students markedly improved their school meal consumption behaviors after participating in the four-year-long SBNEI.

Figure 42. *Students' School Meal Consumption Behavior*



Students markedly improved their school meal consumption behaviors compared to the habits noticed in the needs assessment. At the beginning of the school feeding program, students were reluctant to eat locally prepared conventional foods served by the canteen. However, after being involved in the SBNEI, they realized the importance of conventional foods to meet their nutritional requirements.

Students in the focus group replied, “*Nowadays, we eat meals at the canteen following the school menu. We eat Chiura and Tarkari, Puri and Tarkari, rice pudding, boiled eggs, and cooked legumes regularly*” (Students, Focus Group).

Students shared their stories about how they transformed their meal consumption behaviors from readymade instant foods to homemade and canteen-served ones.

Previously, I used to eat readymade packaging foods like noodles (everyone laughed). [F: Don't you eat these days?] These days, I rarely do that. I used to eat Chow mein, pasta, noodles, biscuits, cake, Nimkin. But these days, I eat rice pudding, eggs, cooked beans, and fried rice with green veggies. These foods are very similar to what I eat at home. (6th Grade Boy Student, Focus Group)

Some upper-basic school students argued that after initiating a collaborative school feeding program, they stopped bringing lunch boxes from home and managing pocket money for their school meals; instead, the school served them a healthy menu. For example, “*These days, we neither bring lunch boxes from home nor do we manage pocket money; instead, we eat healthy meals in the school's dining hall*” (8th Grade Girl Student, Focus Group). A girl, involved in the nutrition wall magazine publication, has shared her story. The story tells us about how she developed healthy dietary behaviors after she was involved in the SBNEI.

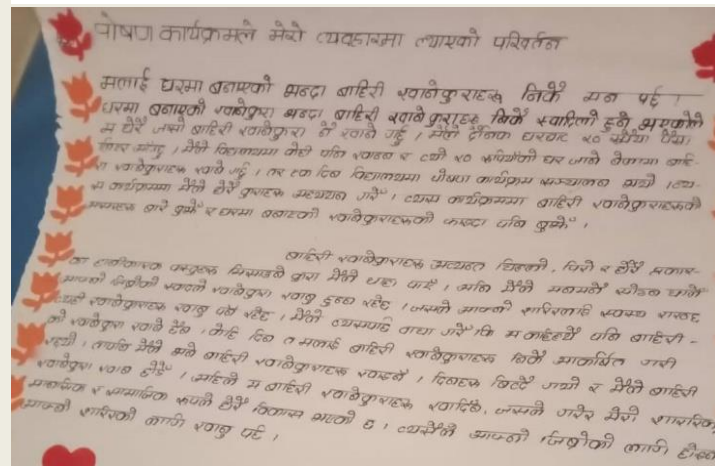
Vignette #2: Story of Basic School Student

A girl student, 14 years of age, currently studying in 8th grade (in the academic year 2021/22), shared her story. When she was in 6th grade, her mom did not provide her pocket money daily for school meals. As a result, she could not eat midday meals regularly. But nowadays, she is taking her school meals daily. She had never thought that she would be lucky enough to consume midday meals in the school. Further, she

narrated that she used to eat noodles, Donuts, cake, biscuits, Samosa, and Nimkin for school meals before SBNEI. But when she was involved in the SBNEI, she started bringing lunch boxes from home. But she felt hesitating doing that when her classmates stopped bringing lunch boxes. Afterwards, she got pocket money from her parents. Though she opted to buy healthy meals at the canteen, no healthy food choices were made available in the canteen. As a result, she ate Nimkin, Chowmin, and Pasta. But after

initiating a collaborative school feeding program, she consumed rice pudding, boiled eggs, cooked beans, fried rice, Puri and Tarkari, and Chiura Tarkari. She argues that she had not consumed junk food in her school for last six months back.

Figure 43. Student's Writing Published in the School



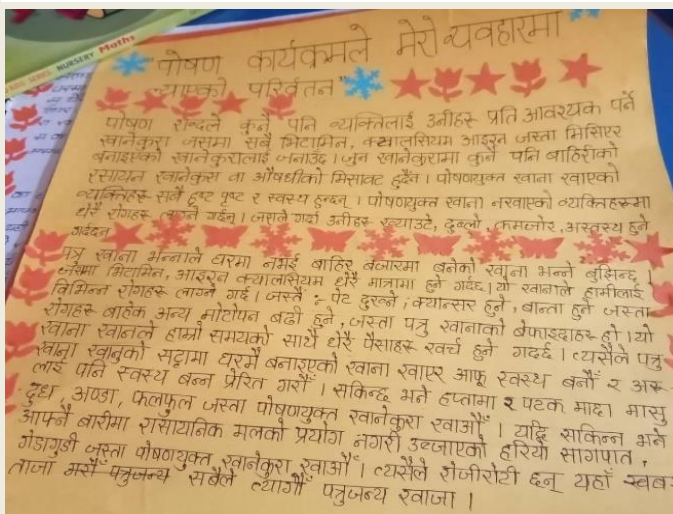
The story of nutrition champions is also similar to the above story. The champions argued that they were role models to influence their classmates' midday meals behavior. Vignette 3 describes the story of a nutrition champion about how a nutrition champion has developed healthy dietary behavior after she was involved in the SBNEI.

Vignette #3: Nutrition Champion's Story

I was a nutrition champion for the academic year of 2077/78 when I studied in 8th grade. As a nutrition champion, I had to interact with my classmate(s) about school nutrition behavior. I worked as a nutrition champion for one academic year. During the period, I changed my behavior. In the early days, I struggled to influence my classmates by being a role model. In so doing, I started managing lunch boxes from home. My lunch box was simple and cost-effective since it contained home-cooked rice and lentil, boiled potatoes, boiled eggs, puffed maize and soybean (Bhuteko

Makai Ra Bhatmas), seasonal fruits and Salad. Most of the time, my lunch box was loaded with rice and curry. At this time, I heavily reduced junk food consumption. I stopped eating junk food at school. Now, I prefer healthy and fresh foods which are available at home. These days, my parents and family members are also consciously aware of their dietary behaviors. Now, I feel proud to be a nutrition champion, which inspired me to promote my nutritional behavior.

Figure 44. Student's Journal Writings



The teachers also argued that students have improved their nutritional behavior compared to the past. They said that previously the lowest number of students, particularly in junior basic classes, used to bring lunch boxes from home. But after this study, overwhelming numbers of upper-basic students managed homemade lunch boxes at school.

Previously, students hardly brought lunch boxes from home. But now, an overwhelming number of students, particularly grades sixth and above, are bringing homemade lunch boxes. These days they eat homemade foods like rice, lentil, Roti, curry, and fried beaten rice. They also eat boiled maize, sweet potato, and seasonal fruits. (Basic School Male Teacher, Focus Group)

Teachers believed that students' meal consumption behaviors have been markedly improved. Students are self-motivated and conscious towards their nutritional behaviors. Teachers are motivating them towards healthy nutritional behaviors. A female teacher argued, "Nowadays, our students are self-motivated

toward healthy eating behaviors. We do not force them; instead, we encourage them to bring homemade foods such as Roti and curry, rice and lentil, fried rice, seasonal fruits, and Salad, etc” (Basic School Female Teacher, Focus Group).

School leaders also realized that SBNEI has substantially improved students’ meal consumption behaviors. They argued that students are shifting away from unhealthy nutritional behavior to traditional diverse foods. The school leader replied, *“Before the school nutrition program, students commonly used to eat biscuits, noodles, bakery items, and other crunchy foods. But these days, they eat traditional diverse foods like Khinchadi, Haluwa, rice pudding, and Chiura Tarkari”* (PAR Committee Male Member, Focus Group).

Parents also argued that their children have consciously improved their meal consumption behaviors compared to the needs assessment study. Before SBNEI, children did not like to eat homemade foods to eat; instead, they used to ask for pocket money. The excerpt below shows how did children shifted from unhealthy eating behaviors to healthy ones.

I feel many changes to my children’s dietary behaviors. Sometimes when we cannot prepare lunch boxes due to our busy schedule, we ask them to eat biscuits and/or noodles. But they denied us; instead, they reminded us that junk food is not allowed in school. Then, upon their request, we provide pocket money so that they would buy the snacks at the canteen. [F: Did you notice such a response earlier?] I never heard before. My grandsons used to take biscuits, noodles, Cheese balls and other instant foods from the shop. I had a Kirana Pasa [grocery shop] at my home. They used to discard homemade foods. (Male Parent, Focus Group)

Similarly, parents argued that children used to ask for pocket money frequently. But these days, children ask for a lunch box to get their school meals. A parent argued, *“Before the school nutrition program, our children used to ask for pocket money to buy snack foods from grocery stores, vending shops, or tuck shops, but these days, they ask for preparing homemade lunch boxes”* (Female Parent, Focus Group)

Canteen service providers also said that students improved their school meal consumption behavior. They argued that the role of teachers and the school administration have played key roles in promoting students’ nutritional behaviors.

I can see many changes in students’ nutritional behaviors after I joined here. To my notice, previously, students frequently asked for noodles, biscuits, cheese balls, and bakery items. But these days, I serve them Puri and Tarkari, Chiura and Tarkari, Samosa, rice pudding, Haluwa, Khinchadi, fried rice, and boiled eggs and grams. For that, teachers and the administration have created a supportive environment. (Canteen Service Provider, Interview)

The above results suggest that basic school students have markedly improved their nutritional behaviors. These days, students prefer to consume local cuisine like *Haluwa, Khinchadi*, rice pudding, beaten rice and cooked legumes, boiled eggs, and seasonal fruits following the menu list.

Junk Food Consumption

The needs assessment study showed that junk food consumption was reportedly common among the students (Upreti et al., 2020; Upreti et al., 2021). But after implementing a four-year-long SBNEI, junk food consumption has been markedly lowered down to 1.3 percent in the outcome evaluation study from 52.5 percent in the needs assessment study. Further, the present study demonstrated that

daily junk food consumers were reduced to 1.5 from 24.4 percent. Similarly, the proportion of those who did not eat junk food for a week also increased (Table 22).

Table 22. *Junk Food Consumption Behaviors of Children*

Descriptions	Needs assessment-2018 (%)	Outcome evaluation-2022 (%)
Consuming junk food at school		
Yes	52.5	1.3
No	47.5	98.7
Frequency of junk food consumption		
Always (all days in a week)	24.4	1.5
Mostly (3-4 days a week)	25.8	4.1
Sometimes (1-2 days a week)	38.3	29.4
Not at all in a week	11.5	65.0

The qualitative results from the outcome evaluation suggest that students have stopped consuming junk foods for their school meals; instead, they argued that they consume homemade and/or canteen-cooked foods for their school meals. Lower basic schoolchildren opined, *“We used to eat noodles, biscuits, bakery items, potato chips, and other crunchy foods in our school meals. But these days, we consume Jaulo, Khinchadi, Haluwa, beaten rice, cooked beans, and rice pudding”* (Grades 4-5 Students, Focus Group).

Upper basic school students argued that junk food consumption had been lowered in their classes; however, they argued that some of their friends consume junk food secretly. Upper basic schoolchildren opined, *“Before 2-3 years, we used to buy junk food from the tuck shop and grocery stores near the school. But these days, we do not buy such foods; instead, we bring homemade lunch boxes. But some of our friends still bring junk food and eat secretly”* (Grades 6-8 Students, Focus Group).

The school community also argued that junk food consumption among children has markedly reduced. They argued that the volume of noodles and biscuit wrappers decreased in dustbins compared to the past. The PAR committee members during the focus groups also argued that junk food consumption has been reduced.

The committee member argued, *“I used to see noodles wrappers, biscuits, and polythene bags around the school. But the waste that comes from junk food are seen minimally observed inside the school’s premises”* (PAR Committee, Focus Group).

The parents reported that children used to refuse to take homemade lunch boxes before SBNEI. But nowadays, they ask for a homemade lunch box.

“There are lots of changes to my children’s dietary Behavior. We are so happy. Before the nutrition program, our children used to ask for pocket money to buy junk food. But nowadays, they ask for a homemade lunch box”.

(Female Parent, Focus Group)

“My son used to buy junk food at the grocery stores on the way to school. Even if I asked him to carry homemade food, he used to ignore us. But these days, he looks happy taking a lunch box; however, I sometimes provide him with pocket money”. (Female Parent, Focus Group)

Teachers also said that students’ junk food consumption practice is markedly reduced. However, some students, particularly newcomers, consume junk food secretly. A male teacher opined, *“Junk food consumption has decreased compared with the past 2-3 years; however, very fewer of them eat secretly, mostly newcomer students migrated from other schools since they were not fully aware of junk food consumption”* (Basic School Male Teacher, Focus Group).

The canteen service providers shared that though some students wished to eat junk food as their school meals, they could not do it openly. It is because consuming junk food was prohibited at school. The canteen service providers also argued that junk food consumption was reduced due to the ban on selling junk foods from the tuck shop.

“Students do not dare to eat junk food inside the school due to the fear of teachers and the school environment. But students may relapse to consuming junk food if they find a supportive environment. Some students still go outside and bring junk food. But they do it secretly”. (Canteen Service Provider, Interview)

Buying junk food at vending shops and grocery stores has also been reduced compared to past years. Students dropped to almost nil after the collaborative school meal program began. However, students still pursued buying chocolates and candies to celebrate their birthdays. Moreover, they also bought sour foods like *Amilo* and *Titaura* (showery candy) since these foods may help them to reduce sleepy feelings in the classroom. Grocery storekeepers also believed that buying junk food has been markedly reduced after collaborative school feeding program. A local vender opined, *“Buying junk food is almost nil after initiating a school feeding program for grades 6-8. Over the last three years, the selling of junk foods has been considerably reduced. These days, students buy stationery goods from the grocery stores”* (Male Grocery Storekeeper, In-depth Interview).

The school canteen used to serve junk food wildly through the tuck shop before implementing a SBNEI. But from the mid of the academic year 2077 BS, the school administration has banned serving junk food from the tuck shop. These days, no students and teachers are allowed to consume junk food inside the school premises.

Hand Washing Practice

School midday meal guideline for the community school has focused on hand hygiene and sanitation as an integral component of school feeding program (Government of Nepal, 2076 BS). The present study has also incorporated hand hygiene and sanitation-related session activities linked with Ecosan and WASH projects. This kind of combined effort has improved students' handwashing behaviors. The students argued that they always wash their hands in the hand washing station before school lunch.

Figure 45. *Students' Handwashing Practice before School Meals*



Further, they argued that they have increased hand washing practice at home and school. The excerpts below reveal that students have improved their handwashing behaviors at school as well as home. Boys from upper basic class argued, *“We used to eat school meals without washing our hands, but nowadays, we always wash our hands with soap and water before every single meal”* (6th Grade Boy Student, Focus Group). Similarly, a group of girls also argued as the boys did, *“We also wash our hands and legs daily with soap and water before consuming our meals at home”* (8th Grade Girl Student, Focus Group)

The school community also believes that students have improved their hand hygiene practices. *“Previously, many students used to eat without washing their*

hands. But now every student washes their hands before meals” (SMC and PAR Committee, Focus Group).

Meal Consumption Behaviors at Home

Students translated the best practices learned in the school into the home. As a result, they preferred to eat homemade foods, whilst most did not like to eat homemade foods for a snack before they were involved in the study. The excerpts of conversational dialogue below reveal the meal consumption behaviors of students at home.

Researcher: *What do you eat at home when you return from school?*

Student 1: *These days, we eat Spinach, fried rice, beaten rice, and boiled potatoes.*

Student 2: *At home, we eat boiled and fried gram, fried rice, boiled eggs or omelet, Chiura, Roti and Tarkari. If nothing is available, we eat biscuits, tea, and sometimes noodles too.*

Student 3: *I usually eat leftover meals at home. I sometimes eat biscuits if there are no leftover meals. But I do not eat noodles and other junk foods since my parents do not let me eat noodles. My parents also do not eat junk food.*

Student 4: *When my mom is busy, she gives us biscuits and tea. Otherwise, we usually eat home-cooked foods like leftover meals, fried rice, beaten rice and tea, and sometimes seasonal fruits and vegetables.*

Student 5: *Three years back, I loved eating tea and biscuits daily when I returned from school. But, nowadays, I hardly do that once a week. My parents are also conscious about what I eat. These days, I usually eat homemade food.*

In similar with students' responses, the parents also argued that these days their children eat conventional type foods (*Raithane Khana*) at home. The below quotations help to reveal the same meaning.

My children like to eat commonly available foods at home. These days, they do not ask for money to buy junk food. (Male Parent, Focus Group)

I have no problem with my daughter. She likes home-cooked foods. She does not like eating junk food; instead, she asks for Chana, Chiura, eggs, and fried rice. (Female Parent, Focus Group)

These days, I provide them with cooked food. Sometimes, I offer them boiled maize, seasonal fruits, boiled yam, sweet potatoes, and Colocasia/Taro.
(Female Parent, Focus Group)

Parents said that their children reduced junk food consumption at home.

Parents were also being aware of not eating junk food and not offering junk food to their children. Instead, they wished to provide a conventional type of food.

These days, my children hardly ask for noodles and biscuits. Instead, they ask for homemade normal foods like rice, curry, and sometimes Chana and Chiura. (Female Parent, Focus Group)

In the last years, my son frequently asked to prepare noodles when he returned from school but nowadays, he does not ask for the same. (Female Parent, Focus Group)

The above results suggest that children reduced junk food consumption at home. Instead, many of them would like to eat conventional types of foods.

Anthropometric Measurements and Nutritional Status

Though I/NGOs, voluntary organizations, and health caring settings were occasionally involved to organize anthropometric measurement tests before

implementing SBNEI in the school, no teachers and students were empowered to get involved in anthropometric measurement activities. But students and teachers acquired the skills of measuring their nutritional status after they were involved in this study. In so doing, they frequently involved in anthropometric measurements activities in the school. They became self-reliant in assessing their nutritional status based on the BMI calculation method.

I do not remember a single day of my involvement in measuring height, weight and calculating the BMI score to estimate my nutritional status before I was involved in this study. (8th Grade Boy, Informal Discussion)

These days, we are involved in measuring height and weight and thereafter estimating the nutritional status. We came to know how to use a weighing machine and measuring tape to obtain our height and weight. Now we can calculate BMI and find out nutritional status accordingly. (7th Grade Girl, Informal discussion)

The nutritional status of children was measured based on BMI-for-age, Height-for-age, and Weight-for-age. The results of BMI-for-age show that the proportion of overweight students decreased from 18.2 to 13.2 percent, and normal-weight students slightly increased from 72.7 to 75.6 percent. Still, underweight students marginally increased from 9.1 to 11.2 percent. Likewise, the results of Height-for-age show that the proportion of stunted students declined to 12.2 from 23.4 percent. But the outcomes of Weight-for-age revealed mixed results, where normal-weight students were almost unchanged. The underweight group of students dropped down to zero, and the overweight group of students surged up by 20 percent. The outcome evaluation results indicate that the nutritional status of children improved their nutritional status compared to the need analysis study (Table 23).

Table 23. *Nutritional Status of Children*

Descriptions (Nutritional status)	Needs ssessment-2018	Outcome evaluation-2022
BMI-for-age (BAZ)		
Underweight (thinness)	9.1 %	11.2 %
Overweight	18.2 %	13.2 %
Normal	72.7 %	75.6 %
Height for age (HAZ)		
Stunting (short)	23.4 %	12.2 %
Normal	76.7 %	87.8 %
Weight for age (WAZ)		
Underweight	16.7 %	0.0 %
Normal	83.3 %	80.0 %
Overweight	0.0 %	20.0 %

Teachers' Nutritional Behaviors

Shifting Away from Junk Food

Though this study aimed to promote healthy nutritional behaviors in children, the teachers who were involved in this study as the co-researchers also improved their nutritional behaviors along with students. Before this study, teachers argued that they did not have options for healthy food choices in the canteen. They were compelled to consume junk food— biscuits and instant noodles and/or deeply-fried-oily snacks like Chow mein, Pasta, *Pakauda*, and Samosa at the canteen. But after they became a part of this study, they consumed healthy school meals like *Roti* and curry; beaten rice, yogurt, and fruit salad, rice pudding; *Puri* and *Tarkai*; *Chana* and *Chiura*, and seasonal fruits.

We used to eat coke and noodles outside of the school premises when there was no canteen inside the school. Now we eat fresh and healthy foods following the canteen menu list. These days, we eat rice pudding; beaten rice and cooked legumes; Roti and Tarkari; beaten rice, yogurt, and fruit salad. These days, we also eat eggs, fish and meat once a week. (Male Teacher, Focus Group)

I also used to eat junk food—Chatpate and instant noodles. I don't claim that I have changed my lunch-eating behaviors. But I became consciously aware of my lunch eating habit than before. These days, I eat less biscuits and noodles. Nowadays, I am conscious of what I eat. (Female Teacher, Focus Group)

The above results suggest that teachers also reduced consuming junk food in school. They would like to eat fresh and healthy foods in school, and they have markedly changed their dietary behaviors after they got involved in this study as co-researchers.

Figure 46. Teachers Having their School Lunch



Teachers as Role Models for Students

The teachers changed their meal consumption behaviors at school and acted as effective role models to encourage them to eat homemade foods for school lunch. The vignette-4 articulates the story of teachers' role-modeling dietary behaviors.

Vignette #4: A Story of Basic School Science Teacher

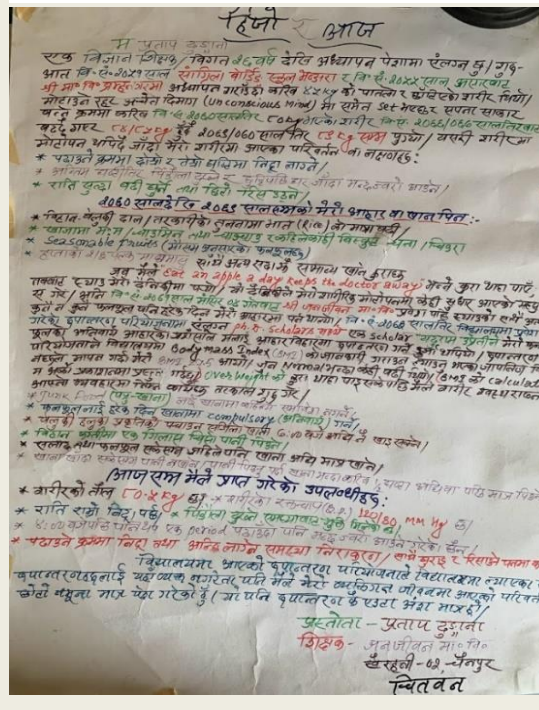
A basic school science teacher, 46, male, has been teaching in the school for 26 years. He was just 45 kg when he was involved in the teaching profession in 2051 BS. But after 20 years back, his weight increased to over 90 kg. As a result, he felt undesirable physiological and psychological changes with him. For example, he started feeling tired, exhausted, sleepy, lethargic, irritated, and tempered while teaching. He realized that his dietary pattern was wrong. He used to love eating biscuits, instant noodles, Chowmin, and Mo:Mo in his school meals.

One day, he reached the doctor's clinic, and the doctor suggested him to change his dietary pattern. In the meantime, the SBNEI also began to be implemented

at school. He learned to calculate Body Mass Index (BMI) after being involved to this study. Based on his BMI outcome, he realized that he got overweight. After that, he stopped eating calories enriched foods like junk foods, but increased eating fruits, vegetables, and salad consumption in his daily diet. He was also involved in doing morning exercises.

He acted as a role model teacher in 234racticition education classes to nudge students towards developing healthy nutritional behaviors. This activity encouraged him to continue healthy behaviors. As a result, his body weight, blood pressure, sugar level, and sleeping disorders were under control. These days, he does not feel tired in the classroom. He argued that he changed his dietary behaviors markedly.

Figure 47. Teacher’s Journal Writings



Teachers discussed that they acted as role models in the classroom and even at home to influence young children’s nutritional behaviors. One basic school female teacher shared that she stopped offering biscuits and noodles to her children; instead, she served home-cooked conventional foods which are enriched with nutritional value.

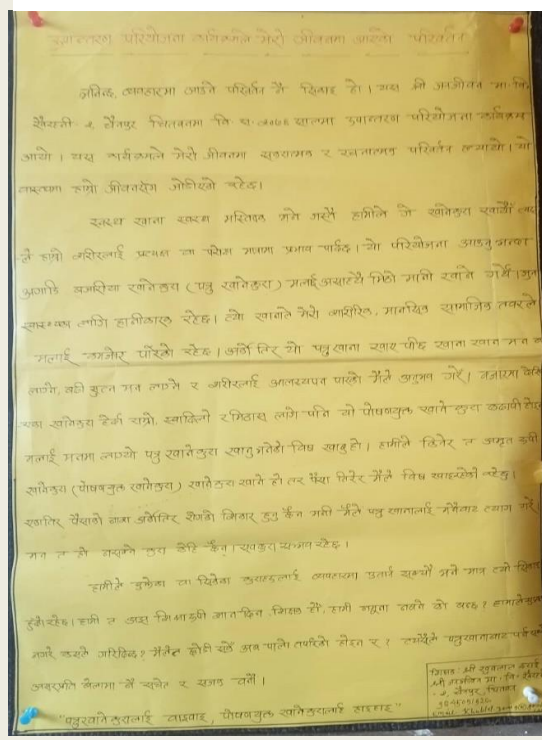
When I engaged in the sensitization and motivation session activities at school, I changed my eating practices. Afterwards, I started acting as a role model at home to encourage children to consume nutrient-enriched conventional foods like Jaulo, Roti, rice pudding, corn, and soyabean. (Basic School Female Teachers, Field Note)

Similarly, the teacher also changed his notion about nutritional behaviors. He stopped eating junk food, including cold drinks at school and home. He consumes healthy meals in the school's canteen. Besides, he also brought fruits or Salads at school. He is an icon of the ideal teacher to his students. Vignette #5 depicts the role-modeling story of the basic school HPE teacher.

Vignette #5: A Story of Basic School Health Education Teacher

A basic school health education male teacher, 39 years, has been teaching for seven years at the current school. These days, he eats one whole fruit every day at school lunch. He often does that based on the availability of the fruit(s) in his locality. He has not consumed junk food in the school for four years, nor did his colleague teachers do the same. Before the school nutrition program, noodles, Chowmin, Samosa, Pakauda, Pasta, doughnuts, and tea were his common snacks to eat. But these days, he eats rice pudding, Roti and curry, beaten rice and cooked beans, beaten rice and yogurt, and Puri and curry. Nowadays, he is consciously aware of what he eats at school. He also argues that his nutritional behaviors have positively influenced his family members' dietary behaviors.

Figure 48. Showcase of Teacher's Journal



I observed that during the lunch break time, when I reached to teachers' room, female teachers were sharing their homemade lunch with each other. Even some teachers, who were also the parents, involved their children to share their lunch brought from the home to their friends. The teachers argued that they eat their lunch by sharing them in the group. Sharing lunch in a group has fostered social inclusion

practice in the school. The practice of sharing lunch in a group can bring people in the mainstream who cannot bring lunch together.

We often share our school lunch with the group of teachers. In so doing, we bring Roti, curry, Salad, and fruits turn by turn. (Female Teacher, Focus Group)

Lunch sharing practice has developed harmony and sharing culture among us. If anyone miss to bring her lunch, she can take from others. (Female Teacher, Focus Group)

The teachers' lunch-sharing culture at school has role modeled to students encouraging them to bring homemade fresh and healthy foods, reducing daily pocket money expenses, and fostering social harmony and inclusion among the teachers. This kind of collaborative effort could be a showcase to motivate students towards healthy nutritional behaviors.

Figure 49. Lunch Sharing Practice among Teachers



School Leaders' Nutritional Behavior

HT, SMC, PTA, and PAR committee members are the school leaders. The SBNEI also motivated the school leaders towards healthy eating behaviors. They became critically aware of unhealthy eating behaviors of selves. The school administration and management committee were enthusiastically committed against consuming junk food at school's premises. Before this study, the school usually served cold drinks, tea, and biscuits at the school's functions. But after SBNEI, the

school administration served seasonal fruits and canteen-prepared foods in the school's functions. The HT, in the informal discussion shared, *"Generally, in the school's function, we used to serve a cup of tea with biscuits, and cold drinks to the participants. But this year, we did not serve such foods. Instead, we managed to buy a healthy lunch box though it was expensive"* (Headteacher, Field Note).

The headteacher's school meal behaviors influenced teachers' and students' nutritional behaviors positively, including family members and relatives in the interpersonal level. The story of the headteacher as explained in vignette #6 describes more about how he transformed his dietary behaviors and inspired others as a transformative change agent.

Vignette #6: Transformative Role of the Headteacher

The school headteacher, 51, male, has been working at the school for eight years. These days, he eats a whole fruit before school lunch at noon. He often does that based on the availability of the fruit(s) in his locality. However, he prefers to eat an apple every day. He has not consumed junk food at school for four years, nor did his teachers because eating junk food is banned at school. He used to eat cooked noodles, chow mein, Samosa and Tarkari, Pakauda, Pasta, doughnuts and tea, beaten rice and curry before this study. But these days, he eats rice pudding, Roti and Tarkari, beaten rice and cooked beans, beaten rice and yogurt, and Puri and Tarkari. He is consciously aware of what he eats in school. For instance, nowadays, he manages healthy snacks in organizational meetings and even at school functions. He argued that he will sustain these changes in his school and personal life as he remains in the leadership position. He asserted that the SBNEI has significantly changed dietary

Figure 50. Apple Day of Headteacher



behavior in his family. As a transformative leader, he also shares the benefits of healthy eating with his family members and relatives.

The school leaders also transformed their nutritional behaviour, changed their thinking and started working against unhealthy dietary behaviors. The story of the SMC chairperson informs that the school leaders should consciously be aware of what they act in the school because they should act as a watchdog against unhealthy dietary behaviors inside the school premises. Vignette # 7 portrays more about the role of school leaders as societal change agents.

Vignette #7: A Story of the SMC Chairperson

The SMC chairperson, a male, 52 years, has been working for six years. Before joining this study, he used to eat whatever was available or quickly served types of foods in the canteen. He used to eat junk foods like instant noodles, biscuits, doughnuts, Samosa, Pakauda, Chowmin, and pasta, which were served in the canteen. But these days, he is consciously aware of what he eats, and he is aware of asking for healthy foods in organizational meetings.

Compared to the past, he asks for fruits and Salad, Roti and Tarkari, beaten rice and yogurt, rice pudding and other healthy meals in the school's meeting. He asks for a cup of yogurt instead of a cold drink and Roti Tarkari instead of Chowmin. He is often consciously aware of being criticized by students, parents, teachers, and school administration if he consumes junk food in front of them. Though he became consciously aware of nutritional behaviors inside the school premises, he is compelled to eat junk snacks outside the school setting. However, he immediately reflects on his committed dietary behavior i.e., no junk food consumption inside the school.

Besides being a chairperson of the school health and nutrition committee, he has to supervise students' meal consumption behavior during lunchtime. He examines the quality of the meals served in the canteen. He suggests improving the quality of the meals to the canteen personnel if something goes wrong. Moreover, being an advisor of the school nutrition wall magazine, he also suggests some innovative ideas for magazine publication.

The above findings suggest that the school leaders have also changed their dietary behavior in the school and in a similar wider social setting. This kind of leadership effort has created a supportive school environment to sustain improved nutritional behaviors among children.

School's Midday Meals Service

Reorienting Canteen Service System

Before a three-year-long SBNEI at school, the canteen used to serve junk food like biscuits, instant noodles, chocolates, baked items, potato chips, lays, and other crunchy foods to students through the tuck shop. Similarly, the canteen served cooked foods like *Nimkin*, *Chowmin*, *Puri* and *Tarkari*, *Aalu Chap*, *Pakauda*, *Dhungro*, *Chatpate*, and boiled noodles. The canteen service providers also argued that 2-3 years back, they used to sell readymade packed foods from the tuck shop, *"I mostly used to serve Good Day and Tiger biscuits and Preeti noodles from the tuck shop. I remember that I used to sell more than four cartons of biscuits and three cartoon noodles daily. There was high demand for these foods"* (Canteen Service Provider, In-depth Interview).

But after this study, the canteen served healthy meals following the weekly menu that meets the nutritional requirements of the children. The menu is prepared following the national standards of the Government of Nepal (Government of Nepal, 2076 BS). The canteen served beaten rice and cooked legumes, beaten rice and milk, rice pudding, *Haluwa*, *Khichadi*, and fried rice to the fifth and below-grade students. Similarly, *Puri* and *Tarkai*, rice pudding, Samosa, beaten rice and cooked beans, boiled egg and cooked grams, and fried rice mixed with carrot, green vegetables, and peas were served to grades 6-8 students.

Based on the recommendation made by the school meal management and supervision committee, school administration, and canteen service providers, the midday meal menus get changed at least twice a year, i.e., in the summer and winter seasons. The canteen utilized fresh and organic foods from the school's farming field, school gardening, mushroom farming, fish farming, and the local market. For example, rice grains and beaten rice are collected from the rice mills located in the community, milk from the local farmers at dairies, eggs and chicken from the local poultry farm, and green vegetables, Salad, and fruits from the local farmers. The garden products are also supplied to the canteen based on the availability of the seasonal products in the school garden and the farming fields.

Figure 51. *Meals Served through the School Canteen*



Menu-Based School Meals

These days, most teachers eat their lunch in the canteen. The canteen has developed a menu with different food options for teachers and students. The canteen serves rice pudding; chicken and/or fish and beaten rice; beaten rice, yogurt, and salad; Puri and *Tarkari*; *Roti* and *Tarkari*; beaten rice and cooked beans; Samosa and *Tarkari*. The canteen service provider argued that she has been serving menu-based healthy foods to students and teachers.

These days, I usually serve fresh and healthy foods to the teachers and other staff. Unlike in the past, I serve them rice pudding and achar; chicken, fish and beaten rice; beaten rice, yogurt, and salad; Puri and Tarkari; Roti and Tarkari; beaten rice and cooked beans; Samosa and Tarkari. Sometimes, I serve them seasonal fruits and Salad. (Canteen Service Provider, In-depth Interview)

The teachers and school leaders also discussed that they get fresh, hygienic, and healthy foods from the canteen compared to the past. But they had a complaint about the price of the menu list. Teachers complained that the price seems to be higher than the market price. Due to this, some teachers, mostly female teachers, manage homemade lunch boxes themselves.

Parental Involvement in the School

Parental support and collaboration with the school are very effective means to strengthen the reciprocal relationship between the school and the community. This study has potentially increased parental involvement to discuss dietary behavior and classroom learning outcomes of students compared with the past three years, whilst there was a paucity of parental involvement in the school before this study. Parents also did not show keen interest in discussing the dietary behavior of their children since they were never asked to come to school and had a discussion with school administration and teachers. Very few parents had come to school to discuss with grade teachers about classroom learning performance of their children. But these days, parents frequently come to the school and talk with teachers about the educational outcomes and dietary behavior of their children. The teachers also argued that there was no interaction held between parents and the teachers talking about the

dietary behavior of children in the past years. They had never realized that students' dietary behavior could closely be associated with students' learning outcomes.

This program has encouraged parents to come to school, which was almost nil before. Now, we frequently exchange our ideas with parents at least once a month, where we discuss nutritional and classroom learning behaviors of children since there is a schedule of parents' and grade teachers' meetings at the end of each month. This is how we have encouraged parents to involve them in school activities. (Headteacher, Focus Group on PAR Committee)

The teachers argued that they have involved parents in classroom teaching as the facilitators. Teachers involved mother parents to share their lived experiences

Figure 52. Parent Involved as a Classroom Facilitator



about healthy cooking, eating, and feeding practices adopted at home (Figure 53).

This participatory action inquiry developed a critical thinking among the parents. As a result, they have realized the relationship between nutritional behaviors and the classroom learning outcomes of their children. A teacher in focus group opined, *“This school nutrition program has institutionalized the relationship between children’s meal consumption behavior and their classroom learning outcomes. Now, parents have fully realized that school meal consumption is closely associated with students’ classroom learning outcomes”* (Basic School Male Teacher, Focus Group on School Meal Committee).

The frequent involvement of parents, particularly in lower basic classes (grades 1-3) encouraged them to join in school feeding, where they would help the teachers to feed their young children at school.

My granddaughter does not eat well if I do not come here at lunchtime. I have been regularly coming to the school from the beginning of this academic year (2078/79 BS) when I got my granddaughter admitted. I am happy to help the teacher(s) to feed my granddaughter since my home is quite near to the school. This near distance between home and school allowed me to come to the school every day. (Male Parent, 55 years, Field Notes)

Parental involvement motivated the school to explore collaborative efforts to solve emergent problems of the school. For instance, parents overwhelmingly supported extending the school midday meal program up to eighth grade since the Government of Nepal was limited to running the school midday meal program up to fifth grade at the time of outcome evaluation of this study (2078/79 BS). Parents agreed to scale up the collaborative school midday meal program, where the parents, school and local

government shared one-third of the total cost each. As a result, parents made partnerships with schools and local government to scale up school feeding programs up to eight grades through the collaborative school feeding program.

Figure 53. Parental Involvement in School Feeding Program



I often come to the school to observe school feeding. I also make complaints with the school administration (Headteacher) if the quality and quantity standard of the meal get concealed. At the end of each month, we come to school to pay the cost of the school meals provided to my children. (Male Parent, 48 years, Field Notes)

Having the parents involved in the thorough process from needs assessment to outcomes evaluation increased parental involvement in the school. In so doing, a couple of contextualized participatory approaches were practiced. Among them, frequent home visits, inviting parents as the classroom facilitators, involving them to feed the young children, companionship to running collaborative school meals program, and linking school nutrition activities with gardening, mushroom farming, and fish farming activities were effective approaches to ensure parental involvement at school.

Covid-19's Impact on the Study: [जे गर्नु कोरोनाले गर्यो]

The coronavirus disease 2019 (Covid- 19), an infectious disease caused by severe acute respiratory syndrome Coronavirus-2 (SARS-CoV-2), was first identified in December 2019 in Wuhan, China. It spread worldwide, leading the WHO to declare a pandemic on 11 March 2020. As WHO confirmed human-to-human transmission of Covid-19 and given the high rate of international movement that happened daily from and to all countries, Nepal has not remained untouched by the pandemic. The Government of Nepal, on Chaitra 11, 2076 (27 March 2020), announced a nationwide lockdown to prevent the spreading of the disease to protect the life of citizens. The lockdown affected all sectors, including education, where all

students, teachers, and researchers were confined inside their homes. Covid-19 also badly hit this study as explained below.

Psychological Distress and Resilience amid Covid-19 Pandemic

Due to unprecedented conditions created by the Covid-19 pandemic, I could not continue my field work physically. As a result, my PhD journey was not completed in the given time frame of the Graduate School of Education (GSE), TU. Besides, the Omicron variant of the Covid-19 badly hit me. Due to this, I could not immediately return to my academic life since my body could not recover quickly. Besides, my beloved mother and wife were also severely hit by the Covid-19. It created a chaotic condition in my life. I was distracted from my PhD journey since I could not fully concentrate on my studies. To immune myself against the Covid-19, I involved in Yoga and meditation to get focused on my study. I joined a six-month-long Yoga course. Once I completed the course, I transformed my role from a Yoga practitioner to a trainer for the teachers collaborating with the Curriculum Development Center (CDC) and Center for Education Human Resource Development (CEHRD), Ministry of Education, Science, and Technology. Though I could not resume my PhD journey for six months due to Covid-19 pandemic, I was able to cope with the pandemic situation through Yogic practices such as Asana, Pranayama, and Meditation as a part of my daily life. Since then, I have been practiced Yoga as a part of my daily life.

Classroom Pedagogy and Learning Management System amid Covid-19 Pandemic

Covid-19 has enormously affected the school's teaching-learning environment. The teacher co-researchers argued that they could not implement participatory nutrition education pedagogy in the classroom teaching since the school remained closed for a longer than one academic session since school was converted

into the isolation and quarantine center. A teacher argued that he could not implement participatory classroom teaching methods during the Covid-19 since the school remained closed for a long time.

I learned many good things from nutrition intervention. I learned participatory teaching methods, but the school remained closed for a year due to Corona. Hence, I could not apply what I had learned from nutrition intervention. Covid-19 has severely affected teaching-learning activities [जे गनं कोरोनाले गर्यो] (Male Teacher, Focus Group)

We know these participatory methods actively engage students in classroom learning activities. Our common problem is that due to the Covid-19 pandemic, we are yet to complete the given customized course of content.
(Female Teachers, Focus Group)

Covid-19 has also created some positive results to connect with people remotely through the learning management system (LMS). I collaborated with teachers through the LMS to foster their professional development. Particularly, we (PhD researcher and school co-researchers) worked together developing digital competencies to handle the ICT-based pedagogy in the classroom. In so doing, we were involved in a weeklong online ICT workshop led by Rupantaran TU. In the workshop, we acted dual role: as the facilitators and learners, where we shared our knowledge, skills, and competencies with each other. Moreover, we worked together via digital platforms to implement an integrated curriculum at lower basic schools. We used Zoom digital tool for integrated curriculum workshop, where we enhanced our digital learning competencies for online pedagogy. Further, we also created a messenger group of school nutrition wall magazine publication, where we shared our critical thoughts and constructive ideas, and enriched experiences.

During Covid-19, I was also able to learn from online learning management platforms (Moodle and Google Classroom) and tools (Google Meet, Zoom and MS Teams). As a result, I could moderate around three dozen virtual colloquium sessions among the MPhil and PhD scholars. The scholars were represented from the five giant universities of Nepal: Tribhuvan University (TU) Kathmandu University (KU), Nepal Open University (NOU), Mid-western University (MWU), and Far-western University (FWU). Similarly, Covid-19 provided ample opportunity to participate in the webinar programs, where I shared my papers in the interest matched national and international community. During the lockdown, I was also involved in the capacity-enhanced online training and workshops like Endnote Reference Manager, data-based literature search strategy, systematic review procedure, and computer-assisted qualitative data analysis software such as Dedoose organized by NHRC, Open Code 4.03 (64) by NMBU, and Atlas.ti assisted by GSE, TU.

Post-Covid Nutritional Behaviors of Students

Covid-19 negatively impacted students' nutritional behaviors. The school community argued that after Covid-19, students were reluctant to bring homemade lunch boxes; instead, they brought pocket money to buy snacks at school. A noticeable number of students relapsed to junk food consumption, which almost decreased to nil before the pandemic.

Before Covid-19, most students brought homemade foods, but now they prefer to bring pocket money. Some of them still bring junk food [F: Why?]. I guess they were locked inside the home for a long time. Due to this, they resumed eating junk food when the school reopened after a long. (Male Teachers, Focus Group)

The PAR committee members also argued that homemade lunch box managing students decreased after Covid-19. A male participant opined, *“These days, around 30 percent of students from grades 6-8 bring a homemade lunch box. Before Corona, this proportion was high”* (Male PAR Committee Member, Focus Group).

A parent who attended the PAR committee meeting also argued that after Covid-19, children did not like to eat homemade foods at school; instead, they preferred to eat readymade instant foods and/or canteen-prepared foods. A female PAR committee member opined, *“These days (after Covid-19), my grandson does not prefer taking homemade foods at school. [F: Any reasons?]. He says that only a few students bring homemade foods”* (Female PAR Committee Member, Focus Group).

The PAR committee also discussed that students disliked eating homemade foods for their school lunches after Covid-19 and the number of unhealthy-eating students surged up. They proposed to scale up a school feeding program for upper basic classes (6-8 grades) and suggest resuming follow-up in-class nutrition education sessions to restore healthy nutritional behaviors in children.

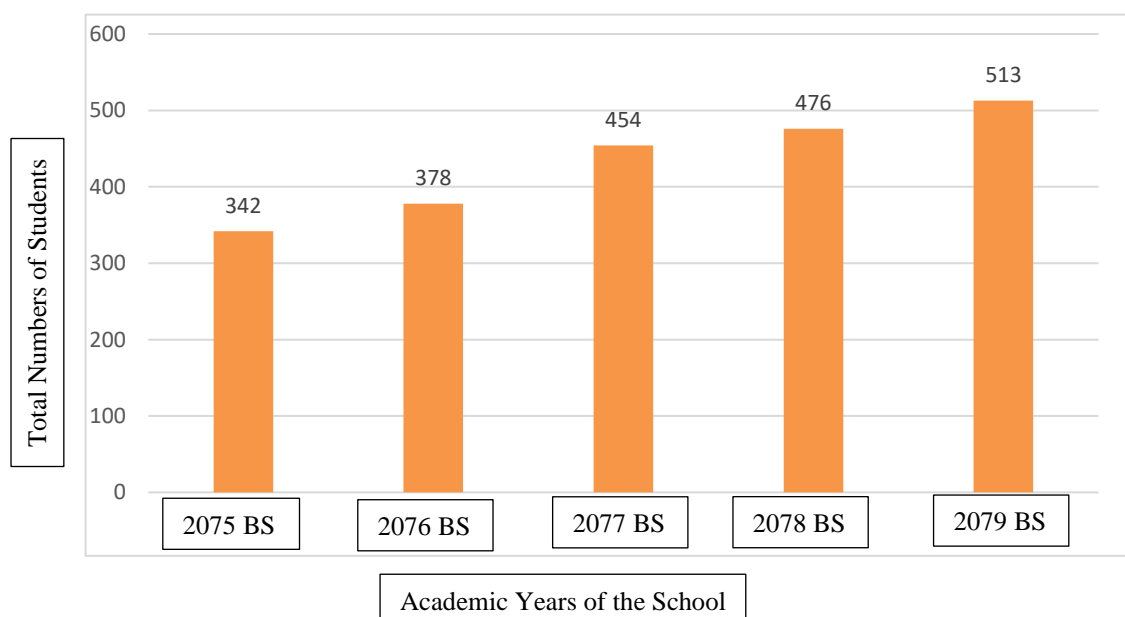
“Students know that homemade foods are healthy and hygienic, but after Covid-19, only a few of them bring homemade lunch boxes; instead, they either bring junk foods or pocket money to buy canteen snacks. We must scale the school feeding program to upper basic classes and implement follow-up nutrition education sessions to resume healthy nutritional behaviors”. (PAR Committee, Focus Group)

The midday meal policy of the Government of Nepal is also concerned with providing students with fresh and hygienic foods instead of homemade since home-cooked foods may get spoiled during the summer. The policy has also encouraged school-cooked fresh and healthy foods for children (Government of Nepal, 2076 BS).

Considering the midday meal policy of the Government of Nepal and realizing the economic burden of the parents created due to Covid-19, the school scaled up the school feeding program up to eighth grade. The school served canteen-cooked fresh and healthy foods through the collaborative school meal program. This initiative after Covid-19 fixed unhealthy dietary behaviors of upper-basic children.

Surprisingly, after Covid-19, students' enrollment increased in the school. Behind this increment, two reasons were prominent. One is parents could not pay tuition fees in the private schools due to the limited income source during Covid-19. The school administration argued that parents with poor income sources could not pay their children's tuition fees in the private schools and thus got their children admitted to the public schools. The next reason was the school feeding program—a component of school-based nutrition education intervention since the program was extended up to eighth grade. Whilst the Government of Nepal has scaled up the school feeding program only up to the fifth grade till the time of the outcome evaluation study. The table below shows the increased numbers of students in the action school over the years after this study.

Figure 54. *Numbers of Students Between the Academic Years of 2075-2079 BS*



Chapter Summary

A four-year-long SBNEI, anchored with PAR methodology, has resulted in a couple of positive outcomes in children's nutritional behaviors. The positive outcomes are also transformed to the wider social settings including the teachers, parents, and the community people. Students' food and nutrition knowledge has increased, particularly on the health benefits of 'healthy food' and the harmful effects of 'junk food'. Students have developed a knowledge-sharing culture in the interpersonal circle, particularly among the classmates and family members with whom they closely interact. Similarly, students have developed a strong intention towards healthy dietary behaviors. Students have developed a critical awareness, commitment, and self-efficacy against unhealthy dietary behaviors. Moreover, teachers, parents, school leaders, and the community people also became critically aware of their nutritional behaviors.

Students' midday meal consumption behaviors are markedly changed. There has been a significant improvement in the number of students eating regular midday meals in school. There has also been a growing trend of carrying homemade lunch boxes, whilst junk food consumers are heavily dropped down. These days, students prefer consuming conventional types of meals like *Haluwa*, *Khinchadi*, *Puri* and *Tarkai*, beaten rice, cooked legumes, and rice pudding for their school meals. They consume midday meals regularly (all school days in a week). Meals skipping, home returning, truancy, and stomach aching problems have also been almost neutralized. The school canteen has stopped selling junk food; instead, the canteen served fresh and healthy foods based on the weekly menu which is updated at least twice a year.

There has also been a significant reduction in buying junk food from the grocery stores around the school.

Children have also reduced junk food consumption at home. Students improved their handwashing behaviors before every single meal. They washed their hands with soap and water at the water station before school meals. Students also translated their healthy nutritional behaviors into the home. For instance, they consume home-prepared foods like rice and curry, beaten rice and tea; boiled eggs; potatoes, yam, and maize; and fried maize and soybean. Similarly, teachers and students became empowered to measure their height and weight to find out their nutritional status. They became self-reliant in estimating their nutritional status following the BMI calculation method. Students' nutritional status has also been improved. For instance, the proportion of overweighted students decreased from 18.2 (needs assessment) to 13.2 percent (outcome evaluation), stunted students markedly lowered down to 12.2 from 23.4 percent, while the underweighted group of students dropped down to nil.

Teachers stopped eating junk food for school lunches. They have heavily cut off junk food consumption even outside of the school setting. The school has banned junk food consumption. These days, no students, teachers, and school leaders consume junk food at school. Most of the teachers regularly consume fresh and healthy food from the canteen. However, some female teachers bring their lunch boxes from home and share each other in the group. The school leaders have also translated healthy food choices and dietary behaviors at home.

These days, no junk foods are served through the canteen; instead, it serves fresh, hygienic, and healthy meals like beaten rice, cooked beans and grams, cow milk, rice pudding, *Haluwa*, *Khichadi*, *Puri*, curry, Samosa, boiled egg, and fried rice

with green veggies. The canteen serves healthy meals following the menu list as recommended by the school meal committee. The canteen utilizes locally produced agricultural products. The school feeding program has also promoted the local market and economy by using local Agri-products. Linking the school feeding program with the local food production system has sustainably promoted the school feeding program.

The covid-19 pandemic has badly hit this study. It has altered students' nutritional behaviors. As a result, they bounced back to unhealthy dietary behaviors. However, follow-up nutrition education session classes corrected their unhealthy dietary behaviors. The findings of the study also reveal that the number of students in the action school has increased, particularly at the basic school level, over the project years.

In the next chapter, I explain transformative changes in students' nutritional behaviors, classroom teaching and learning behaviors of teachers and students (pedagogical innovation), social change outcomes (social transformation) by using a theoretical lens of transformative learning theory, and the mechanism of the sustainability of the SBNEI in the action school. I also explain opportunities and challenges while co-designing and co-implementing the SBNEI in collaboration with the school community in the action school.

Chapter Seven

Transformation in Human Agency, Pedagogical Innovations, and Sustainability

This chapter aims to answer two research questions; To what extent can school-based nutrition education intervention (SBNEI) result in healthy nutritional behaviors in children, pedagogical innovation in classroom, and social transformation among school community after intervention? and What contextualized approaches are relevant for the sustainability of the school-based nutrition education intervention? under four major themes: i) personal transformation in human agency, ii) social transformation in human agency iii) pedagogical innovations in classroom, iv) sustainability of the SBNEI. The final section discusses the opportunities and challenges of the present study.

Personal Transformation in Human Agency

Students' food and nutrition knowledge, particularly on benefits of healthy eating and harmful effects of junk food consumption has increased. Students have developed knowledge-sharing culture among their close circles like classmates, family members, relatives, and playmates. Similarly, students developed a strong positive intention towards consuming healthy school meals. They have developed self-awareness, self-efficacy, and commitment to avoid unhealthy dietary behaviors. Besides, teachers, parents, school leaders, and community people have also become critically aware of their predisposed behaviors. Students have markedly changed their school meal consumption behaviors. Students are more focused on consuming fresh and healthy foods. The proportion of students who consume school meals has progressively increased with a growing trend of carrying lunch boxes from home, particularly among the upper basic children. Junk food consumers are heavily dropped at school and home. These days, students prefer to consume conventional types of

meals like *Haluwa*, *Khinchadi*, *Puri* and *Tarkai*, beaten rice, cooked legumes, and rice pudding in the school. They consumed midday meals regularly (all school days in a week). Meals skipping, home returning, truancy, and stomach aching problems have been overtly reduced. The school canteen's tuck shop has stopped selling junk foods; instead, the canteen serves healthy cooked foods to students following the weekly menu which is continually updated at least twice a year as per the needs. There has also been a significant reduction in the proportion of students who buy junk food from the grocery stores. Students also transformed their healthy eating behaviors and stopped junk food consumption at home. Students have improved their handwashing behaviors before-and-after every single meal in school and at home. They have learned to wash their hands with soap and water. The follow-up nutrition education sessions after Covid-19 pandemic also pushed them to wash their hands regularly. Students have also translated their healthy nutritional behaviors at home from the school. These days, they consume home-prepared foods like rice and curry, beaten rice and tea; boiled eggs; potatoes, yam, and maize; and fried maize and soybean, which were commonly available at their locality. Similarly, students have learned height and weight measurement skills and translated them to self-examine their nutritional status based on BMI calculation method. The proportion of overweight and stunt (less height regarding their age) group of students markedly lowered down, whilst the underweight group of students dropped down to nil.

Findings regarding the positive contributions of the school-based nutrition program to the improved food and nutrition knowledge, healthy eating attitude, and healthy dietary behaviors among children from this study align closely with the findings of similar studies carried out in different parts of the world (Dorado et al., 2020; Hawkins et al., 2020; Jung et al., 2019; Yip et al., 2016). Jung et al. (2019)

demonstrated that school-based nutrition education program improved healthy eating literacy and healthy food choices among primary schoolchildren. Similarly, a five-year long intervention conducted among four elementary schools in a high-needs area in the USA demonstrated that a multicomponent nutrition education program empowered the teachers to improve nutrition literacy, fruits and vegetables consumptions, and prevent obesity among elementary school students (Hawkins et al., 2020). A study conducted in four different elementary schools in Italy concluded that the intervention significantly improved fruit and vegetable consumption to prevent childhood obesity among the children (Grassi et al., 2016). Another study conducted among school-age children (aged 6–12 years) in basic schools of Ghana revealed that nutrition education intervention could have positive impacts on knowledge and attitudes of children, and in the development of healthy behaviors for improved nutritional status (Antwi et al., 2020). Similarly, another study conducted among the Syrian refugee children studying in grades 4-6 in Lebanon demonstrated that a 6-month school nutrition intervention brought positive changes in dietary knowledge, attitude, behavior, and nutritional status of children (Harake et al., 2018). Wang et al. (2015)'s study with the seventh-grade students in China demonstrated that the program could improve nutrition knowledge, attitudes, and behaviour among students. In Nepal too, a short course delivered to the ninth-grade students of two schools was found significantly effective for changing the intention to consume healthy food and student's attitude, perceived behavioral control and intention towards healthy eating behavior (Dhauvadel et al., 2020).

From theoretical perspectives, the present study shares the features of transformative learning theory as asserted by Jack Mezirow and Edward W. Taylor. Evidence from transformative learning theory suggests that commitment; shared

awareness and understanding; changes in the habit of mind, underlying assumptions, and contested beliefs; and being critically aware of the taken for granted of the beliefs and practice are important facets of the transformation. In this study, students, after involving in the SBNEI, critically reflected on their false consciousness on their (un)healthy nutritional behaviors, developed positive intention towards healthy eating behaviors, and consumed healthy meals at home and the school on prior knowledge and practice. This is some foregrounding evidence for transformative learning practices in students.

Following the ten phases of transformative learning process as explained by Mezirow (2009), I could see this process in relation to developing the nutritional behaviors among the children in this study. From the early phase of the study, students moved through disorienting dilemma about quitting junk food and/or consuming healthy and fresh foods after self-examining the paradoxes (pros and cons factors) of both healthy and unhealthy behaviors. After this, they critically assessed their underlying assumptions about (un)healthy dietary behaviors and compared the benefits and harms of old and new health behaviors. Doing this, they were involved in the intervention development course of action for healthy behaviors together with teachers in the school and parents at home. They acquired knowledge and skills for adopting healthy eating behaviors. They gradually tried to adopt healthy eating behaviors at school and home. In so doing, they carried homemade lunch boxes from home and/or consumed healthy meals in the school canteen. They built competence and self-confidence in the newly adopted school meals behaviors. As a result, they reintegrated with newly adjusted environment in the school and home by adopting healthy nutritional behaviors and quitting junk food.

Self-Transformation

Transformation in self (psyche) is an underlying part of the transformative learning theory since self-critical reflection on own's contested belief and assumption is the entry point of the transformative learning (Dirkx, 1998; Mezirow, 2009). The present study also added value to the transformation of my personal and professional life. Though this study aimed to bring positive changes in students' nutritional behaviors, I am intrinsically influenced by my research agenda to transform my own dietary behavior as a transformative researcher. I believe that the researcher with transformative world view should be a role model to influence the researched behavior. In so doing, I stopped consuming junk food though I used to eat sometimes earlier, particularly in the social functions. But since I was involved in motivating students towards healthy dietary behaviors, I realized that I should not have consumed junk food at all.

My PhD journey also influenced my family members' dietary behaviors. My daughter, who was just four years old, also transformed her snacking behaviors. She stopped eating junk food. This was mainly due to the exposure of listening to nutrition poems, songs, and stories that were co-developed by a team of teachers in my study and I used to share those genres with my daughter at home. Nowadays she (now she is eight years) prefers eating home-cooked fresh and healthy foods for her school lunch. In the same fashion, my son, who was sixteen, also started carrying homemade foods to college, whilst previously he used to take pocket money. My wife also started preferring carrying homemade lunch boxes, whilst she used to be hesitant to carry a homemade lunch box previously. The poem below best describes how I and my family members transformed nutritional behaviors after I pursued my PhD study.

Table 24. Transforming Nutritional Behaviors of Self and his Family Members

लक्ष्य मेरो पोषण	Nutrition My Aim
<p>गहु मकै कोदो फापर बन्छ यसको पिठो धेरै धेरै परिकार खान लाई कति मिठो</p> <p>सानी नानी ४ पुगिन ठुलो बाबु १६ बिहान उठी सातु खान्छन गर्देनन अटेर</p> <p>छोरी जान्छिन स्कुल पढन स्याउ सुन्तला बोकी छोरो जान्छ कलेज पढन रोटि बोकी बोकी</p> <p>म्याडम जन्छिन ९ बजे काम गर्नलाई अफिस आफ्नो खाजा आफै लान्छिन बनाउनलाई खप्पिस</p> <p>म पनि त के कम छु र मेरो आफ्ना लागि बोकी ल्याछु एउटा स्याउ आफै खान भनि</p> <p>दिन भर करेसाबारी आमालाई छ ताउलो छोरी आउछीन ३ बजे खान्छिन क्वाप्प जाउलो</p> <p>साझ पर्यो के खाने हुन्छ खेलाबैला बुढी आमा पिठो झिक्छिन खोल्दै घैलाथैला</p> <p>ढिडो पाक्यो साग अचार आहा कति मिठो काइदा रै छ साथी भाइ यो मकैको पिठो</p> <p>यस्तै छ है साथिभाइ साकाहारी जीवन असल स्वास्थ्य उन्नत जीवन लक्ष्य मेरो पोषण</p>	<p>Maize, wheat, buckwheat, and their flour <u>How</u> delicious dishes, I want to eat more.</p> <p>My daughter of four and son of 16, not lying Eats <u>Sattu</u> in the morning without denying. Daughter goes to school carrying apple and <u>orange</u> Carrying bread, my son goes to his college.</p> <p>An expert cook, my madam, goes to office at <u>nine</u> Carries her own lunch box who is always fine.</p> <p>I am not less efficient in my work! Bring one apple to eat, it's not a joke.</p> <p>So busy! My mother is in the kitchen garden, never <u>free</u> So fast! Daughter eats <u>Jaulo</u> returning home at three.</p> <p>We discuss in the eve, what to eat? Loving mother takes out flour pot and packet.</p> <p><u>Dhindo</u>, lettuce and pickles, how delicious it is! My <u>fren</u>, what an amazing this flour of maize.</p> <p><u>Oh</u> my friend, this is the life of a vegetarian Good health and a higher living goal, my nutrition.</p>

Social Transformation in Human Agency

Educational research should have both personal and social transformation impacts since educational research, particularly action research and social transformation are complementary (Desjardins, 2015). Social transformation implies fundamental societal changes that encompass a wide range of institutional and socio-cultural behavior changes over the time (Khondker & Schuerkens, 2014). The intertwining of personal transformation with the goal of social transformation should be an inseparable part of the transformative research. The present study aimed to connect personal transformation outcomes with wider socio-political and cultural transformations within and beyond the school setting. I do believe that incorporating

the concepts of both personal and societal changes will serve the world well in understanding the potential outcomes of the PAR within a transformative worldview (Mertens, 2017).

This study showed that the SBNEI has strengthened social action inquiry, resulting in broader outcomes that extend from personal to social transformation. Though this study aimed to bring transformation in children's nutritional behaviors, the outcomes of the study also reached to the wider social setting since this study involved students, their parents, teachers, and school leaders (HT, SMC, PTA, and PAR committee) through the research process from needs assessment to the outcome evaluation. Further, I discuss parental engagement, role modeling, and interdisciplinary collaboration as the forms of social transformation to this study.

Social Transformation in the Form of Parental Engagement

Effective decision-making roles of parents and community people in school education are acknowledged as challenging undertakings, particularly in the community schools of Nepal (Aryal, 2021). However, studies suggest that transformational school leadership and teachers' collaborative efforts are the keys to involving parents in school-led activities (DeSpain et al., 2018; Yulianti et al., 2021). The present study offered a couple of school-based participatory activities to provide an inclusive approach for parental engagement. SBNEI has potentially increased parental engagement in the school compared with the results of needs assessment study. Parental engagement in school has come in different forms. For instance, parents engaged observing the nutritional behaviors of children, discussing with the teachers to explore the classroom learning behaviors of their children, acting as the classroom facilitator in collaboration together with the teachers, helping students to

contextualize their learning through school gardening, mushroom farming, and fish farming activities. The teachers argued that they could co-learn from parents by connecting nutrition education with contextualized approaches. For instance, a basic schoolteacher shared his experiences about how he could learn from parents while contextualizing the nutrition education curriculum connecting with school gardening, mushroom farming, and fish farming projects.

These days, I am co-learning with parents connecting myself in the school gardening, mushrooming, and fish farming activities. Once I learn from parents, I translate my learning experiences and skills into the classroom teaching. I also bring students out of the classroom and help them to learn through the experiential space of learning. I came to know that such kind of experiential learning approaches empowered students to acquire life skills. Some of our students have already started kitchen gardens after they were involved in school gardening activities. (Male Teacher, Field Note from Participant Observation)

The evidence affirms that parental engagement at school could have multifold outcomes of social transformation. There could be ample opportunity to develop the nexus of social transformation in the school since the school serves to communicate the innovation from personal to social agency. For instance, a review highlights that school-based nutrition intervention accompanied by a school garden program encouraged parental involvement, interaction, and engagement with students, teachers and school leaders (Kirkland et al., 2018), which provides communicative space for action inquiry. This kind of transformative journey can be viewed from the lens of ‘diffusion of innovation’ theory, which asserts that innovation can be communicated

through certain channels over time among the large members of a social system (Rogers, 2003).

Social Transformation in the Form of Role Modeling Behaviors

The motivational theory of role modeling highlights that role models, who are light minded transformative leaders, are often suggested to motivate individuals (role aspirants) to perform novel behaviors and inspire them to achieve ambitious goals. Role models can, of course, impact performance, either through the acquisition of knowledge or through increased learning intention (Morgenroth et al., 2015). I use Bandura's observational learning theory: learning by observing others' behaviors (Bandura, 1977) as a main concept of the social learning theory to discuss how role-modeling behaviors of students, teachers, and school leaders promote social transformation.

The results of this study indicate that students, particularly nutrition champions from upper basic school acted as role models to their classmates through which they could disseminate their learning experiences and skills in classroom settings. In so doing, nutrition champions regularly brought homemade lunch boxes. Many of them, particularly female students, prepared their lunch boxes themselves before collaborative school feeding program was begun. The champions never brought junk snacks to school; instead, they encouraged their classmates to eat healthy snacks at school by managing lunch boxes from home. In so doing, the champions reflected their classroom activities by writing journals daily. The class teachers, who collaborated closely with nutrition champions, shared successful stories of the nutrition champions in classroom to motivate others towards healthy dietary behaviors. This has inspired nutrition champions to continue their positive health behaviors and created a supporting environment in the classroom to learn healthy

dietary behaviors from the role models. Following the peer teaching approach, nutrition champions positively influenced healthy nutritional behaviors for their classmates. Besides, the upper grades 6-8 students also role-modeled to the lower basic students by exhibiting handwashing practices before school meals. This could be a showcase of vicarious learning, which could increase self-efficacy for junior students to learn from the senior role models (Morgenroth et al., 2015). The social learning theory asserts that role modeling is well-recognized for influencing people's behavior (McAlister et al., 2008). Based on the above discussion, I argue that children are more likely to imitate role-modeled behaviors from others who are in their cohort group.

Students' role modeling behaviors would be a benchmark to their parents since parents always support their children's positive health behaviors. It was evident from this study that parents have become aware of unhealthy snacking behaviors learning from their children. They claimed that they learned positive health behaviors from their children since children shared classroom learnings at home. For instance, a parent shared his story about how he could learn positive health behaviors from his daughter.

My daughter used to eat noodles frequently, particularly when she returned from school. She used to skip home-cooked foods. But I wondered when my daughter asked me not to prepare noodles arguing that readymade packaged foods are not good for health. When I joined in a parent-teachers meeting in the school, I learned that she was role modeling to her classmates as a nutrition champion. We [indicating to his family members] also reduced noodles and biscuits consumption at home. (Male Parents, 52 years, Field Note from Parents-Teachers Meeting)

Through this study, teachers transformed their meal consumption behaviors at school and acted as effective role models to encourage students to manage homemade lunch. They also reported improved snacking behaviors at home and motivated family members to adopt healthy nutritional behaviors. Similarly, the teachers encouraged students to bring lunch boxes from home. The teachers, particularly female teachers, brought homemade lunch and practised lunch-sharing culture to each other among the female teachers' group. Since teachers are considered change agents of society who could influence students' behaviors within a short time. This study also found that the role-modeling behavior of the teachers influenced students. As a result, students imitated role-model behaviors from teachers. For instance, upper basic school students argued that they practised bringing homemade lunch boxes and lunch-sharing culture to each other in the group. Lunch sharing culture among students would promote social inclusion practices in the school since it includes all students eating lunch in the group, even if someone cannot manage lunch boxes or pocket money. From the above discussion, it can be affirmed that the lunch-sharing culture within students remained effective to include students in the mainstream of the school feeding program, particularly to the students from low-income and ethnic minority, who could neither bring lunch box from home nor manage pocket money to buy midday meals at school.

The results of the study also revealed that the school leaders transformed their nutritional behaviors since they became critically aware of their unhealthy dietary behaviors. It has created a supportive environment to sustain healthy nutritional behaviors at school. Besides, the school leaders are also role modeled as transformative change agents in society. For instance, the quotation below affirms how the school HT acted as the transformative change agent in society.

In my family, no one shows interest in consuming junk food. I have also talked to my cousins, who live on the down floor of my house, about the harmful effects of junk food that I learned from school. Since then, they have been consciously aware of eating noodles...even I have talked to my relatives and neighbors about the health benefits of healthy eating behaviors. (HT, 51 years, In-depth Interview)

The above results affirmed that the peers (nutrition champions) could influence their classmates' positive health behaviors through role modeling. Teachers and school leaders could effectively role models to children. Similarly, children can influence their family members' dietary behavior. These findings are consistent with the results of a couple of studies. For instance, an intervention study conducted among rural Chinese seventh-grade students showed that classroom peer support activities have been effective in increasing students' food and nutrition knowledge and developing healthy dietary behaviors (Wang et al., 2015). Another school-based multi-component nutrition quasi-intervention study conducted among the children highlights that observational learning through the role modeling of healthful behaviors by teachers could effectively increase nutrition knowledge, develop healthy dietary behaviors, and improve nutritional status of children (Harake et al., 2018). Though a couple of previous studies (Christiansen et al., 2013; Mahmood et al., 2021; Pearson et al., 2012; Reicks et al., 2015; Story, Neumark-Sztainer, et al., 2002) have demonstrated that parental role modeling behaviors could influence dietary behaviors of their children. But it is yet to collect more evidence about how children's role-modeling can also influence positive dietary behaviors of their parents and family members. However, evidence from a systematic review study synthesizes that school

can provide an opportunity for parents to learn healthy eating habits from their children (Kirkland et al., 2018).

From the above discussion, I argue that role modeling behaviors from peers, teachers, and school leaders would effectively influence healthy nutrition in the social setting.

Pedagogical Innovations in Classroom Teaching and Learning

As a pedagogic mediator to the teachers, the university co-researcher used participatory learning methods to initiate transformative thinking among the schoolteacher co-researchers. This study affirms that pedagogic mediation supports the schoolteacher co-researchers in their professional development, where they could challenge their prior pedagogic assumptions and practices and switch towards participatory pedagogical practices.

Over the four consecutive school academic years (2018-22), schoolteacher co-researchers changed their perspectives on classroom teaching. Previously, teachers heavily relied on teacher-centered dogmatic classroom teaching, but after they were involved in the participatory action inquiry process, they incorporated participatory approaches in classroom teaching. As a result, they involved students in storytelling, poems and songs, music, arts, drama, and simulation activities. They changed their teacher-centered dogmatic teaching practices and have applied contextualized teaching approaches such as arts-based, inquiry-based, project-based, and experiential learning, which could serve the learners' interest in the center. These days, teachers use project-based classroom activities connecting them with interdisciplinary fields such as school gardening, mushroom farming, fish farming, and school nutrition wall magazine publication situating themselves in the real-world problems. Similarly, they connect nutrition classes with experiential learning, such as school feeding program,

hand washing practices, anthropometric measurements, and nutrition wall magazine publication project works. These days, teachers also incorporate Yoga pedagogy in their classroom teaching to foster personal transformation in the forms of loving self, developing awareness against false consciousness, being empathetic and compassionate, self-dialogue (talking to thyself), and having a sense of humor. The teachers are also replicating participatory learning approaches in other subjects such as social studies, mathematics, and science education. Interestingly, some teachers also argued that they have been using storytelling methods in their mathematics and science classes, particularly in the lower basic classes (grades 1-5). For instance, a mathematics teacher shared: *I borrowed the storytelling method to teach mathematics lessons in lower-basic classes. The storytelling method developed good listening and reasoning capacity among the learners.* (Basic School Male Teacher, Focus Group)

Teachers argued that arts-based activities foster creativity and imagination capacity in students who were engaged with the team of teachers at school nutrition wall magazine publication-related works. They reflected on their creativity and imaginative performances via songs, poems, and drawings in classroom teaching. One of the basic schoolgirls, involved in nutrition champion and school nutrition wall magazine publication-related project works, articulated that she markedly improved her classroom performance and final exam outcomes. After she got exposure to engage herself in the school-led curricular and extra-curricular activities through SBNEI, she markedly improved her position in the subsequent terminal exams. She became a smart and capable student since she reintegrated her school life from a new paradigm (transformative one).

Two years back, I was a failure student in my class. I repeated the class in 6th grade. But I got overwhelmed encouragement to struggle hard to transform

myself when I became a part of the school nutrition program. Now, I am in 8th grade with 3rd position. Along with my studies, I am actively involved in extracurricular activities. (Basic School Girl Student, Focus Group)

After being involved in the participatory learning approaches, students reportedly argued that these learning approaches evoked their feelings and new perspectives of learning and participatory classroom activities promote creativity, imagination and intelligence in students. Cranton (2016) also argue that art-based pedagogical approaches encourage creativity and imagination among the learners. The transformative learning theory also asserts that creativity and imagination are the fundamental process of participatory learning, which further results in critical reflection and self-reflection among the teachers and the learners (Dirkx, 1998; Khabanyane et al., 2014; Mezirow, 1997).

Participatory pedagogies have created a democratic learning space for students, developed a culture of collaboration, provided a space for dialogue and critical reflection, and developed enough space to enhance cognitive and affective skills and competencies in classroom learning. A PAR study conducted in the educational setting of Nepal suggests that participatory pedagogy fostered context-responsive pedagogical strategies, which empowered students and teachers in the curriculum improvement process within a respectful learning environment in the classroom setting (Dhungana et al., 2022).

The result of this study affirms that the participatory pedagogical approach has developed a dialogical relationship and collaborative classroom learning practice between children, their families, and teachers together to co-construct the knowledge and apply co-constructed knowledge to solve the problem in their practice setting. A study, though conducted in the European society, revealed similar evidence

corroborating with the findings of the present study focusing on the importance of involving families in the learning processes as a means to foster in-depth understanding and allowing interactive relationships between children, their families, and the teachers (de Sousa et al., 2019). Participatory nutrition pedagogy has brought students' perspectives and values to the center of learning, encouraging them to feel the ownership of learning and apply them in their day-to-day life. As a result, students minimize unhealthy eating behaviors in school and home. From the above discussion, I argue that the present study has empowered teachers to reconceptualize the nutrition education curriculum and improve their quality of teaching and learning through contextualized pedagogical innovation. These contextualized approaches also transformed classroom learning behaviors in students, which further resulted in positive nutritional outcomes.

I apply transformative learning theory as a theoretical lens to explain how classroom-based participatory nutrition education could foster transformative learning behaviors in teachers and students. In so doing, I use six essential elements of the transformative learning theory to describe the process of pedagogical innovation (Baumgartner, 2019; Taylor, 2009) in classroom teaching and learning in a public school of Nepal as a theoretical lens.

Individual Experience

Individual experiences of the learners can be taken as an entry point of the transformative learning (Taylor, 2009). To foster prior learning experiences of the learners relating to their nutritional behaviors, the teachers and I involved them in the experiential learning activities under three inter-connected components of the SBNEI viz motivation and sensitization, nutrition pedagogy, and school supporting environment. Through school-based nutrition education intervention activities,

learners were encouraged to reflect on their personal experiences relating to their nutritional behaviors through a dialogue with classmates and writing a reflective journal. The learners enhanced their food and nutrition knowledge and improved healthy school meals consumption behaviors by reflecting on their own past experiences. Along with students, the teachers also shared their professional experiences about encouraging students to learn healthy dietary behaviors. These activities catalyzed critical reflection and self-awareness among students and teachers. I do believe that an interdependent relationship between personal experience and critical reflection can potentially lead towards a journey of transformative learning in practice.

Critical Reflection

Critical reflection is the core element of transformative learning (Taylor, 2009). In this study, learners were encouraged to question their deeply held assumptions and beliefs relating to their unhealthy dietary behaviors per se junk food consumption behaviors. In so doing, they were involved in audio-visual promotional activities, storytelling, arts and music, role-playing and simulation, and experiential learning activities. After involving them in the nutrition education classroom activities, they were asked to share their experiences with their classmates and teachers. Sometimes, they were asked to reflect on their experiences and write journals.

Mezirow (1990) emphasized on applying content, process, and premise questions to foster critical reflection among the learners. Following Mezirow's theoretical notion, we involved students to critically reflect while co-implementing the sensitization and motivation related intervention activities per se nutrition fair, drama show, and commitment sessions. In so doing, we asked students to critically

reflect upon the content questions such as what are the likelihood health effects of junk foods consumption to me? What positive health outcomes are likely to result in my life? Process questions such as how do I shift from eating junk snacks to healthy meals? How do I learn cookery skills to prepare my meals? And premise questions such as why don't I bring a homemade lunch box from home? Why am I eating junk food? Why does the canteen not offer us healthy meal choices? These questions, particularly premise reflection questions, triggered them to think differently about their underlying (unhealthy) nutrition behaviors. The evidence also suggests that premise reflection has the potential influence to lead in transformational changes (Cranton, 2016). The classroom dialogue—a transformative learning vehicle, helped students reflect on their underlying assumptions and contested beliefs on their dietary behaviors.

Classroom Dialogue

Classroom dialogue is a social interaction which develops a reciprocal communicative relationship and trustful communication between teachers and learners (Gravett & Petersen, 2009). Classroom dialogue, in this study, remained an essential participatory tool through which transformation was fostered among the learners. We (teachers and researchers) used dialogue as a discursive tool in the classroom to develop a transactional relationship among the learners and between the teachers and researcher. Through communicative learning, as suggested by Mezirow (2009), we repeatedly involved the learners in classroom dialogue in questioning their contested beliefs and deeply held assumptions about unhealthy nutritional behaviors, which ultimately transformed their habits of mind and developed self-awareness against (un)healthy nutritional behaviors. In so doing, we used turn and talk, think-pair-share (TPS), jigsaw, storytelling, peer teaching, small group discussion and

presentation, and project-based learning activities in nutrition education classes allowing students to involve in classroom dialogue. Besides, we were also involved in a dialogic teaching approach in the classroom. These participatory activities remained effective in leveraging the classroom dialogue between teachers and learners, which eventually nudged them towards healthy food choices and dietary behaviors. We involved students in a holistic approach to learning by applying dialogical classroom relationship.

Holistic Orientation

Holistic orientation refers to affective and relational ways of learning, which develops awareness of feelings and emotions among the learners (Baumgartner, 2019; Taylor, 2009). Getting self-awareness of feelings and emotions anticipated students towards action (healthy eating practice). We involved students in the holistic approach to learning in the classroom using multimodal teaching methods viz music, drama and simulation, and storytelling activities. After involving students in the holistic learning approach, they reflected that those activities evoked them to express their emotions, helped them open their eyes to new perspectives, and engaged in critical reflections on their own past experiences on unhealthy nutritional behaviors. The holistic orientation approach created a whole person (every student in the class) learning environment conducive to changing their nutritional behaviors. Taylor (2009) contended that holistic learning approaches such as music, drama, dance, and storytelling effectively engage the whole person in the learning, which further leads the learners towards transformative thinking and acting. Holistic orientation of the learning created self-awareness among the learners about their prior assumption of (un)healthy dietary behaviors.

Critical Awareness of the Context

Socio-cultural context is a critical component of transformative learning. As discussed previously, the learners' prior experience potentially influenced practicing healthy nutritional behaviors. But it depends on supporting personal and socio-cultural environment (Baumgartner, 2019; Taylor, 2009). Connecting to the present study, students were encouraged to be critically aware of their personal and socio-cultural context. For example, after they were involved in the sensitization, motivation, and participatory classroom learning, students were critically aware of managing healthy lunch boxes from home, healthy school meals from the school's canteen, and reducing junk food consumption. Similarly, the school community was also becoming aware of connecting the inter-project activities to sustain school nutrition program. In so doing, green vegetables, mushrooms, and fish were supplied from the school gardening, mushroom farming, and fish farming projects to the school feeding program. Similarly, the school community sought collaboration with parents, local government, and research projects to sustain the school feeding program. For example, Rupantaran TU has provided technical and financial support to scale up the school feeding program. Getting critically aware of the research context allowed me to develop an authentic relationship with the school community.

Authentic Relationship

Authentic relationships with students fostered transformative changes in students' nutritional behaviors. The teachers developed a positive and productive relationship with learners. In so doing, teachers encouraged them to bring a homemade lunch box for their meals at school. They involved students in school gardening, mushroom farming, and fish farming activities linking with students' nutritional behaviors. Similarly, teachers involved students in the school nutrition wall

magazine publication-related tasks. Besides, teachers also involved students in public exposure activities like drama shows, music (nutrition songs and poems), and public speaking programs. This authentic relationship allowed students to have discussions, share information openly, and achieve a consensual relationship with their friends and teachers in classroom learning. The previous studies also claim that an authentic relationship between students and teachers could foster transformational changes in learners' behaviors (Baumgartner, 2019; Cranton, 2016; Taylor, 2009).

The results of this study suggest that context-responsive participatory nutrition pedagogies seemed to be a hallmark in promoting healthy nutritional behaviors (knowledge, strong intention, and practice) in children since it involves both learners and teachers in the locus of the transformative pedagogical practices.

Sustainability of the School-Based Nutrition Education Intervention

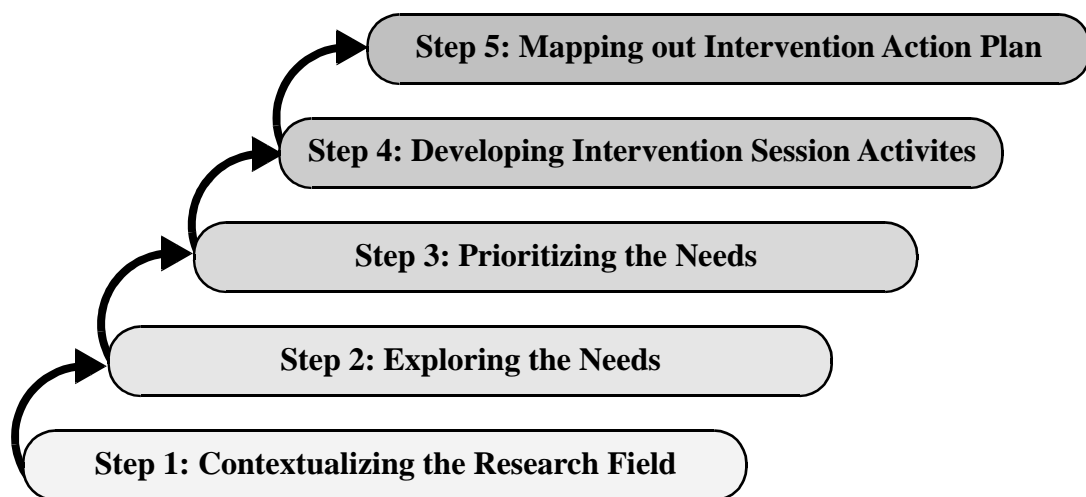
Sustainability of the SBNEI—a PhD project—is worthwhile to retain the improved nutritional behaviors in children, which results in long standing positive outcomes in students' future life. This study has theorized three approaches for fostering the sustainability of the intervention: i) bottom-up model of SBNEI, ii) theory-guided multilayered and multicomponent SBNEI, and iii) transdisciplinary and interdisciplinary collaboration.

Bottom-up Model of Intervention

School-based nutrition education intervention (SBNEI) is a whole-school approach which actively involves entire school community including children, their families, school leaders (teachers, HT, SMC, and PTA members), local farmers, and school meals service providers. Fostering ownership of the intervention among the school community is a must to ensure the sustainability of the intervention. This study applied a five-stepped bottom-up approach to develop a sense of ownership of the

intervention among the school community to ensure its sustainability. The bottom-up approach to this study begins with contextualizing the research field and mapping out intervention action plan through the needs assessment, needs prioritization, and developing intervention session activities (Figure 56). Based on a four-year long field work experience, I propose a bottom-up model of developing the SBNEI which I discuss below. This bottom-up model of SBNEI can ensure the ownership and sustainability of the intervention.

Figure 55. *Contextualized Model of Developing SBNEI*



Contextualizing the Research Field. Developing egalitarian relationships and collegiality among the co-researchers is the entry point of contextualizing the research field in participatory action research (Upreti et al., 2023). High-level commitment, punctuality, flexibility, a non-judgmental mindset, mutual communication and trust, and respect and autonomy are fundamental partnership principles (Whitty-Rogers et al., 2020) to develop an egalitarian relationship (Gillis & Jackson, 2002) and build collegiality (Rajbanshi & Luitel, 2020) among the school community.

Exploring the Needs. Exploring the needs in action research is the process of gathering data from varied sources, including both quantitative and qualitative

information, to explore the contextualized problems (Gillis & Jackson, 2002) , which can be accomplished in collaboration with joint efforts between researchers and co-researchers (Ledwith, 2020; Ross, 2006). Survey questionnaire, observation form, in-depth interviews, group discussion, focus groups, field notes, site artifacts can be used for needs assessment study.

Prioritizing the Needs. The needs assessment study collects a wide array of needs from the research fields which may represent from individual to policy level. Therefore, the research stakeholders need to be involved in the needs' prioritization process. In so doing, researchers can be involved in negotiation with the research participants through regular dialogue and discussion. 'Bridging-the-gap workshop' can be used as an effective participatory tool to prioritize the needs undergoing communicative action inquiry (Upreti et al., 2023).

Developing Intervention Activities. Identifying context-bound solutions to the research problem is a complex task since multilevel factors may influence the problem. It is therefore entire research stakeholders need to be involved in developing the intervention activities through their active participation (Rajbanshi et al., 2021). Connecting to this study, students, teachers, parents, and the PAR committee members were involved in developing the intervention activities. In so doing, Freire's (2000) empowerment model i.e., 'dialogue conference' was used.

Mapping out Intervention Action Plan. Effective implementation of the intervention action plan depends upon careful planning of the intervention by the team of research (Bartholomew et al. 2006). An effective way to map out the intervention action plan is to involve every research stakeholder throughout the study (Kok et al., 2011). In so doing, based on the list of the intervention activities developed by the team of research, the intervention action plan can be mapped out. The intervention

plan should consist of the performance objectives, personnel involved, methods, materials, anticipated outcomes, evaluation tools and methods, and the timeline to accomplish the intervention activities. Finally, the intervention activities can be presented on a matrix table.

Theory-Guided Multilayered and Multicomponent Intervention

Promoting healthy nutritional behaviors in children is challenging since students' nutritional behaviors are influenced by multilevel determinants, which extend from the individual to environmental levels. The findings of a previous study suggest strong evidence of the sustainability of the multi-component nutrition intervention to bring a positive outcome in the dietary behavior of children (De Bourdeaudhuij et al., 2011; Van Cauwenberghe et al., 2010). The present study opted for a multicomponent nutrition education intervention to ensure the comprehensiveness and sustainability of the intervention. The multicomponent intervention activities were implemented under the three concentric layers of the SEM: intrapersonal, interpersonal, and environmental, as suggested by the theoretical framework of the SEM.

Intrapersonal Level. Intrapersonal level intervention includes individual-level activities related to the predisposed behaviors of the people. This study implemented sensitization, commitment expression, and goal setting under the intrapersonal level intervention activities.

Interpersonal Level. The interpersonal level intervention includes formal and informal social networks and social support systems. This study implemented a couple of intervention activities under the interpersonal level framework, such as parent-teacher interaction; home visitation; sharing short nutrition speech; sharing audio-visual activities; and role modelling by peers, teachers, and school leaders.

Organizational Level. The organizational level intervention framework creates a health-promoting environmental setting that promotes nutritional behaviors in children. This study implemented a couple of intervention activities such as contextualizing the curriculum; developing themes and key messages and teaching-learning resources; designing and implementing the nutrition lessons; forming the school health and nutrition committee; reorienting the school's canteen service system; scaling up the school feeding program; publishing a school nutrition wall magazine; demonstration of the nutrition fair and drama show, prohibition of the junk food at school, implementing the school nutrition policy and programs under the organizational level framework.

Since multiple layers of determinants influence nutritional behaviors in young children and adolescents, several successful studies (Harake et al., 2018; Melnick et al., 2022; Pérez-Rodrigo & Aranceta, 2001; Prelip et al., 2012; Scherr et al., 2014) suggest implementing a multicomponent nature of nutrition intervention to sustain its positive outcomes. The present study incorporated three-dimensional intervention and their underlying session activities.

Sensitization and Motivation. The motivational component, also known as the pre-action phase, focuses on increasing awareness and enhancing motivation towards healthy nutritional outcomes. The intervention activities of this component raise awareness among the people regarding the possible risks of not taking the action and exploring the barriers to taking the action. Developing positive attitudes and self-efficacy regarding healthy food choices and dietary behavior motivates people to take necessary action. The motivation component of the SBNEI makes people critically aware of why it may be worthwhile to change unhealthy nutritional behaviors.

Participatory Pedagogy of Nutrition Education. The participatory pedagogy of nutrition education focuses on strengthening students' food and nutrition knowledge, developing positive attitudes, and healthy dietary practices through a participatory classroom learning environment. The pedagogy of nutrition education aims to increase food and nutrition knowledge, cultivate favorable attitudes towards healthy nutritional behaviors, and develop healthy dietary practices through informed choices and decision-making behaviors.

Supportive School Environment. Maintaining healthy dietary behavior in children through classroom teaching is only possible if pedagogical outcomes are intertwined with an environmental component. The environmental component focuses on creating a supportive school environment to sustain healthy nutritional outcomes in children. A supportive school environment incorporates health-promoting settings and relationships among human agencies within the system.

Transdisciplinary and Interdisciplinary Collaboration

Transdisciplinary Collaboration. Transdisciplinary collaboration is a process where members from different disciplines work together utilizing their expertise to solve the multifaceted nature of the problems together with (Gehlert et al., 2010). Since SBNEI is a multilayered and multicomponent project which has sought a transdisciplinary collaboration from the people with different sectors/disciplines such as teacher educators, teachers, SMC and PTA members from the educational sector; local farmers and housewives from the agricultural sector; health workers and professionals from the health sector; and local governmental bodies such ward office chairperson, Mayor, local government administrative officer from the political sector.

I collaborated with school community such as students, teachers, HT, SMC, PTA, PAR committee members to design and implement SBNEI involving them from

needs assessment to the outcome evaluation stages. Students were involved in developing the school nutrition project works such as nutrition related arts and drawing, preparing publishing materials for nutrition wall magazine and collecting locally produced foods to make the showcase of the learning materials for nutrition education classes. They were also involved in art-based performances like singing nutrition poems and songs, drama showing, acting role model to their classmates, and performing simulation activities in nutrition education classroom. The teachers were involved in implementing nutrition education lessons applying participatory pedagogies along with involving together with the HT, SMC, PTA, PAR committee members in needs assessment, intervention action plan development, implementation, and evaluation. We developed a School Health and Nutrition Committee, School Midday Meal Management Committee, and School Nutrition Wall Magazine Publication Committee to regularize the school nutrition program in the school to develop the ownership and sustainable mechanism of the SBNEI project. These committees have been supervising and regularizing the day-to-day school health and nutrition related activities in the school.

Similarly, we (I and school leaders) collaborated with people from the agricultural sector such as local farmers and household wives. The farmers were involved in nutrition education classroom session as the local experts to share their knowledge and experiences with students about how to grow healthy and organic foods in the farming fields as well as we collaborated with them for supplying locally produced foods for school feeding program. The household wives were involved as the nutrition education facilitator in the classroom to share their experiences about how they prepare balanced diet using locally grown and available foods. They also collaborated with us in the school feeding program to help students with making a

habit of eating conventional types of foods prepared in the canteen for midday meals among the children.

We also had a collaboration mechanism with the local governmental bodies. The collaboration with the ward office was initiated soon after the needs assessment study. Following the recommendations made by the needs assessment study in the action school from the beginning of the FY 2075/76 BS, the school initiated a school feeding program in the school earlier to the budgetary provision for school midday meal made by the Government of Nepal from the FY of 2076/77 BS under the financial support of the ward office. Furthermore, the school has also initiated collaborative school feeding program from grades 6-8 from the academic year of 2077/78 under the financial support from the ward office, school and parents. We also had a collaboration with the ward office and municipal government to develop a school health and nutrition related policy and program. This kind of collaboration has resulted in the recruitment of school nurses in the school to scale up school health and nutrition-related policies and programs.

Interdisciplinary Collaboration. Interdisciplinary collaboration is a democratic approach of binding two or more individuals or projects together, often from different professional disciplines but who work to achieve shared aims and objectives (Fewster-Thuente & Velsor-Friedrich, 2008). The present study also reveals that interdisciplinary collaboration within the PhD projects such as Ecosan, School gardening, Life skills-based health education for personal transformation, and school entrepreneurship remained effective to sustain the SBNEI. For instance, the handwashing session activities implemented under the ‘Ecosan and WASH Project’ offered students to learn with adequate knowledge and skills for handwashing practice with supporting materials and technology. As a result, they transferred their

handwashing practice to the school nutrition project exhibiting themselves by washing their hands with soap before they joined to eat school meals. The gardening activities under the ‘School Gardening Project’ offered hands-on practical activities connecting students to the school garden—a biological lab for learning. Students could obtain practical knowledge about the importance of green vegetables and their nutritive values from gardening activities. Such experiential learning has improved food and nutrition knowledge and positive attitude towards healthy dietary behavior in children.

Moreover, there has been a substantial increase to use the garden products such as green vegetables to the school feeding program. The evidence from previous study argued that school gardening activities can effectively be linked with school feeding and nutrition education classes, which further contribute to promoting healthy eating habits and improving nutritional status among children (Monville-Oro et al., 2020). A study conducted in low-income countries including Nepal also concluded that school gardening interventions are more effective in increasing awareness, knowledge, and preferences for healthy eating behaviors in students (Schreinemachers et al., 2020). Similarly, ‘Life Skills-based Health Education for Personal Transformation Project’ also contributed to sustaining the nutritional behaviors in children. Through the intervention activities under this project, students and teachers developed anthropometric measurement skills (height and weight measurement and BMI calculation) to determine their nutritional status like being underweight and/or overweight. These activities nudged students to develop healthy dietary behaviors. Besides, through the stress management intervention activities incorporating Yoga and meditation practice, students could learn to consume school meals in a calm environment without bothering others. They also learned to calm down and be

attentive before eating their midday meals and not to waste foods. The ‘School Entrepreneurship Project’ activities also contributed to bring positive impacts in nutritional behaviors of children and their close community to which they connected. Through the school entrepreneurship activities, the school supplied rice grains, mushrooms, and fish to the school midday meals program. The school entrepreneurship project linked with the school nutrition project has multifold impacts on students’ nutritional behaviors including improved nutritional status. The school HT argued that school gardening and entrepreneurship activities within the school setting have contributed to sustaining the school feeding program.

I believe that school gardening and entrepreneurship activities have given a key message to the community about how we are linking garden products, mushroom farming, and fish farming to the school feeding program.

(Headteacher, Fieldnotes from Informal Conversation)

The evidence from the above discussion affirms that the SBNEI which has been implemented in the action school will sustain longer even upon the completion of this PhD project since the school has already owned this project undergoing through transdisciplinary and interdisciplinary collaborative mechanism. Moreover, school health and nutrition education related programs have still been considered as the prioritized area of the local, provincial, and federal governments of Nepal. The United Nations General Assembly also proclaimed the years 2016-25 as the United Nations Decade of Action on Nutrition and the years of 2016-2030 for striving towards achieving the targets of SDGs, particularly SDG-2 i.e., end hunger, achieve food security and improved nutrition and promote sustainable agriculture.

Emergent Opportunities and Challenges in PAR

Every PAR study has its context-specific pros and cons (Gillis & Jackson, 2002; Jacobs, 2016; MacDonald, 2012). The present school-based PAR study took four consecutive academic years to complete the intervention activities. During this journey, I have gone through many ups and downs. As a participatory action researcher, I would like to discuss the opportunities (pros) and challenges (cons) so that the evidence will serve as the lesson learned for future researchers.

Opportunities (Pros)

Co-developing and co-implementing the SBNEI following the PAR methodology offered manifold opportunities in the practice setting where this study was conducted, the professional setting where I am working, and the personal life where I am living. I explain them in the following sub-sections.

Co-creating Practical Knowledge to solve Problems in the Practice

Setting. One of the obvious strengths of this study is to involve the school community, particularly students, teachers, school leaders, PAR committee, and parents to improve social practice allowing them to critically reflect upon the actions from the time of the needs identification to the outcomes evaluation. This kind of rigorous involvement of the co-researchers empowered them to co-create practical knowledge to solve the problems in the practice setting.

Unfolding Participatory Learning Endeavors. The present study has created maximum opportunities to foster participatory learning opportunities by involving students and teachers in the decision-making process. For instance, student co-researchers were involved in developing learning materials for nutrition education classes, role modeled to their classmates for healthy eating behaviors, involved in the school nutrition wall magazine publication together with the teachers, and acted as

nutrition education message convener through art-based pedagogy. The teacher co-researchers were also involved in the participatory learning approaches. For instance, they contextualized basic school nutrition education curriculum, developed nutrition education lesson plans, developed teaching and learning materials, created themes and key messages to teach nutrition education, and explored participatory classroom teaching methods such as art-based learning, project-based learning, garden-based learning, experience sharing-based learning, and home visitation and counseling methods. The school leaders and parents also participated in nutrition education classroom by sharing their lived experiences. The evidence from the above discussion affirms that this study has fostered context-bound participatory learning approaches among the school community.

Fostering a Culture of Collaboration. The beauty of PAR is to foster culture of collaboration between researcher and co-researchers, which optimizes work performance and minimizes the challenges and tensions in the practice setting (Gillis & Jackson, 2002; MacDonald, 2012). Through this study, I could be able to make a collaboration with students, their parents, teachers, school leaders, PAR committee, and local body constituents. For instance, I collaborated with students to write the scripts and rehearsal practice for drama show in the school's annual program. Similarly, I had a joint seminar paper presentation with the teacher co-researchers in the 13th Annual General Meeting and National Seminar Program organized by the Health Education Association of Nepal (HEAN) in Chitwan. Moreover, I co-worked with the PAR committee and local government to develop a school health and nutrition policy and program. I also owned culture of collaboration with other PhD researchers in the action school linking school nutrition project with Ecosan and WASH, school gardening, school entrepreneurship, and life skill-based health

education intraschool projects. The culture of collaboration with multilayered agency of the school expedited the sustainability of the positive health behavior outcomes in the practice setting.

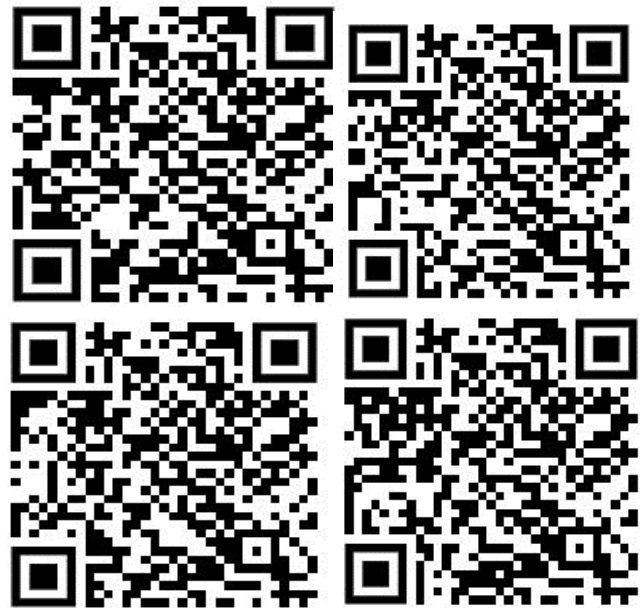
Becoming a Transformative Teacher Educator. Since I learned collaborative learning practice from the PAR study, I transferred it to my professional setting per se in the university's classroom teaching. In so doing, I started group teaching in collaboration with my TU faculties, where we combinedly exchanged our interdisciplinary knowledge and experience with master's in education students. Unlike the traditional teaching style, collaborative learning practice allowed a wide range of learning opportunities to university students by sharing their critical reflection in classroom teaching. This action-reflection cycle improved classroom learning practice. I also engaged them to share journal writings in the classroom. This kind of communicative learning space offered them the opportunity to view the world through a transformative lens.

Similarly, before I was involved in this study, I used to view the world with a naïve perspective, thinking that reality is 'out to be there' which can be externally observed. I used to apply a set of questionnaires, observation, and interview methods to understand the human phenomenon through numbers and texts. But after I started navigating through the PAR study, it developed new schemas to view the world from transformative lens as asserted by Mertens (2017). Now I believe that 'reality is socially co-constructed in the practice setting' which can be explored through dialogical relation. Nowadays, I can see the research world within my personal and professional context where I live and work and pose research questions to seek out context-specific solutions to the problems. When I shared my research paper in the Community of Action Research Network (CARN) conference (webinar) held in

October 2021, I started viewing the world influenced by the 'living educational theory' asserted by Whitehead (2008). The webinar triggered me to understand the world "I" as a living contradiction in educational inquiries such as "how do I improve what I am doing"? (Whitehead, 2008, p. 103).

Curricular Resources Development Opportunities. It was my great pleasure to be a part of the CDC MOEST to develop curricular resources for basic school education. I worked as an expert to develop and review the health education curriculum for basic school education. I also worked as a lead author in the task force team for developing integrated curriculum-based curricular resources for grades 1-3. Similarly, I also involved to develop the textbook of *Health, Physical Education and Creative Art* subject for fourth grade. Besides, I also worked as a key facilitator in Master of Training for the Trainers (MTOT), Training for the Trainers (TOT), and Teachers' Professional Development (TPD) training programs to implement integrated curriculum in the basic school level on behalf of the Center of Education, Human resource Development (CEHRD), MOEST. While working with the apex body of the school education system of Nepal, I could be able to translate my learning experiences of my PhD project into the CDC and CEHRD and vice-versa. Thus, my PhD project has created a golden opportunity to replicate my learning experiences of the PhD project with the Ministry of Education, Science and

Figure 56. QR Code for Curricular Resources



Technology while developing curricular resources and developing the human resource manpower.

Besides, this study has also created some other opportunities, such as increasing students' active participation in SBNEI, cultivating meaningful engagement of parents and community in the school, empowering the participants as active contributors to research, developing mutual trust and respect for each other, and fostering critical understanding and reflection among both researcher and co-researchers for personal as well as social transformation.

Challenges (Cons)

Although PAR study offers several opportunities, it also poses a wide array of challenges. In this study, I encountered the following challenges.

Disorienting Dilemmas. Disorienting dilemmas are commonly observed as 'unexpected incidents' in transformative research (Mezirow, 2009; Reynolds, 2014). However, in my early fieldwork, I was not conscious of the unexpected incidents that might occur in my study when I worked with the co-researchers in the needs assessment phase of the study. I realized that life does not move in a linear mode, there are ups and downs. I observed contradictory leading viewpoints between the teachers and SMC members while prioritizing the school health and nutrition-related needs before we were involved in co-developing the intervention activities. The contradictory leading viewpoints such as conflicts, misunderstandings, stagnation, and failures, have resulted in a stagnation of the study's progress. In the meantime, Covid-19 also created unexpected conditions. My own transformative learning experiences convinced me that disorienting dilemmas develop resiliency power with a new schema to view the world.

Challenge in Trust-Building and Egalitarian Relationships. Trust-building and egalitarian relationships are the entry point to tap the power for the successful implementation of the PAR study (Gillis & Jackson, 2002; Rajbanshi & Luitel, 2020). It is because the research subjects are involved as contributors in the PAR study. Constant collaboration, rigorous field engagement, sharing knowledge and experiences, involving in the decision-making process, and having dialogic and negotiation skills are necessary in developing the trust-building and egalitarian relationship between researcher and co-researchers. But in the case of the university researchers, if they are outsider of the research context, must struggle to get familiar with the research context since continue living in the field is quite difficult due to official issue like leave deputation, economic burden like accommodation, socio-cultural barrier like cultural competencies, conflict resolution skills, and communication skills in the local language. Moreover, winning trust and developing an egalitarian relationship between the teachers and students need constant collaboration through classroom teaching, which might not be feasible for all PAR researchers. Similarly, winning the trust of parents and community requires frequent home visitation and involvement in social functions, which further demands long-term field engagement, which may not be suitable to all PAR researchers.

A Time-Consuming Project. It is important to note that a rigid time period poses additional challenges to sustaining the transformative changes (Cranton, 2016; Taylor, 2009). Keeping this in mind, I completed four consecutive academic years being involved in the collaborative action inquiry with the school community, which allowed me to explore the socio-cultural context by standing in their shoes (fostering an emic perspective). Developing collegiality for egalitarian relationship between researcher and co-researchers, exploring the context-bound needs of the school,

prioritizing the needs by involving the school community, designing the intervention activities, and implementing them undergoing PAR methodology is a rigorous and time-consuming project. Selecting the team of co-researchers, preparing them as a part of the research project, and enabling them to engage throughout the study often demands a long time to complete the project as Gillis and Jackson (2002) argued. It is; therefore, this study suggests the co-researchers must be informed in advance about PAR is time-consuming project and requires commitment of the research team. Otherwise, they may lose their patience. I spent three consecutive academic sessions to complete the PAR cycle-related intervention activities, where I spent one academic year arriving at the project development and three consecutive academic sessions to implement the project activities and outcome evaluation. Due to unprecedented reasons created by Covid-19 pandemic, the school was shut down for intermittent period. As a result, the intervention activities did not complete in the expected timeline.

Mismatched Relationship and Power Imbalance. From the beginning of the fieldwork, I tried to be an active inquirer to co-learn with the school community, whilst the school community perceived me as a professional expert. My taken-for-granted positionality has created a mismatched relationship to create a power hierarchy. For instance, the school community behaved me as a *Jadu ko Chhadi* (magic stick), expecting to get tailormade support. They had a mindset that university researchers could be qualified with a higher academic degree and help them with a tailor-made solution to each problem. For instance, during *Chiya Pasal* and *Chautara Gaf*, one of the teachers opined that he was expecting some training about effective classroom teaching. “*You are a highly qualified university teacher, but we are just*

undergraduate teachers. I must learn pedagogical knowledge and skills from you and your team”.

Similarly, during the early fieldwork, the school chairperson invited me as an expert to provide them with tailor-made solutions to their problems. It took time to get them critically aware of their false consciousness of behaving us as the expert of context-bound solutions to their problems of them.

Reluctancy in Self-Directed Participation in the Study. Self- directed active participation and commitment from co-researchers are challenging in PAR study, particularly among in the community school of Nepal (Parajuli & Das, 2013). It happens because most of the study would take them as the research subject, rather than active contributors. Gillis and Jackson (2002) argue that ‘the commitment to the research project by the community members may not be the same as the commitment of the university researcher’ (p. 268). Though I was theoretically aware of involving the school community as the co-researchers throughout the study, it took time to get their self-directed participation in the study. I learned that the PAR researcher must share the possible benefits of the study to the co-researchers before they join the study, which could positively influence their self-directed participation in the study.

Divergent Perspectives, Values, and Abilities. It is quite challenging to address the co-researchers divergent perspectives, values, and credibility, though these are the beauty of PAR (Gillis & Jackson, 2002; MacDonald, 2012). Divergent perspectives and values may create misunderstanding, mistrust, and conflict within and between the researcher and co-researchers if their voices are not heard (prejudicial credibility deficit) while making a shared decision. Connecting to this study, in the early fieldwork, we needed help to realize the intent of participatory action research fully. As a result, we did not materialize the divergent perspective,

values, and abilities in the school's setting. This stereotypical issue is common in Nepali context (Parajuli & Das, 2013).

Turnover of the Students, Teachers, and School Leaders. Commitment and engagement from students, teachers, and school leaders are crucial to sustaining the school-based intervention since the continual engagement of the school community can develop a more profound feeling of ownership of the intervention (Herlitz et al., 2020). However, getting continual support from the school community depends on how long they serve in the school. The present study, longitudinal in nature, was implemented from 2018 to 2022. During the period, the turnover of the stakeholders remained influential. Since more than two-thirds of students in the school were represented from working-class families, their parents seasonally migrated to and from the locality of the school in search of jobs during the autumn and winter seasons of the year since many workers get jobs in the brick kiln at the time. The turnover of students has created a problem of adjustment to the school's changing environment. Similarly, due to the turnover of the teachers and the leaders such as the school management committee (SMC) and parent-teacher association (PTA), we could not complete intervention activities in the given time as newly appointed teachers and the school leaders were yet to contextualize the nature of the intervention.

From the research participants' and the co-researchers' perspectives, I have highlighted some underlying challenges of the PAR-based study, which was one of the comments that I received during the pre-viva defense program of my PhD dissertation. They reported a couple of challenges of the present study what they perceived. I have collected underlying challenges of the study undergoing a PAR bridge workshop among the school community—which was co-organized during the

endline data collection of the Rupantaran project in July 2023 though I had completed outcomes evaluation of my project in early 2022.

They, particularly teachers and leaders, reported that they could not involve all basic school students and teachers proactively in the nutrition education intervention session activities since self-directed participation of them seemed to be challenging in the absence of mediating role of the PhD researcher. They reported that it was quite difficult to make students, particularly newcomer students in the beginning of the academic session, realized against junk food consumption. As a result, they might continue bringing junk food to the school and thus there would be challenges to sustain healthy nutritional behaviors among children. In this regard, the SMC, PAR committee, and school health and nutrition committee members doubted if the outcomes of the SBNEI sustained in the absence of the mediating role of the PhD researcher.

Washing hands before school meal consumption is a must to prevent children from parasitic infections and malnutritional disorders. For that, there could be a regular supply of soap and hand washing materials. But the school community perceived that there could be further challenges of supplying soap and hand washing materials in the water station for children since the community school receive no regular fund for purchasing hygiene and sanitation materials. Besides, the school community also perceived threats of regular supply of garden products to the canteen because the vegetables in the school garden get produced only seasonally.

My experience that I gained from four-year long school-based PAR study would suggest that high motivation, commitment, action with reflection, dialogic and negotiation skills are the keys to minimize the challenges that emerged in the PAR study; however, it varies depending upon the specific research context.

Chapter Summary

I used transformative learning theory as a theoretical lens to explain how personal transformational would take place in children's nutritional behaviors. Teachers shifted their classroom teaching practices from the traditional teacher-centered methods to participatory learning approaches such as art-based pedagogy, inquiry-based, project-based, and experiential learning. The pedagogical innovation in classroom teaching has been explained through the six mutually supporting core elements such as individual experiences, critical reflection, classroom dialogue, holistic orientation, getting awareness of the context, and authentic relationship with learners as suggested by transformative learning theory. The teachers also connected nutrition education classes with school feeding, gardening, entrepreneurship, life-skills-based education, and WASH activities. These contextualized participatory learning approaches transformed classroom learning behaviors in students, which further resulted in positive nutritional outcomes. The results of this study also suggest that the SBNEI has strengthened social action inquiry, resulting in broader outcomes that extend from personal to societal transformation.

Sustainability of the SBNEI is worthwhile to retain the improved nutritional behaviors in children, which results in long standing positive outcomes in students' future life. I discussed three mechanisms i) bottom-up model of SBNEI, ii) theory-guided multilayered and multicomponent SBNEI, iii) and transdisciplinary and interdisciplinary collaboration for implementing the SBNEI to ensure the sustainability of the PhD project to retain healthy nutritional behaviors in children where this study was situated.

Using a PAR methodology as an emergent action inquiry offered several opportunities to this study. They are co-creating practical knowledge to solve the

problems in the practice setting, fostering participatory learning approaches, nurturing culture of collaboration, becoming a transformative teacher and researcher, and curricular resources development opportunities connecting with the Ministry of Education. Similarly, while undertaking this PAR study, I encountered several challenges such as disorienting dilemmas, challenges to developing trust-building and egalitarian relationships with co-researchers, consuming long duration to complete the PhD project, mismatched relationships, and power imbalance with co-researchers, reluctance in self-directed participation in the study, divergent perspectives, values, and abilities among the researcher and co-researchers, and turnover of the students, teachers and school leaders. I do believe that high motivation, commitment, action with reflection, and dialogic and negotiation skills could be the keys to minimize the challenges that emerged in the PAR study. In the next chapter, I present a summary of the findings, conclusion, implications, followed by final remarks and lesson learned.

Chapter Eight

Summary of the Findings, Conclusions, and Implications of the Study

This chapter presents the summary of the findings based on the research questions and concludes the research findings subsequently. The chapter also sheds light on the research implications followed by the final reflection, lessons learned and some take-away messages.

Summary of the Findings

This section presents the major findings of the study based on the guiding research questions.

Nutritional Behaviors and Multilevel Determinants

The findings from the needs assessment study indicated that children had poor food and nutrition knowledge, unfavorable dietary intentions and attitudes; particularly, unwillingness towards homemade food consumption but loved to consume junk foods. They had irregular and unhealthy school meal consumption practices. In addition to this, they reportedly consumed junk food at school and home. Most of the children, particularly, from ethnic minorities and poor income families did not have regular access to meals at school.

The needs assessment also revealed that children's nutritional behaviors were influenced by multiple determinants that include biological predisposition, individual behaviors, familial environment, social supports and interactions, school environment, socio-cultural environment, and school policy and program. These multilevel determinants were further explained through the three constructs of the socio-ecological model (SEM): individual, interpersonal, and organizational (environmental) settings.

Components of School-Based Nutrition Education Intervention (SBNEI)

With an increased understanding of the importance of considering the SEM to account for the multiple spheres of influence in students' nutritional behaviors, a three-dimensional SBNEI was co-developed and co-implemented: i) sensitization and motivation, ii) classroom-based nutrition education sessions, and iii) a supportive school environment. The intervention activities under each dimension were co-implemented in the school in collaboration with the school community that included students, teachers, school leaders, PAR committee, and parents, following the inherent components of the PAR cycle that are planning, acting, observing, and reflecting. Under the sensitization and motivation cycle, audio-visual session; home visitation and interaction; drama show, nutrition fair and expression of commitment; short speech on nutrition; and parent-teacher interaction were co-implemented. Similarly, under the classroom-based nutrition education sessions, contextualizing the standard nutrition education curriculum; developing the teaching-learning resources for classroom teaching; designing the themes and key messages of nutrition education; developing the nutrition education lesson plans; teacher professional development workshop; and implementing nutrition education lesson studies were co-implemented. Supportive school environment is comprised of school health and nutrition committee formation; school feeding program; reorienting school canteen service system; junk food prohibition at school; role modeling by nutrition champions, and school health and nutrition policy and program. Due to Covid-19, some environmental intervention activities such as follow-up nutrition education sessions and school nutrition wall magazine publications, were combined under the supportive school environment.

Pedagogical Innovation in Classroom Teaching

Participatory and transformative pedagogies of nutrition education were contextualized to teach nutrition education lessons in classroom teaching to transform children's nutritional behaviors. These participatory pedagogies include arts-based learning, small group interaction, experiential learning, experience-sharing, and multi-modal learning approaches. The arts-based learning approaches include drawing and coloring, game playing, rhyming, and singing, storytelling, role-playing, and simulation. Similarly, small group interactive learning approaches include brainstorming, think-pair-share (TPS), turn-and-talk (TAT), group discussion and presentation, and jigsaw methods. Experiential learning approaches include garden-based learning, project-based learning, and experience-sharing. And multi-modal learning approaches include visual, audio-visual, and PowerPoints presentation. This study suggests that arts-based and multi-modal learning approaches are effective for lower basic classes (grades 1-5), while small group interaction, experiential learning, and experience-sharing approaches are more effective for upper basic classes (grades 6-8).

The basic level teachers changed their teacher-centric conventional classroom teaching practices into participatory learning approaches in their teaching. This practice has developed a dialogical relationship between students and teachers and thus has fostered a collaborative learning environment. These practices have developed meaningful engagement of students in learning; increased opportunities for interaction within and between the peers and teachers; and developed social learning practices such as cooperation, collaboration, problem-solving practice, negotiation, leadership, teamwork culture, and tackle with real-world problems.

Personal Transformation in Nutritional Behaviors

SBNEI has brought positive outcomes in nutritional behaviors of children, teachers, school leaders, parents, and PAR committee members. Children have improved their food and nutrition knowledge, particularly on benefits of healthy foods and the harmful effects of junk food. Students have developed a knowledge-sharing culture with their classmates and family members. Similarly, students have developed strong positive intentions and favorable attitudes towards healthy school meal consumption. They have developed self-awareness, self-efficacy, and commitment to avoid unhealthy dietary behaviors.

Students have markedly improved their school meal consumption behaviors. The proportion of students who consume school meals has progressively increased with a growing trend of carrying lunch boxes from home. The number of junk food consuming students markedly declined at school. Meal skipping, returning home from school at lunch break time, school absenteeism (truancy), and falling sick due to stomachache have been overtly decreased. The school canteen's tuck shop has stopped selling junk foods; instead, the canteen serves healthy meals following the school menu. There has also been a significant reduction in the proportion of students who buy junk food from grocery stores and vending shops surrounding the school. Students have also improved their healthy dietary behaviors at home. They have improved handwashing practices before every single meal at school and home. Similarly, students learned anthropometry skills to self-examine their nutritional status based on their measured height and weight. The proportion of underweight, overweight, and stunt students has markedly dropped down. In addition to the children, teachers, parents, school leaders, and PAR committee members have become critically aware of their taken nutritional behaviors.

Social Transformation

The nutrition champions of the classroom positively influenced their classmates' nutritional behaviors through role modeling practice. The teachers and school leaders also acted as role models to their children. Further, children served as role models for their family members and relatives in society to promote healthy dietary outcomes.

SBNEI has considerably increased the meaningful engagement of the parents in the school. Parental engagement in the school has appeared in different forms such as involvement in school feeding program, gardening activities, entrepreneurship activities, parents-teachers' interactions, and school's education and development programs. The intervention has also increased the number of students, particularly at basic level.

Sustainability of the Intervention Outcomes

This study suggests three approaches for the sustainability of the SBNEI such as bottom-up model of the intervention, theory-guided multilayered and multicomponent intervention, and transdisciplinary and interdisciplinary collaboration to ensure the sustainability of results of this PhD project to retain healthy nutritional behaviors in children.

This study applied a five-stepped bottom-up approach to develop ownership of the intervention among the school community. The bottom-up approach begins with contextualizing the research field, exploring the needs, prioritizing the needs, developing intervention session activities, and mapping out an intervention action plan.

This study has developed theory-guided multilayered (intrapersonal, interpersonal, and environmental) and multicomponent (sensitization and motivation,

classroom-based nutrition education, and supporting school environment) intervention.

This study has embraced transdisciplinary and interdisciplinary collaboration while with different people such as teacher educators, teachers, SMC, and PTA members from educational sector; local farmers and housewives from agricultural sector; health workers and professionals from health sector; and local governmental bodies such as ward office chairperson, Mayor, local government administrative officer from political sector. Besides, interdisciplinary collaboration within the PhD projects in the action school such as Ecosan and WASH, School Gardening, Life Skills-based Health Education for Personal Transformation, and School Entrepreneurship also remained incredible to sustain the SBNEI.

Emergent Opportunities and Challenges in PAR-Based Study

PAR methodology as an emergent action inquiry has offered several context-bound opportunities and challenges to me as a PhD (co)researcher. The opportunities include co-creating practical knowledge to solve the problems in the authentic space—an action school, fostering participatory classroom learning approaches, nurturing the culture of collaboration within and between the co-researchers, becoming a transformative teacher educator and researcher, transforming personal dietary behaviors, and developing the curricular resources connecting to the higher body of the education system. Similarly, I also encountered a couple of emerging challenges such as disorienting dilemmas particularly in the beginning of the research; trust-building and egalitarian relationships with co-researchers; longer duration to stay in the field; power dynamics within and between the co-researchers; reluctance in self-directed participation in the study; and the divergent perspectives, values, and abilities among the school co-researchers and between school co-researchers and

myself. Besides, the co-researchers also perceived a couple of challenges what they reported in the bridging workshop during outcome evaluation of the intervention. These challenges are involving all basic school students and teachers proactively to continue the nutrition education sessions; self-directed participation of the school community; stopping junk food consumption among students due to newcomer students at every academic year; irregular hand washing practice due to lack of hand washing materials, and unable to supplying garden products to the school canteen for school meals.

Conclusions

The present study has aimed to transform nutritional behaviors in children through a four-year long intervention. The four-year multicomponent intervention through a PAR framework resulted in several positive outcomes. Following the core empirical findings grounded through the PAR, I have theorized some conclusive statements based on the guiding research questions.

Nutritional behaviors of children are influenced by multilevel factors extending from individual to the environment. The findings of this study affirm that socio-ecological model (SEM) fits to explain the nutritional behaviors of children. Theoretical assumption of the SEM posits that health behaviors are influenced by five levels of determinants: individual, interpersonal, community, socio-cultural, and public policy. However, the present study confirms that three constructs of the SEM such as individual, interpersonal, and environmental settings better explain the nutritional behaviors of children in the context of the public schools in Nepal.

Since multilevel determinants influence students' nutritional behaviors, a multi-component and multi-layered SBNEI could have a high potential to develop healthy nutritional behaviors. The study recommends three components of

intervention: a) ‘motivation and sensitization’ aims with developing awareness, sensitization, motivation, self-efficacy, and strong intentions and positive attitudes towards healthy dietary outcomes; b) ‘classroom-based nutrition education’ aims with increasing food and nutrition knowledge, dietary intentions and attitudes, and healthy meal consumption behaviors; and c) ‘supportive environment’ aims with creating a supportive school environment for the sustainability of the intervention. This study stresses that environmental setting plays a crucial role in promoting healthy behavior of children in school as suggested by Health Promoting School Guidelines developed by WHO (WHO, 1997).

PAR is a process of co-identifying social action(s) to address the co-identified problems where the co-researchers are fully involved and actively participated in co-designing and co-implementing intervention under a participatory framework. It encourages power sharing and mutually empowers co-researchers in the forms of transformative learning practices such as critical thinking, self-reflection, and problem-solving skills through dialogue, negotiation, and collaboration among those involved in the research process.

Participatory nutrition education pedagogies foster transformative thinking and acting among students and teachers for pedagogical innovations in classroom and they are transformative vehicles to result in improved healthy behaviors in children. Participatory pedagogies encourage students to develop food and nutrition knowledge, change for positive dietary intentions and attitudes, and develop healthy dietary practices providing a ‘communicative space for learning that enables students to reflect critically on their actions, is called praxis. This study affirms that participatory pedagogies also enrich individual experiences through critical reflection, classroom

dialogue, dialectical thinking, holistic orientation, critical awareness of the context, and authentic relationships.

SBNEI effectively improves students' food and nutrition knowledge, positive intention on dietary behavior, self-awareness, self-efficacy, and commitment against unhealthy dietary behaviors. Besides, SBNEI triggers to improve teachers, parents, school leaders, and PAR committee members' dietary behaviors as the spillover effects of the intervention. But it is important to note that sustaining improved nutritional behaviors among children is a challenge. It needs constant team efforts (collaboration) among the team and a supportive environment such as school feeding program, classroom-based nutrition education, and school health and nutrition policies and programs.

Similarly, sustaining the long-term impact of the SBNEI on students' nutritional behaviors needs transdisciplinary and interdisciplinary mode of collaboration. For instance, to have a sustained impact, transdisciplinary collaboration among education, health, agriculture, and political sectors and interdisciplinary collaboration within the school community should come together. Besides, intraschool projects such as Ecosan and WASH, School Gardening, Life Skills-based Health Education, and School Entrepreneurship can better support to result in healthy nutritional behaviors in students. Though opportunities and challenges appear as the two sides of a single coin, in a PAR-based study, it is quite difficult to predict the challenges and opportunities beforehand since they are emergent and contextual in nature. Disorienting dilemmas, trust-building and egalitarian relationships, stipulated time to complete the project, power relations, motivation for self-directed participation, and working on divergent perspectives, values, and abilities among the co-researchers, and turnover of the students, teachers, and school leaders are some of

the bottlenecks of this study. Similarly, co-creating a practical knowledge to solve the problems in practice setting, fostering participatory pedagogies in classroom teaching, nurturing the culture of collaboration, becoming a transformative change agent, transforming personal behaviors, and developing the curricular resources for effective classroom teaching are some underlying opportunities of the PAR-based study.

Implications

This section presents the implications of the findings of this study and they are presented under the following sections.

Practice Level Implications

This sub-section draws several pedagogical implications of the study to the classroom and the research practice setting.

Classroom Implications. PAR is more emergent and contextual. Teachers could be engaged in PAR to address the challenges that they face replicable engaging their students and parents either in the classroom settings and/or in the similar socio-cultural context. Similar approach could also be considered useful at higher education institutions (HEIs), particularly in the Faculty of Education (FoE), where the university faculty members can empower the prospective teachers through PAR.

School Classroom. Teachers can serve as a change agent in classroom teaching. Thus, teachers can contextualize the school level curricula representing the ecological and socio-cultural richness, develop learning resources for classroom teaching, develop activity-based learning projects, and implement activity-driven participatory pedagogy for classroom teaching using the PAR approach adopted in this study. PAR could be used by teachers, particularly health education teachers, to employ art-based pedagogy, small group interactions, experiential learning, experience-sharing, and multi-modal learning approaches to ensure students' active involvement in learning.

Similarly, the teachers' manual and guide for teaching nutrition education lessons could be used to implement participatory pedagogies for classroom teaching. This has a potential implication to scale up and replicate in other schools through the local governments.

This study has connected nutrition education to school farming systems and gardening activities, where students get ample opportunities to learn the importance of local products and their nutritional value. Participation of students, teachers, and parents in the school farming and gardening activities can switch the mode of classroom teaching from teacher-centric 'chalk and talk' to 'real-world problem solving active-driven' methods. Linking nutrition education classes aligning with the school feeding program appear to be a successful intervention, where students pursue to wash their hands before every single meal, eat locally produced foods, and avoid unhealthy food. Following the school feeding practice under the midday meal program introduced by the Ministry of Education, Science and Technology, the teachers could effectively link the nutrition education classes to the school feeding program. This integrated teaching approach would create an enabling environment for sustainability of the school nutrition program.

Another implication of the current study could be drawn to measure the students' nutritional status. Teachers can conduct anthropometric measurements as a part of nutrition pedagogy in the classroom and involve students to find out their nutritional status based on the anthropometric results. This can provide students with experiential learning opportunities to explore their nutritional status and enable them to change their dietary behaviors. A similar approach could be expanded to other subjects where such practice is feasible.

This study has brought all school community such as teachers, school leaders like HT, SMC and PAR committee members, parents, local farmers, health personnel from nearest health centers as the experts in their own context and this approach could be used across all other subjects and overall school development.

Higher Education Classroom. As a teacher educator at the FoE, TU and a PhD researcher of this study (dual positionality), I can apply transformative thinking and acting in my university classes, pursuing the application of participatory pedagogies in classroom teaching with transformative intent. It could also be useful to university students learning through critical reflection and self-reflexivity in their learning. After this study, I can see my every single classroom activity with the transformative lens navigating through a question, “how do I improve what I am doing”? being influenced by the educational living theory articulated by Whitehead (2008). Besides, based on the research findings laid by this study, the university can incorporate PAR methodology as an emergent research inquiry in graduate, post-graduate, and doctoral level research curricula.

Research Implication. This study also indicates empirical, methodological, and theoretical implications for future research.

Empirical Implications. Since this study was conducted for four-consecutive academic years by involving school community as the co-researchers in a school, other schools could also develop and implement health intervention to promote healthy behaviors and lifestyle in children based on the learning of this research. Moreover, future researchers who work in a similar field could use the research findings to get insights to implement SBNEI in collaboration with the school community to bring positive outcomes in nutritional behaviors.

Methodological Implications. In Nepal, most of the researchers in higher education, particularly, health education and promotion related studies, are still sticking to the (post) positivism worldview for their research. As a PAR researcher, I reflect that the research participants, such as students, teachers, parents, school leaders, and local community people, can collaboratively be engaged in research world as the co-researchers.

PAR challenges traditional hierarchies between the researcher(s) and the participants, where the study is conducted in partnership 'with participants' NOT 'on participants'. The PAR study allows the researchers and the participants to develop collegiality, common understanding and sharing power. Involving the research participants in the dialogue conference, informal conversation (*Chhalphal*), and bridging-the-gap workshop provides a social interaction space through which they can transform their frame of reference for viewing the research world.

The methodological journey of this study would also provide robust evidence to guide early career researchers. Thus, I can see the prospects of the PAR-driven study as a new epistemic journey among the Nepali academia. In addition to this, since the FoE, TU aims to pursue public schools-driven research to develop and transform public schools' education system, PAR methodology could be incorporated to get the practical solutions to the problem through active involvement of the school community in the action research world.

Theoretical Implications. SBNEI appears to show the effectiveness of the needs-based intervention to transform nutritional behaviors among children in the context of a public school of Nepal. It inspires active involvement of students, teachers, school leaders, and local community in developing healthy behaviors and lifestyle in children.

Future researchers can also consider inherent components of the SBNEI such as: ‘sensitization and motivation’, ‘classroom-based lesson study’, and ‘supportive school environment’ as a guiding framework to develop and implement a need-based multicomponent and multi-layered school health intervention. The SEM could be the guiding theoretical framework for designing and implementing the intervention.

Further Study Implications. The focus of the present study was to transform children’s nutritional behaviors through a four-year long SBNEI collaborating with the school community. However, this study could not engage the school community in the meaning making process (chapter analysis) of the study. Therefore, this study recommends involving the research stakeholders throughout the study, including them in the meaning making process which could embrace the emic perspective of the co-researchers in the dissertation.

The present study has selected one public school as an action school to implement interventions focusing on nutritional behaviors. Therefore, the findings cannot be generalized in the wider social setting. Thus, future studies can uncover this gap by employing more than one school in the intervention representing a wider social context so that the findings could be expanded to a larger extent.

The present study has compared the needs assessment and outcome evaluation results considering one school. Though the remaining four schools were also taken for the needs assessment study, they were not taken as the control schools to compare the outcome results. Given the gap, future studies could consider both intervention and controlled schools to compare the pre-post results to determine the net effects of the intervention.

Policy Level Implications

The present study suggests that this study has implications for the policy and program development at various levels viz local, provincial, and federal. The study implies that school's supportive environments, including school health and nutrition policy can be promising to sustain improved nutritional behaviors in children.

Following the evidence, the school can develop a school health and nutrition policy to regulate healthy dietary behaviors among children. In so doing, the school can collaborate with health post and rural/municipal government. Moreover, the local government could replicate strategies of school nutrition interventions in other schools within the municipality. For instance, contextualizing the nutrition education curriculum with applying participatory pedagogy in classroom teaching, connecting school gardening activities, school feeding program, handwashing practice, mobilizing nutrition champions for peer education and school nutrition wall magazine publication can be considered into account to replicate in other schools within the municipality and beyond the similar socio-cultural context.

Another important implication of this study could be reframing the curriculum, textbooks, teachers' resource guides, and teachers' professional development programs at school level. The CDC, an academic center under the Ministry of Education, is established to develop curricula, textbooks, and other instructional materials for school education, can borrow the pragmatic insights from the present study while developing basic level school curricular resources in many ways. For instance, the curriculum designers can consolidate pedagogical innovations brought by this study. As this study has successfully demonstrated the effectiveness of the participatory pedagogy in bringing positive outcomes in children's nutritional behaviors, the curriculum designers, textbooks writers, and teachers' guide developers

can consider these participatory learning approaches while developing curriculum, textbooks, and other learning resources.

CHERD, a central body under the Ministry of Education, established to effectively implement and monitor the policies, plans and the programs, could also utilize the findings of the study in many ways. For instance, the curricular resources (hard copy and digital) developed for teachers' professional development programs could be used as the common goods in the teachers' training program.

Furthermore, an important policy contribution of this study is that it offers abundant pragmatic insights stemming from the real field experiences of the school community, which could provide groundbreaking evidence for developing school health and nutrition-related policy and program. The study's findings might be worthwhile to the federal and provincial policymakers to get insights to apply participatory approaches to ensure the involvement of the school community in the school-based intervention activities.

Final Reflections

During the four-year school-based intervention, I reflect that SBNEI is effective to result in improved nutritional behaviors in children, particularly in low-income and ethnic minority groups. I believe that a school-based intervention approach accompanied by PAR methodology would meaningfully increase parental engagement in the school, which further yields synergetic effects in health and educational outcomes in students' life. I am sure that participatory pedagogies could foster transformative thinking and acting among the teachers and students for pedagogical innovation in classroom teaching and learning.

Using a PAR methodology in action research is a time-consuming journey since it demands prolonged fieldwork to build a trust and reciprocal relationship

between the researcher and co-researchers particularly when the researcher is from outside the research context. Therefore, it is important for the researcher to develop the culture of collaborative learning to solve the real-world problems in the research context.

Further, I reflect that school-based interventions could increase meaningful engagement of parents in different forms such as involvement in sharing the cost for school feeding program for midday meals; engaging in classroom activities together with the teachers as the local experts; engaging in the school gardening activities to transmit first hand experiences to the children since school garden is a biolab for science and health education; working in school entrepreneurship activities such as mushroom farming, fish farming, and kitchen gardening together with teachers and students to sustain the school feeding program by supplying healthy and nutritious locally produced foods to the school canteen; and involving them in the parents-teachers' interaction sessions for the betterment of children's health and education outcomes.

Finally, I reflect dialogue, informal discussions like *Chhalphal* and *Chiya-Chautara Gaf*, negotiation, and bridging-the-gap workshop are effective communicative action inquiries to identify and resolve the real-world problems and to co-create the knowledge in the realm of PAR.

Lessons Learned

Since this study applied PAR methodology—a new methodological approach, I learned a couple of lessons which might be important to consider for future researchers in the related field. First and foremost is 'disorienting dilemmas and tensions' in the initial phase of the field work that is inevitable in PAR-based study if the researcher(s) is an outsider of the research context. The disorienting dilemmas and

tensions are created due to the taken-for-granted positionality of the researcher, which further creates a power hierarchy between researcher and researched. However, this challenge can be overcome with communicative action inquiries in the real-world situation.

Secondly, unlike the conventional mode of research, the research agendas in PAR study are emerged in the field, which may not be anticipated before situating in the real-world situation. It is, therefore, the research agenda, research design, methods, procedures, and intervention strategies need to be more flexible. The third is the changing behavior in human agency, particularly among the children is a great deal unless a theory guided multicomponent intervention is incorporated. And the fourth is seeking self-directed participation of the school community, particularly teachers, is just like a breaking iceberg phenomenon since teachers do not easily trust outsiders unless the researchers make them assure about the possible benefits of the study to their personal and professional life. Last but not least, collaboration, dialogue and negotiation are the pillars of the PAR for co-working with the researched to contextualize the real-world problems, develop action plan with intervention activities, and solve the problems together.

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Appendices

Appendix A: Survey Questionnaire for Students (Needs Assessment)

General Information

Name of the School: _____

District: _____

Municipality: _____

Ward number: _____

Enumerator's name: _____

Date (mm/dd/yyyy): _____

Student's code: _____

(Students' Code for anonymity: First letter of the school's name, Grade, First letter of the first name, middle name and last name.)

Is the consent provided? 1. Yes 2. No

1. Background Information

	 Girl	 Boy
Are you a boy or a girl?		




SN	Questions	Response	Code	
			Yes	No
102	What is your date of birth?	____/____/____ day/month/year		
103	What is your age?			
104	Education level: Which class are you in?			
105	What is your caste/ethnicity? (write the SUR Name)(SUR Name)		
106	What is your religion?	Budhism Hinduism Muslim Christian Others (Specify.....)	1 2 3 4 98	
107	What language do you speak at home?	Nepali Newari Tamang Gurung Tharu	1 2 3 4 5	

		Magar Darai Chepang Others (specify.....)	6 7 8 98
108	What is your home made with?	Mud//stone/brick/wood Cement, brick and iron rod Wood/bamboo Others (specify.....)	1 2 3 4
109	Who do you live with?	Parents, grandparents and siblings Parents and siblings only Others (specify.....)	1 2 3
110	What is your mother's main occupation?	Agriculture Business Regular job at govt/pvt sector Service work Labour work/Daily wages Others(specify)	
111	What is your father's main occupation?	Agriculture Business Regular job at govt/pvt sector Service work Labour work/Daily wages Others(specify)	
112	How do you come to school?	On foot By bicycle By bus	1 2 3
113	In the last 30 days, how many days were you absent from school?	Write days you were absent from school..... I have not been absent from school in the last 30 days	
114	Why were you absent from the school in the last 30 days?	I became sick I had to take care my siblings I had to look after cattle I had to support my parent in household chores farm activities Others (specify.....)	1 2 3 98
115	Do you enjoy studying in your school?	Yes No (If no go to question no. 1.16.)	1 0

2. Knowledge on Food and Nutrition

SN	Questions	Response	Code	Instruction
201	Match Group A with Group B(draw lines)(Students below Grade 5 do not need to answer)			Group A consists of diseases caused by vitamin deficiency whereas Group B shows name of vitamins
	Group 'A'	Group 'B'		
	1.Night Blindness	Vitamin C		
	2. Rickets	Vitamin A		
	3.Beri-Beri	Vitamin B		
	4.Scurvy	Vitamin D		
	5. Pellagra	Vitamin B 'Niacin'		

202	Are rice, potato, sweet potato and sugar sources of carbohydrate?	Yes No	1 0	
203	What are main sources of vitamins?	Fats and oil Wheat and rice Fruits and vegetables Fish, meat and eggs	1 2 3 4	
204	What are main source of protein/body building nutrients?	Fats and oil Wheat and rice Fruits and vegetables Fish, meat and eggs	1 2 3 4	
205	Main nutrient in milk is:	Carbohydrate Vitamin Fats Calcium and protein	1 2 3 4	
206	What are the causes of malnutrition?	Lack of foods to eat	1	
		Eating unbalance diet	2	
		Lack of affords to different kinds of foods	3	
		Eating insufficient amount of food each day	4	
		No /idea/not sure	5	
	Others (Specify.....)	98		

3. Attitude on Healthy Eating				
	How much do you agree with these statements?	Strongly disagree 	Neutral/Not sure 	Strongly agree 
301	I am interested to eat healthy diets/food.			
302	I would like to learn about how to prepare healthy diets and snack.			
303	I would like to eat vegetables every day.			
304	I would like to drink a glass of milk every day is good for my health.			
305	I would like to eat fruits daily.			
306	It is good to eat fruits for snack.			
307	I enjoy brining homemade snacks			
308	It is good to learn what I eat.			
309	I like to know how to grow vegetable in the home/school garden.			
310	Eating healthy tiffin/snack in school is important for me.			

4. Snack Eating Behaviour				
SN	Questions	Response	Code	Instruction
401	Today, did you have meal before coming to school?	Yes	1	
		No	0	
402	How did you manage tiffin/snack in your school?	Brought from home	1	
		Bought from school cafeteria	2	
		Bought from shop adjoining the school	3	
		Took from my friends	4	
		Did not eat anything	5	
403	Did you bring snack at school today?	Yes	1	If yes go to no 3.11
		No	0	
404	Why did not you bring snack at school today?	No food at home	1	
		No money to buy	2	
		Parents were busy	3	
		I did not like to eat	4	
		Foods are available in school canteen	5	
		Others (specify.....)	98	
405	What did you bring as tiffin/snack at the school today? (You do not need to answer this if you have not/did not bring snacks today)	Cooked food brought from home	1	
		Vegetable, rice/beaten rice	2	
		Junk food (noodles, biscuits....)	3	
		Fruits	4	
		Others (specify.....)	98	
406	How often do you bring snacks from home?	Always	1	
		Sometimes	2	
		Never	3	
407	If yes, what items are included in your snack?	Rice, bean and vegetable	1	
		Roti and vegetables	2	
		Beaten rice and vegetables	3	
		Noodles	4	
		Biscuit/cookies	5	
		Others (Specify.....)	98	
408	How much money do you usually bring each day from home as pocket expenses?	Rs		
409	How many days a week are vegetables served at lunch/dinner at your home usually?	Daily	1	
		Alternate day	2	
		Twice a week	3	
		Once a week	4	
		Not sure	5	
410	From where do you bring/get vegetable?	From school kitchen garden	1	
		From school kitchen garden	2	
		From market	3	
		From relative's kitchen garden	4	
		Other (specify.....)	98	
411	How often do you eat fruit?	Daily	1	
		Rarely	2	
		Not sure/no idea	3	

Appendix B: Survey Questionnaire for Students (Outcome Evaluation)

आधारभूत तहमा अध्ययनरत बालबालिकाहरुको पोषण ब्यबहार सम्बन्धित सर्वेक्षण- २०७८

विद्यालयको नाम:

जिल्ला: चितवन

नगरपालिका:

वडा न.

तथ्यांक संकलकको नाम: _____

मिति:गते विद्यार्थीको कोड: _____

(विद्यार्थी कोडका लागि विद्यालयको नामको पहिलो अक्षर, विद्यार्थी पढिरहेको कक्षा, विद्यार्थीको प्रथम, मध्य, थरको पहिलो अक्षर)

के यो सर्वेक्षणमा तपाईंको सहमति छ ? छ छैन

यदि छ भने हस्ताक्षर गर्नुहोस :

१. व्यक्तिगत बिबरण			
क्र.सं.	प्रश्नहरू	प्रतिक्रिया	कोड
१.१	तपाईंको यौन/लिङ्ग कुन हो ?	क) केटा	१
		ख) केटी	२
		ग) अन्य	९८
१.२	तपाईं कति वर्षको हुनुभयो ?वर्ष	
१.३	तपाईं कुन कक्षामा पढ्दै हुनुहुन्छ ?		
१.४	तपाईंको थर/जातजाती के हो ?	क) क्षेत्री	१
		ख) बाह्रमण	२
		ग) जनजाति	३
		घ) आदिवासी	४
		ङ) दलित	५
		च) मधेसी	६
		छ) मुस्लिम	७
१.५	तपाईं वा तपाईंको परिवारले मान्ने धर्म कुन हो ?	(क) हिन्दु	१
		(ख) बौद्ध	२
		(ग) इसाई/क्रिश्चियन	३
		(घ) इस्लाम	४
		(ङ) अन्य	९८
१.६	तपाईं कस्तो प्रकारको परिवारमा बस्नु हुन्छ ?	(क) एकल	१
		(ख) संयुक्त	२
१.७	तपाईं हाल कोसँग बस्नुहुन्छ ?	(क) अभिभावक	१
		(ख) नातेदार	२

		(ग) अन्य	९८
१.८	तपाईंको बुबाको शैक्षिक योग्यता कति हो ?	(क) पढ्न लेख्न नसक्ने	१
		(ख) साक्षर मात्र	२
		(ग) विद्यालय शिक्षा	३
		(घ) स्नातक तह वा माथी	४
१.९	तपाईंको आमाको शैक्षिक योग्यता कति हो ?	(क) पढ्न लेख्न नसक्ने	१
		(ख) साक्षर मात्र	२
		(ग) विद्यालय शिक्षा	३
		(घ) स्नातक तह वा माथी	४
१.१०	तपाईंको आमाको मुख्य पेशा के हो ?	(क) कृषि	१
		(ख) व्यापार	२
		(ग) जागिर	३
		(घ) ज्यालादारी	४
		(ङ) वैदेशिक रोजगार	५
		च) गृहणी	६
		छ) अन्य	९८
१.११	तपाईंको बुबाको मुख्य पेशा के हो ?	(क) कृषि	१
		(ख) व्यापार	२
		(ग) जागिर	३
		(घ) ज्यालादारी	४
		(ङ) वैदेशिक रोजगार	५
		च) हाल काम/रोजगार नभएको	६
		छ) अन्य	९८
१.१२	तपाईं विद्यालय कसरी आउनुहुन्छ ?	(क) हिडेर	१
		(ख) साईकल चढेर	२
		(ग) बस चढेर	३
१.१३	तपाईं विद्यालयको कुनै क्लब जस्तै बाल क्लब, इको क्लब, पोषण क्लबमा आबद्ध हुनुहुन्छ ?	(क) छ	१
		(ख) छैन	०
१.१४	तपाईं शारीरिक क्रियाकलाप एवम् खेलकुदमा कतिको सहभागी हुनुहुन्छ ?	(क) नियमित/सधै	१
		(ख) प्रायजसो	२
		(ग) कहिलेकाही	३
		(ग) न्युन	४
१.१५	तपाईं विद्युतीय साधनहरू जस्तै टि.भी., मोबाइल, कम्प्युटर कति समय हेर्नुहुन्छ ?	(क) दैनिक १ घण्टा वा भन्दा कम	१
		(क) दैनिक २-३ घण्टा	२
		(क) दैनिक ३-४ घण्टा	३
		(क) दैनिक ४ घण्टा भन्दा बढि	४

२. खाना र पोषण सम्बन्धित आधारभूत ज्ञान				
क्र.सं.	प्रश्नहरू	जवाफ	स्कोर	निर्देशन
२.१	समूह (क) सँग समूह (ख) रेखा तानेर जोडा मिलाउनुहोस् ।			
	समूह (क)	समूह (ख)		
	१. रतन्धो	भिटाभिन सी		
	२. रिकेटस	भिटाभिन ए		
	३. रक्तअल्पता	जड्क फुड		
	४. स्कर्भी	भिटाभिन डी		
	५. मोटोपना	आईरन		
२.२	हाम्रो शरीरलाई शक्ति दिने खानाहरू कुन हुन् ?	(क) भात, आलु, चिनी, घीऊ	१	कुनै एक विकल्पमात्र छनौट गर्नुहोस् ।
		(ख) माछा, मासु, दाल, गेडागुडी	०	
		(ग) फलफुल र तरकारी	०	
		(घ) दाल, भात र तरकारी	०	
		(ङ) थाहा छैन	०	
२.३	हाम्रो शरीरलाई वृद्धि गर्ने खानाहरू कुन हुन् ?	(क) भात, आलु, चिनी, घीऊ	०	कुनै एक विकल्पमात्र छनौट गर्नुहोस् ।
		(ख) माछा, मासु, दाल, गेडागुडी	१	
		(ग) फलफुल र तरकारी	०	
		(घ) दाल, भात र तरकारी	०	
		(ङ) थाहा छैन	०	
२.४	हाम्रो शरीरलाई रक्षा गर्ने खानाहरू कुन हुन् ?	(क) भात, आलु, चिनी, घीऊ	०	कुनै एक विकल्पमात्र छनौट गर्नुहोस् ।
		(ख) माछा, मासु, दाल, गेडागुडी	०	
		(ग) फलफुल र तरकारी	१	
		(घ) दाल, भात र तरकारी	०	
		(ङ) थाहा छैन	०	
२.५	हाम्रो शरीरलाई शक्ति दिने पोषक तत्व कुन हो ?	(क) कार्बोहाइड्रेटस् र चिल्लो	१	कुनै एक विकल्पमात्र छनौट गर्नुहोस् ।
		(ख) प्रोटिन	०	
		(ग) भिटाभिन	०	
		(घ) मिनिरल	०	
		(ङ) थाहा छैन	०	
२.६	हाम्रो शरीरलाई वृद्धि गर्ने पोषक तत्व कुन हो ?	(क) कार्बोहाइड्रेटस्	०	कुनै एक विकल्पमात्र छनौट गर्नुहोस् ।
		(ख) प्रोटिन	१	
		(ग) चिल्लो/बोसो	०	
		(घ) भिटाभिन र मिनिरल	०	
		(ङ) थाहा छैन	०	
२.७	हाम्रो शरीरलाई रक्षा गर्ने पोषक तत्व कुन हो ?	(क) कार्बोहाइड्रेटस्	०	कुनै एक विकल्पमात्र छनौट गर्नुहोस् ।
		(ख) प्रोटिन	०	
		(ग) चिल्लो/बोसो	०	
		(घ) भिटाभिन र मिनिरल	१	

		(ड) थाहा छैन	०	
२.८	सन्तुलित भोजनको उदाहरण कुन हो ?	(क) भात, रोटी, ढिँडो	०	कुनै एक विकल्पमात्र छनौट गर्नुहोस् ।
		(ख) माछा, मासु, अण्डा	०	
		(ग) फलफुल र तरकारी	०	
		(घ) दाल, भात र तरकारी	१	
		(ड) थाहा छैन	०	
२.९	कुपोषणको मुख्य कारण के हो?	(क) खानेकुरा कम खाएर	०	कुनै एक विकल्पमात्र छनौट गर्नुहोस् ।
		(ख) खानेकुरा धेरै खाएर	०	
		(ग) खानेकुरा नियमित नखाएर	०	
		(घ) शरीरमा चाहिने भन्दा कम वा बढि पोषक तत्वको उपभोग भएर	१	
		(ड) थाहा छैन	०	
२.१०	कुन खाना स्वस्थ र पोषिला हो ?	(क) बिस्कट	०	कुनै एक विकल्पमात्र छनौट गर्नुहोस् ।
		(ख) जाउलो	१	
		(ग) चकलेट	०	
		(घ) चाउचाउ	०	
		(ड) थाहा छैन	०	
२.११	कुन खाना जड्क फुड (अस्वस्थकर खाना) हो ?	(क) बिस्कट	१	कुनै एक विकल्पमात्र छनौट गर्नुहोस् ।
		(ख) जाउलो	०	
		(ग) खिर	०	
		(घ) चिउरा तरकारी	०	
		(ड) थाहा छैन	०	

३. खाना तथा पोषण सम्बन्धी धारणा		मापन स्केल		
		३	२	१
क्र.सं.	यी भनाइप्रति तपाईं कतिको सहमत हुनुहुन्छ ?	सहमत ☺	थाहा छैन ☹	असहमत ☹
३.१	म स्वस्थ र पोषिलो खाना/खाजा खान मन पराउँछु ।			
३.२	म स्वस्थ र पोषिलो खाना/खाजा बनाउने तरिका सिक्न चाहन्छु ।			
३.३	मलाई हरियो सागपात र तरकारी खान मन पर्छ ।			
३.४	मलाई मौसम अनुसारको फलफुल खान मन पर्छ ।			
३.५	मेरो स्वास्थ्यको लागि दुध पिउन आवश्यक छ ।			
३.६	मलाई घरमा बनाएको खाजा खान मन पर्दछ ।			
३.७	घरमा बनाएको खाजा स्वस्थ र पोषिला हुन्छ ।			
३.८	जड्क फुड हाम्रो स्वास्थ्यको लागि हानीकारक छ ।			
३.९	विद्यालयमा खाने खाजा स्वस्थ र पोषिलो हुनुपर्छ ।			
३.१०	म विद्यालयमा खाने दिवा खाजाप्रती सचेत/चनाखो छु ।			

४. पोषण ब्यबहार				
क्र.सं.	प्रश्नहरू	जवाफ	कोड	निर्देशन
४.१	तपाईंले आज विद्यालयमा खाजा खानुभयो ?	(क) खाए	१	नखाएको भए ४.३ मा जानुहोस् ।
		(ख) खाइन	०	
४.२	तपाईंले आज विद्यालयमा के खाजा खानुभयो ?	(क) घरबाट ल्याएको खाजा	१	कक्षा ४/५ को विद्यार्थी ४.९ मा जानुहोस् ।
		(ख) क्यान्टिनको खाजा	२	
		(ग) तयारी खाजा जस्तै बिस्कुट, चाउचाउ, चिजबल	३	
		(ग) खाजा खान मन नलागेर	४	
		(घ) फलफुल तथा सलाद	५	
४.३	यदी खानु भएन भने किन नखाएको ?	(क) खाजा ल्याउन अलिख लागेर	१	
		(ख) खाजा ल्याउन लाज लागेर	२	
		(ग) खाजा किन्ने पैसा नभएर	३	
		(घ) भोक नलागेर	४	
		(ङ) अन्य	९८	
४.४	तपाईं घरको खाजा कतिको ल्याउनुहुन्छ ?	(क) सधैं	५	
		(ख) हप्ताको ४/५ दिन	४	
		(ग) हप्ताको ३/४ दिन	३	
		(घ) हप्ताको १/२ दिन	२	
		(ङ) कहिल्यै पनि ल्याउँदैन	१	
४.५	यदि घरको खाजा ल्याउनुहुन्छ भने कस्तो खाजा ल्याउने गर्नुभएको छ ?		
४.६	तपाईंलाई घरबाट खाजा ल्याउन मन लाग्छ ?	(क) लाग्छ	१	
		(ख) लाग्दैन	०	
४.७	यदि लाग्दैन भने किन होला ?	(क) घरमा बनाउने कोही छैन	१	
		(ख) लाज लागेर	२	
		(ग) कक्षामा खाने ठाऊ नभएर	३	
		(घ) अभिभावकले नभनेर	४	
		(ङ) घरको खाजा मिठो नभएर	५	
		च) पैसा ल्याउने भएर		
		छ) अन्य	९८	
४.८	सामान्यतया, खाजा खर्चका लागी तपाईं घरबाट कति पैसा ल्याउनुहुन्छ ?	रु.		
४.९	तपाईं विद्यालयमा तयारी खाजा (जड्क फुड) कतिको खानुहुन्छ ?	(क) दैनिकजसो	५	
		(ख) हप्ताको ४/५ दिन	४	
		(ग) हप्ताको २/३ दिन	३	
		(घ) हप्ताको १/२ दिन	२	

		(ड) विरलै/कहिलेकाही	१	
४.१०	तपाईंलाई विधालयमा खाजाको रूपमा जङ्क फुड खान मन लाग्छ ?	(क) लाग्छ	१	
		(ख) लाग्दैन	०	
४.११	के तपाईं कक्षाकोठामा साथीहरूसँग खाना तथा षोषणबारे कुराकानी गर्नुहुन्छ ?	(क) गर्छु	१	
		(ख) गर्दिन	०	
४.१२	तपाईं घरमा हरियो तरकारी कतिको खानुहुन्छ ?	(क) दैनिकजसो	५	
		(ख) हप्ताको ४/५ दिन	४	
		(ग) हप्ताको २/३ दिन	३	
		(घ) हप्ताको १/२ दिन	२	
		(ड) विरलै/कहिलेकाही	१	
४.१३	तपाईं घरमा फलफुल कतिको खानुहुन्छ ?	(क) दैनिकजसो	५	
		(ख) हप्ताको ४/५ दिन	४	
		(ग) हप्ताको ३/४ दिन	३	
		(घ) हप्ताको १/२ दिन	२	
		(ड) विरलै/कहिलेकाही	१	
४.१४	तपाईं घरमा माछामासु, दुधदही गेडागुडी कतिको खानुहुन्छ ?	(क) दैनिकजसो	५	
		(ख) हप्ताको ४/५ दिन	४	
		(ग) हप्ताको ३/४ दिन	३	
		(घ) हप्ताको १/२ दिन	२	
		(ड) विरलै/कहिलेकाही	१	
४.१५	तपाईं घरमा तयारी खाजा (जङ्क फुड) कतिको खानुहुन्छ ?	(क) दैनिकजसो	५	
		(ख) हप्ताको ४/५ दिन	४	
		(ग) हप्ताको ३/४ दिन	३	
		(घ) हप्ताको १/२ दिन	२	
		(ड) विरलै/कहिलेकाही	१	

५. शारीरिक मापन

५.१ जन्ममिति:

साल महिना गते

--	--	--	--	--	--	--	--	--	--	--	--

५.२ मापन गरिएको मिति:

साल महिना गते

२	०	७	८		०	१					
---	---	---	---	--	---	---	--	--	--	--	--

५.३ शरीरको उचाई (cm) :

--	--	--	--	--

५.४ शरीरको तौल (kg):

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धन्यवाद !

Appendix C: Survey Questionnaire for Teachers

1. Personal Detail

101. School's name:
 102. Teacher's Name:
 103. Sex:
 104. Age:
 105. Caste:
 106. Religion:
 107. Educational qualification:
 108. Specialization:

2. Professional Detail

201. Type of job:

- | | |
|-----------------------------|-------------------|
| a. Permanent | b. Contract |
| c. Special contract (Rahat) | d. Private source |

202. Present working post:

- | | |
|---------------------|-----------------|
| a. Higher Secondary | b. L. Secondary |
| c. Secondary | d. Primary |

203. Teaching experiences (since the beginning):

.....years

204. Working at this school (since the time):

.....years

205. Subjects to be taught in this school:

1. 2. 3.

206. Main subject to be taught in this school:

.....

207. Mention the grade that you have been teaching HPE subject in this school.

.....grade

208. How long you have been teaching this subject in this school?

.....years

3. Pedagogical Practices

301. Are you satisfied with your teaching job?

.....

302. Are you satisfied teaching HPE subject?
303. Do you think that you need to update nutrition related knowledge before you initiate nutrition pedagogy?
.....
304. Do you think you need some more interactive training sessions to enhance your skills on nutrition pedagogy?
.....
305. What methods you have been applying while teaching nutrition related contents in past years?
1. 2.
3. 4.
306. Are you interested to adopt context responsive (transformative) nutrition pedagogy in HPE class?
.....
307. For that, what challenges and opportunities you see at near future?
- | | |
|--------------------|-----------------------|
| <u>Challenges:</u> | <u>Opportunities:</u> |
| 1. | 1. |
| 2. | 2. |
| 3. | 3. |

308. Fill up the missing information of you

Lessons	Teaching Learning Materials		Teaching Learning Materials	
	Before	Now	Before	Now

Appendix-D: 24 Hour Food Recall Form (For Students)

Name of student:

Grade:

	Cereals	Beans and pulses	Animal products	Vegetables	Fruits/Salad
Breakfast					
Morning meals					
Day snack					
Evening meals					

Appendix-E: 24 Hour Food Recall Form (For Parents)

Name of Parent:

Address:

Name of Children:

Grade:

	Cereals	Beans and pulses	Animal products	Vegetables	Fruits/Salad
Breakfast					
Morning meals					
Day snack					
Evening meals					

Home visitation date:

Appendix-F: A Weeklong Midday Meal Consumption Logbook for Students

Name:

Date:

Grade:

Days	Snacks managed at school				NOT managed
	Homemade foods	Readymade Junk snacks	Canteen made foods	Shared with friends	
Sunday					
Monday					
Tuesday					
Wednesday					
Thursday					
Friday					

Appendix-G: FGD Guideline for Students

छलफलको विषय: बालबालिकाहरुको पोषण ब्यवहारमा रुपान्तरण

छलफलका लागी प्रश्नहरु

१. के तपाईंहरुले विद्यालयमा दिवा खाजा नियमित रुपमा खाईरहनु भएको छ ? खाजाको ब्यवस्थापन कसरी गरी रहनुभएको छ ? के के खाजा खाईरहनु भएको छ ? के तपाईंहरु यसबाट सन्तुष्ट हुनुहुन्छ ?
२. आजकाल तपाईंका साथीहरु टिफिन समय पछि घर जाने, बिरामी पर्ने अवस्थामा कतिको सुधार भएको छ ?
३. तपाईंहरुलाई टिफिन पछिको कक्षामा पढन कतिको जागर लाग्ने गर्दछ ? टिफिन अघि र पछिको कक्षामा पढ्दा केही फरक पाउनुभएको छ ?
४. तपाईंहरुको शिक्षकले सन्तुलित भोजन, स्वस्थकर खाना, पोषिलो दिवा खाजाबारे सिकाउनु हुन्छ ? पहिला र अहिलेमा केही भिन्नता महशुस गर्नुभएको छ ?
५. के तपाईंहरुको विद्यालयमा खाजा खाने ब्यवहारमा परिवर्तन आएको छ ? के यो ब्यवहारमा आएको परिवर्तनलाई निरन्तरता दिन सकिन्छ ?
६. तपाईंहरु आजकाल घरमा के के खाजा खानुहुन्छ ?

धन्यवाद !

Appendix-H: FGD Guideline for Teachers

छलफलको बिषय: बालबालिकाहरुको पोषण ब्यवहारमा रुपान्तरण

छलफलका लागी प्रश्नहरु

१. आजकाल तपाईंको विद्यालयका आधारभूत तहका विद्यार्थीहरुको दिवा खाजा सम्बन्धित ब्यवहारमा के कस्तो परिवर्तन आएको छ ? शिक्षकहरुको खाजा खाने ब्यवहारमा पनि केही परिवर्तन आएको छ, की ?
२. के यो अनुसन्धान पछि पनि विद्यार्थीहरुको पोषण ब्यवहारमा आएको परिवर्तन टिकाऊ हुन्छ त ? भावी दिनमा के कस्ता चुनौतीहरु देख्नुहुन्छ ?
३. दिवाखाजा ब्यवस्थापनले बालबालिकाहरुको अध्ययनमा केही सकारात्मक प्रभावहरु पारेको छ ? जस्तै टिफिन पछिको कक्षामा पढन उनीहरु कतिको जागर गर्दछन् ? टिफिन समय पछि कतिको बिरामी पर्दछन् ?
४. बालबालिकाहरुको पोषण ब्यवहारलाई के कुरा (पोषण ज्ञान, साथीभाईको प्रभाव, शिक्षको निर्देशन, घरपरिवार, विद्यालयको वातावरण, चमेना गृह, विद्यालयको नीति नियम) ले बढि प्रभाव पार्दो रहेछ ?
५. यो अनुसन्धानमा सहभागी हुनु अघि र पछि तपाईंले अपनाउनु भएको पोषण पेडागाजीमा केही भिन्नता आएको छ ? के के भिन्नता आएको छ ?
६. सहभागीतामुलक पोषण पेडागोजीको माध्यमद्वारा बालबालिको पोषण ब्यवहारमा परिवर्तन ल्याउन सकिन्छ, भन्ने कुरामा तपाईं कतिको विश्वास गर्नुहुन्छ ? सहभागीतामुलक पोषण पेडागोजीलाई बालबालिको पोषण ब्यवहारमा परिवर्तन ल्याउने प्रभावकारी माध्यमको रुपमा लिन सकिन्छ ?

धन्यवाद !

Appendix-I: FGD Guideline for Parents

छलफलको बिषय: बालबालिकाहरुको पोषण ब्यवहारमा रुपान्तरण

छलफलका लागी प्रश्नहरु

१. तपाईंको छोराछोरीले विद्यालय दिवा खाजाको प्रबन्ध कसरी गरीरहेका छन् ?
२. तपाईंको छोराछोरीको खाजा खाने बानी ब्यवहारमा केही परिवर्तन आएको महशुस गर्नु भएको छ ? जस्तै के के होला ?
३. तपाईंको बालबालिकाहरुले विद्यालयमा खाने खाजाको कुरा घरमा पनि गर्दछन् ? जस्तै ?
४. आजकाल तपाईंको छोराछोरीले कस्तो खालको खाजा खान मन पराउदछन् ? किन होला ?
५. के तपाईंले छोराछोरीलाई घरबाट खाजा बनाएर पठाउनु भएको छ ? छैन भने किन होला ?
६. विद्यालय दिवा खाजा ब्यवस्थापनमा तपाईंले विद्यालयलाई के कस्तो सहयोग गर्नु भएको छ ?

धन्यवाद !

Appendix-J: FGD Guideline for PAR Committee Members

छलफलको विषय: बालबालिकाहरुको पोषण ब्यवहारमा रुपान्तरण

छलफलका लागी प्रश्नहरु

१. तपाईंको विद्यालयमा संचालन भैरहेको दिवा खाजाको बारेमा केही बताउनुहोस् ।
 - दिवाखाजा ब्यवस्थापन कसरी भैरहेको छ ? आर्थिक सहयोग कसरी भैरहेको छ ? यसको दिगोपन (टिकाऊ) बारे के गर्दैहुनुहुन्छ ?
 - दिवाखाजा ब्यवस्थापनमा सहकार्य कसरी भैरहेको छ ?
 - बालबालिकाहरुको पोषण ब्यवहारमा कस्तो परिवर्तन आएको छ ?
 - शिक्षकको ब्यवहारमा कस्तो परिवर्तन आएको छ ?
 - अभिभावकको भूमिकामा कस्तो परिवर्तन आएको छ ?
 - दिवाखाजा ब्यवस्थापनको लागी स्थानीय सरकार र निकायसग कस्तो सहकार्य भएको छ ?
 - दिवाखाजा ब्यवस्थापनको दिगोपनका लागी केही नीतिगत प्रयासहरु पनि भएका छन की ?
 - दिवाखाजा ब्यवस्थापनको लागी थप भावी योजनाहरु के के छन् ?
२. के विद्यार्थीहरुले स्वस्थ र पोषिलो खाजा खाईरहेका छन् त ? सुधार गनुपर्ने कुराहरु केही छन् की ?
३. विद्यार्थीहरुको पोषण ब्यवहारलाई मुख्यतया के के कुराले प्रभाव पार्ने रहेछ ?
४. सहभागीतामुलक विद्यालय पोषण शिक्षा कार्यक्रमद्वारा बालबालिको पोषण ब्यवहारमा परिवर्तन ल्याउन सकिन्छ भन्ने कुरामा तपाईं कतिको विश्वस्त हुनुहुन्छ ? सहभागीतामुलक पोषण कार्यक्रमलाई बालबालिकाको पोषण ब्यवहारमा परिवर्तन ल्याउने प्रभावकारी माध्यमको रुपमा लिन सकिन्छ ?
५. बालबालिको पोषण ब्यवहारमा परिवर्तन ल्याउन आजका दिन सम्म के कस्ता चुनौतीहरुको सामना गर्नु पर्यो ?

धन्यवाद !

Appendix-K: FGD Guideline for School Meal Management Committee

छलफलको बिषय: बालबालिकाहरुको पोषण ब्यबहारमा रुपान्तरण

छलफलका लागि प्रश्नहरु

१. तपाईंको विद्यालयमा अध्ययनरत आधारभूत तहका विद्यार्थीहरुले दिवा खाजाको रुपमा के के खाईरहेका छन् ?
२. विद्यार्थीहरुको पोषण ब्यबहारमा केही परिवर्तन आएको महशुस गर्नुभएको छ ? के यो अनुसन्धान पछि पनि विद्यार्थीहरुको पोषण ब्यबहारमा आएको परिवर्तन दीर्घकालिन रुपमा टिकाऊ हुन्छ त ?
३. दिवाखाजा ब्यवस्थापनले बालबालिकाहरुको अध्ययनमा पनि केही सकारात्मक प्रभावहरु पारेका छन की ? जस्तै के हुन् ?
३. बालबालिकाको पोषण ब्यबहारमा परिवर्तन ल्याउन आजका दिन सम्म के कस्ता समस्या चुनौतीहरुको सामना गर्नु पर्यो ?
४. दिवाखाजा ब्यवस्थापनको लागि कसरी सहकार्य गर्नुभएको छ ? छोटकरीमा भनिदिनुहोस् ।
५. यसलाई भावी दिनमा निरन्तरता दिन के कस्ता चुनौतीहरु देख्नुहुन्छ ?

धन्यवाद !

Appendix-L: Total Days in Field Work During the PhD Project

S. N	Field engagement date	Days	Cumulative days	Days in a year
1	2018 June 10-16	7	7	18
2	2018 Oct. 28 to Nov 3	7	14	
3	2018 Dec 4-7	4	18	
4	2019 Jan 2-18	17	35	105
5	2019 Feb 17 to March 1	13	48	
6	2019 March 11-16	5	53	
7	2019 March 30 to April 7	9	62	
8	2019 April 27 to May 10	13	75	
9	2019 June 3 to July 5	31	106	
10	2019 Aug 24 to Sep 13	16	122	
11	2019 Nov 2 to 4	2	124	
12	2019 Nov 21 to 30	9	133	
13	2019 Dec 30 to Jan 7	8	141	
14	2020 June 15	1	142 (Virtual)	
15	2020 July 18	1	143 (Virtual)	
16.	2020 Sep. 6-11	6	149 (Virtual)	36
17	2021 Jan 25 to Feb 6	12	161	
18	2021 March 6-13	8	169	
19	2021 April 8-16	9	178	
20	2021 April 25-28	4	182	
21	2021, Dec 19 th to 2 nd Jan 2022	15	197	15
22	2022, March	9	206	
23	2022, June	4	210	33
24	2023 Jan-Feb	6	216	
25	2023 Feb-March	10	226	
26	2023 June	7	233	
27	2023 July	8	241	
28	2023 October	2	243	

Appendix M: Expected Timeline of the Study

Needs assessment phase	Planning phase	Intervention phase	Evaluation phase
Year 1 st (1 st semester)	Year 1 st (2 nd semester)	Year 2 nd	Year 3 rd
<ul style="list-style-type: none"> • Selection of the schools • Conduct needs assessment study • Examine day to day practices of the school • Arrange formal/informal meetings with stakeholders • Arrange dialogue conference • Explore the needs 	<ul style="list-style-type: none"> • Prioritize the needs: Negotiation with the School community • Develop intervention activities • Map out interventional action plan 	<ul style="list-style-type: none"> • Implementation of sensitization and motivation session (3 months) • Teachers' capacity development for nutrition education • Implementation of classroom-based nutrition education sessions (6 months) • Implementation of supportive school environment (6 months) 	<ul style="list-style-type: none"> • Evaluate school-based nutrition interventions in the action school • Replicate nutrition education sessions in the reference schools.
Documentation	Documentation	Documentation	Documentation

Note. Due to Covid-19 pandemic, the timeline was extended until year 4th year

Appendix N: Ethical Approval Letter



Government of Nepal
Nepal Health Research Council (NHRC)
 Estd. 1991



Ref. No.: 1960

Date: 18 January 2019

Dr. Bhimsen Devkota
 Principal Investigator
 Tribhuvan University
 Kathmandu

Ref: **Approval of research proposal** entitled **Assessment of personal transformation on water, hygiene and sanitation, nutrition, life skills and student learning in Chitwan and Kavre Districts of Nepal**

Dear Dr. Devkota,

It is my pleasure to inform you that the above-mentioned proposal submitted on **22 November 2018** (Reg. no. 733/2018) please use this Reg. No. during further correspondence) has been approved by Nepal Health Research Council (NHRC) Ethical Review Board on **16 January 2019**.

As per NHRC rules and regulations, the investigator has to strictly follow the protocol stipulated in the proposal. Any change in objective(s), problem statement, research question or hypothesis, methodology, implementation procedure, data management and budget that may be necessary in course of the implementation of the research proposal can only be made so and implemented after prior approval from this council. Thus, it is compulsory to submit the detail of such changes intended or desired with justification prior to actual change in the protocol. Expiration date of this proposal is **March 2020**.

If the researcher requires transfer of the bio samples to other countries, the investigator should apply to the NHRC for the permission. The researchers will not be allowed to ship any raw/crude human biomaterial outside the country; only extracted and amplified samples can be taken to labs outside of Nepal for further study, as per the protocol submitted and approved by the NHRC. The remaining samples of the lab should be destroyed as per standard operating procedure, the process documented, and the NHRC informed.

Further, the researchers are directed to strictly abide by the National Ethical Guidelines published by NHRC during the implementation of their project proposal and **submit progress report in between and full or summary report upon completion**.

As per your research proposal, the total research amount is **NRs 20,32,800** and accordingly the processing fee amounts to **NRs 60,984**. It is acknowledged that the above-mentioned processing fee has been received at NHRC.

If you have any questions, please contact the Ethical Review M & E Section at NHRC.

Thanking you,

Prof. Dr. Anjani Kumar Jha
 Executive Chairperson

Appendix O: Information Statement Letter and Consent Form for the School

To

The Headteacher

.....School

Khairahani, Chitwan

Subject: Information Statement and Consent for the Study

Dear Sir

I, Yadu Ram Upreti, PhD student, on behalf of the NORHED, Rupantaran, TU, am involving in the participatory action research entitled ‘*Transforming nutritional behaviors of basic schoolchildren through school-based participatory nutrition education*’ in your school. I am glad to let you know that your school has been selected for the study purpose. Since this is a participatory action research, it needs long term filed engagement in your school together with you, your teachers, students, parents, SMC, PTA, local farmers, and the community people. You and your team will participate in this study from needs assessment to the outcome evaluation, which might take around three years. Thus, I would like to request you to participate to this study and let your team be involved. The outlines below clarify the about the procedure with potential benefits and risks of the study.

Study Procedure

If you agree to conduct this study in your school, you and your team will participate in the interview, focus groups, informal conversation, home visitation and parental interaction, active participation in the intervention activities, along with involving in the active classroom teaching and learning activities, extracurricular activities, school feeding program, health, sanitation, and hygiene related activities with your teachers in the classroom.

Right to Participate in the Study

You and your team have the full right to participate or withdraw from the study at any time. You and your team will not be forced to get involved in the study. Once you feel the overburden to your school, you and your team can withdraw from the study at any time.

Potential Risks of the Study

No potential risks and harm at all to you, your team and school from this study. This study creates no conflict of interest to conduct the research and publish the papers. But You and your team may have to contribute your extra time along with your daily jobs in the school.

Potential Benefits of the Study

If your teachers participate in this study, the study will help them to improve teaching and learning activities in the classroom. It will empower them to contextualize classroom teaching and learning activities. They will have an opportunity for the teachers' professional development. Besides, I believe that along with students' nutritional behaviors, you and your team will have an opportunity to improve your dietary behaviors since they will work with students as role models to them.

Confidentiality

The results of this study will be kept confidential. The information provided will only be used for the purposes of this study. To keep the identity confidential, the personal identity will be anonymized. The information will not be shared with your name attached to else one.

After reading above information, I and my team, on behalf of my school, are ready to participate to this study.

.....

Signature

.....

Seal of the School

.....

Date

Appendix P: Informed Consent Form for Teachers

Namaste!

I, Yadu Ram Upreti, PhD student, on behalf of the NORHED, Rupantaran, TU, am involving in the participatory action research entitled ‘*Transforming nutritional behaviors of basic schoolchildren through school-based participatory nutrition education*’ in the school where you work. I am glad to let you know that you will be participating to this study as the research participants as well as the co-researchers, where you will be participated to this study from needs assessment to the outcome evaluation. Thus, I would like to request you to ensure your permission to participate to this study. The outlines below clarify the about the procedure with potential benefits and risks of the study.

Study Procedure

If you agree to become a part of the study, you will participate in the interview, group groups, informal conversation, home visitation and parental interaction, active participation in the intervention activities, along with involving in the active classroom teaching and learning activities, extracurricular activities, school feeding program, health, sanitation, and hygiene related activities in your school.

Right to Participate in the Study

You have the full right to participate or withdraw from the study at any time. You will not be forced to get involved in the study. Once you feel the overburden to you, if you can withdraw from the study at any time.

Potential Risks of the Study

No potential risks and harms at all to you from this study. This study creates no conflict of interest to conduct the research and publish the papers. But you may have to contribute your extra time along with your daily jobs in the school.

Potential Benefits of the Study

If you participate in this study, the study will help you to improve your teaching learning activities in the classroom. It will empower you to contextualize classroom teaching and learning activities. You will have an opportunity for the teachers’ professional development. Besides, I believe that along with students’ nutritional behaviors, you will have too an opportunity to improve your dietary behaviors since you will work with students as the role models to them.

Confidentiality

The results of this study will be kept confidential. The information provided by you will only be used for the purposes of this study. To keep your identity confidential, your personal identity will be anonymized. The information you will give us will not be shared with your name attached.

Signatory Sheet for Teachers

I have read the information sheet concerning the study and understand what it is about. I understand that I am free to request further information at any stage. I believe that my participation in this study will be entirely voluntary. I am free to withdraw my participation. I understand that the research data [(audio tapes and transcript) will be retained in secure storage, and that all personal information (names and consent forms) will be destroyed at the end of the study. I understand that the results of the study may be published but my anonymity will be preserved. I give consent for taking part in this study.

.....

Signature

.....

Date

Appendix Q: Informed Consent Form for Parents

Namaste!

I, Yadu Ram Upreti, PhD student, on behalf of Rupantaran (NORHED), am involving in the participatory action research entitled ‘*Transforming nutritional behaviors of basic schoolchildren through school-based participatory nutrition education*’ in the school where your child study. I would like to request you to give me permission to participate your child to this study. The outlines below clarify the about the procedure of the study with potential benefits and risks of the study.

Study Procedure

If you allow your child to participate in the study, he/she will participate in group discussion and activities with other children and be asked some questions in a group about school learning environment, classroom activities, extracurricular activities, school meal behaviors, health, sanitation, and hygiene.

Right to Participate in the Study

You have the right to allow or stop or withdraw your child from participating in the study at any time.

Potential Risks of the Study

No risks and harm to your child will result from the study. Your child may experience some anxiety or discomfort while being interviewed/engaged in a group discussion.

Potential Benefits of the Study

If you allow your child to take part in this study, he/she will help researchers to improve the learning environment of school and wellbeing of school age children in your community in future. There will be no payment to your child for participating in this study.

Confidentiality

The results will be kept confidential. Only the people working on the study will see personal information about your child. The information provided by your child will only be used for the purposes of this study.

Signatory Sheet for Parents/Guardian

I have read the information sheet concerning the study and understand what it is about. I have also read a copy of my child's information sheet and consent form. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I believe that my child's participation in the study is entirely voluntary. I am free to withdraw my child from the study at any time without any disadvantage to my child.

I understand that the research data on my child [(audio tapes and transcript) will be retained in secure storage, and that all personal information (names and consent forms) will be destroyed at the end of the study. I believe that my child will be part of a group discussion and activities with other children as well as survey interview. I understand that the results of the study may be published but my anonymity and my child's anonymity will be preserved.

I give consent for my child to take part in this study.

.....

Signature of parent/guardian

Date:

Thumbprint

Appendix R: Likelihood of Junk Food Consumption in Schoolchildren

Socio-ecological theory	Category	Adjusted OR	95% CI	
			Lower	Upper
Micro (interpersonal) system	Sex			
	Male	1		
	Female	1.073	0.521	2.209
	Age			
	12 years and below	1		
	12 years and above	1.294	0.551	3.038
	Food and nutrition knowledge			
	Low knowledge (Ref)	1		
	High knowledge	0.352*	0.132	0.936
	Attitudes towards healthy eating			
	Positive	1		
	Negative	0.909	0.432	1.912
	Educational outcomes at last year's exam			
	Above average	1		
Average and below	1.500	0.700	3.213	
Meso (interpersonal) system	Type of family			
	Joint family	1		
	Single	1.444	0.715	2.918
	Sharing food and nutrition knowledge with classmates			
	Yes	1		
	Neutral (Not applicable)	1.175	0.459	3.005
	No	15.198*	1.528	151.119
	Sharing food and nutrition knowledge with teachers			
	Yes	1		
	Neutral (Not applicable)	0.643	0.233	1.77
No	0.827	0.201	3.405	
Exo (organisational) system	Type of home			
	Traditional	1		
	Modern	0.857	0.399	1.842
	Mode of travel to school			
	Walking	1		
	Cycle/bus	1.105	0.530	2.305
	Canteen available in the school			
	No	1		
	Yes	2.013	0.601	6.745
	Being a member of school clubs			
	No	1		
	Yes	1.149	0.578	2.284
Study grades/level				
4-5 (9-10 years)	1			
6-8 (11-13 years)	1.269	0.507	31.77	

Macro (socio-cultural) system	Caste/Ethnicity			
	Dalit	1		
	Janaajati	1.044	0.411	2.655
	Upper caste	1.117	0.387	3.223
	Religion			
	Buddhism	1		
	Hindu	1.454	0.501	4.223
	Christian	1.218	0.273	5.425
	Mother's occupation			
	Agriculture	1		
	Labor/daily wages	2.318	0.780	6.892
	Service, business and housewife	1.098	0.443	2.722
	Father's occupation			
	Agriculture	1		
	Daily wages/labor	1.333	0.517	3.435
	Service, business and others	1.134	0.533	2.556
	Constant	0.303		
	2 Log likelihood	220.964		
	Cox & Snell R Square	0.163		

Note: *Significant $p < 0.05$; CI = Confidence Interval

Appendix S: Contextualized Nutrition Education Curriculum for Basic School

Nutrition education contents	Grades	Expected teaching methods	Sessions	Time
Daily eating foods, Raw edible foods, Foods available at locality, Healthy and nutritious foods, Safe and fresh foods, Healthy ways of eating, Water for life, Source of food, Vegetables and fruits Effects of junk foods	Grade 1-3	Story telling Rhyming (poem and song) Direct experiential learning Parental interaction Demonstration Puzzle and game play Art and drawing Audio-visual learning Work-sheet activities Question-answer	18 (6 sessions for each class)	One trimest er
Food as a fuel of body Useful nutrients Basic food groups Fruits and vegetables Use of balanced diet Kitchen-garden and nutrition Effects of malnutrition Effects of junk foods	Grade 4-5	Story telling Rhyming (poem and song) Direct experiential learning Parental interaction Demonstration and explanation Puzzle and game play Project work Art and drawing Dramatization (role play) Work-sheet activities Audio-visual learning Group work Question-answer Brainstorming (Think, pair and share)	18 (9 sessions for each class)	
Food as a fuel of body Foods' classification Types of nutrients Balanced diet Adolescents' nutrition Kitchen-garden and nutrition Effects of junk foods Self-appraisal of nutritional status Healthy snacks at school Nutrients preservation Malnutrition and its effects	Grade 6-8	Direct experiential learning Interaction with experts Demonstration and explanation Power-point presentation Nutrition game play Dramatization (role play) Project work Work-sheet activities Audio-visual learning Field visitation and report writing Group work and presentation Question-answer and discussion Brainstorming (Think, pair and share) Goal setting and commitment	27 (9 sessions for each class)	One trimest er

Appendix T: School Health and Nutrition Committee

विद्यालय स्वास्थ्य तथा पोषण समिति -२०७८

कार्यसमितिका पदाधिकारीहरूको नामावली

१. अध्यक्ष:	श्री रोहिणी प्रसाद उप्रेती, विद्यालय व्यवस्थापन समिति अध्यक्ष
२. सदस्य	श्री रुद्र प्रसाद सुबेदी, नगर स्वास्थ्य शाखा प्रतिनिधि
३. सदस्य	श्री आरती पौडेल (सुबेदी), नगर शिक्षा शाखा प्रतिनिधि
४. सदस्य	श्री निर्मल घिमिरे, चैनपुर स्वास्थ्य चौकी इन्चार्ज
५. सदस्य	श्री कृपादेवी अधिकारी, खैरहनी न.पा.-२ वडा सदस्य
६. सदस्य	श्री प्रताप ढुङ्गाना, शिक्षक प्रतिनिधि
७. सदस्य	श्री उमा खड्का अधिकारी, विद्यालय व्यवस्थापन समिति सदस्य
८. सदस्य	श्री कृष्ण बहादुर अधिकारी, विद्यालय करेसावारी समिति प्रतिनिधि
९. सदस्य	श्री अर्जुन कुमार सापकोटा, स्थानीय उधमशील नमूना कृषक
१०. सदस्य	श्री सुभद्रा भण्डारी, विद्यालय दिवा खाजा व्यवस्थापन समिति संयोजक
११. सदस्य सचिव	श्री गोपाल प्रसाद शर्मा, विद्यालय प्र.अ.

द्रष्टव्यः यस समितिको काम, कर्तव्यहरू तथा जिम्मेवारी देहायबमोजिम रहने छ ।

- विद्यालय स्वास्थ्य तथा पोषण सम्बन्धित नीति, नियम तथा कार्यविधि बनाउने र कार्यन्वयन गराउने,
- विद्यालयमा सञ्चालित दिवा खाजा कार्यक्रमको वार्षिक बजेट कार्यक्रम तथा कार्ययोजना निर्माण गर्ने र सो अनुरूप कार्यन्वयन गराउने,
- विद्यालय दिवा खाजा कार्यक्रमको अभिलेख राख्ने र राख्न लगाउने,
- स्थानिय कृषक, उधमशील उत्पादक, टोल सुधार समिति र आमा समुहसँग समन्वय गरी स्थानिय उत्पादकलाई दिवा खाजा कार्यक्रमसँग जोड्ने,
- विद्यालय दिवा खाजा व्यवस्थापनमा देखा परेका समस्याहरूलाई पहिचान गरी समयमै समाधानको उपायहरूको खोजी गर्ने,
- विद्यालय स्वास्थ्य तथा पोषण कार्यक्रमलाई संचालनमा ल्याउनकालागी स्थानिय निकाय र संघ संस्थाहरूसँग सहकार्य गर्ने, आदी ।

Appendix U: School Midday Meal Management and Supervision Committee

विद्यालय दिवा खाजा व्यवस्थापन तथा सुपरिवेक्षण समिति -२०७८

संरक्षक:	श्री गोपाल प्रसाद शर्मा, विद्यालय प्र. अ.
सल्लाहाकारहरु:	श्री हरि प्रसाद अधिकारी, विद्यालय स.प्र. अ. श्री रामहरि खकुराल, विद्यालय स.प्र. अ. श्री प्रताप दुङ्गना, शिक्षक प्रतिनिधि

कार्यसमितिका पदाधिकारीहरुको नामावली

१. संयोजक:	श्री सुभद्रा भण्डारी
२. सदस्य	श्री अमृत अधिकारी
३. सदस्य	श्री परमानन्द भा
४. सदस्य	श्री लक्ष्मी शर्मा
५. सदस्य	श्री अनिता अधिकारी
६. सदस्य	श्री देवी शर्मा
७. सदस्य	श्री हिरा तामाङ
८. सदस्य	श्री मिना तामाङ
९. सदस्य	श्री सरस्वती लामिछाने
१०. सदस्य	श्री सुमित्रा लौडारी

द्रष्टव्य: यस समितिको काम, कर्तव्यहरु तथा जिम्मेवारी देहायबमोजिम रहने छ :

- विद्यालयमा सञ्चालित दिवा खाजा कार्यक्रमलाई विद्यालय खुलेको दिन कार्यन्वयन गराउने,
- विद्यालय दिवा खाजा कार्यक्रमको अभिलेख राख्ने,
- विद्यालय दिवा खाजा मेनु तयार गर्ने र लागु गराउने,
- स्थानिय उत्पादकलाई दिवा खाजा कार्यक्रमसँग जोड्ने,
- विद्यालय दिवा खाजाको गुणस्तर परिक्षण गर्ने र सधारको लागी सिफारिस गर्ने,
- संघ, प्रदेश, स्थानिय निकाय, विभिन्न संघ सस्था एवम समुदायबाट अबलोकन तथा अनुगमनका लागी आएका ब्यतिहरुको सुझाव संकलनका लागी लग बुक राख्ने
- विद्यालय दिवा खाजा व्यवस्थापनमा देखा परेका समस्याहरुलाई पहिचान गरी समाधानको लागी विद्यालय स्वास्थ्य तथा पोषणलाई अनुरोध गर्ने
- विद्यालय स्वास्थ्य तथा पोषण कार्यक्रमलाई संचालनमा ल्याउनकालागी स्थानिय निकाय र संघ संस्थाहरूसँग सहकार्य गर्ने, आदी ।

Appendix V: School Nutrition Wall Magazine Publication Team

विद्यालय पोषण भित्तिपत्रिका सम्पादन समिति

सल्लाहाकारहरु : श्री गोपाल प्रसाद शर्मा, विद्यालय प्र.अ.
श्री रोहिणी प्रसाद उप्रेती, विद्यालय व्यवस्थापन समिति अध्यक्ष
श्री यदुराम उप्रेती, त्रिभुवन विश्वविद्यालय, रुपान्तरण परियोजना

सम्पादन मण्डल:

१. प्रधान सम्पादक :	श्री देवी थापामगर
२. सम्पादक	श्री कृष्णराज बरुवाल
३. सम्पादक	श्री मिना तामाङ
४. सदस्य	श्री अनु गुरुङ
५. सदस्य	श्री प्रकृति अर्याल
६. सदस्य	श्री पवन अर्याल
७. सदस्य	श्री स्मृति श्रेष्ठ

विद्यालय पोषण भित्तिपत्रिकाका अंगहरु

- सम्पादकिय
- पोषण गित, कविता र चुटुका
- पोषण कथा एवम् रूपक
- पोषण चित्र तथा पोष्टरहरु
- पोषण सामान्य ज्ञान
- रेसिपी
- मेरो पोषण कथा/अनुभव
- बहुगुणी तरकारी, फल, अन्न, जडिबुटी
- तथ्यपरक एवम् मौलिक लेख तथा रचना
- कट पिस
- पोषण विषेश भाग
- पोषण सन्देश तथा बाणी

द्रष्टव्य: यस समितिको काम, कर्तव्यहरु तथा जिम्मेवारी देहायबमोजिम रहने छ :

- प्रकाशनको सम्पूर्ण अधिकार सम्पादन मण्डललाई हुनेछ ।
- सल्लाहाकारबाट आवश्यक सल्लाह र सुझाव लिनु पर्नेछ ।
- लेख तथा रचनाहरुको संकलनको लागी अग्रिम सुचना दिनुपर्नेछ,
- भित्तिपत्रिका हरेक महिनाको पहिलो हप्ता प्रकाशन गर्नुपर्नेछ ।
- पत्रिका प्रकाशनको तयारी अधिल्लो महिनाको दोस्रो हप्ताबाट नै प्रारम्भ गर्नुपर्नेछ ।



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Transforming Nutritional Behaviors in Schoolchildren Through a School-Based Participatory Nutrition Education Intervention Yadu Ram Upreti A Dissertation for the Degree of Doctor of Philosophy (PhD) in Health Education Submitted to

Graduate School of Education Faculty of Education Tribhuvan University Kirtipur, Kathmandu

November 2023 i Abstract An abstract of the dissertation prepared by Yadu Ram Upreti for the Degree of Doctor of Philosophy (PhD) in Health Education in November 2023 with the title 'Transforming Nutritional Behaviors in Schoolchildren through a School-Based Participatory Nutrition Education Intervention' is approved by: Prof. Bhimsen Devkota, PhD (Supervisor) This study showcases the results of a participatory action research (PAR) in transforming nutritional behaviors in basic level schoolchildren through school-based nutrition education intervention (SBNEI) in a public school in Chitwan district of Nepal. Mixed-methods participatory intervention research design was contextualized to pursue in the realm of participatory and/or social justice-based research framework. The needs assessment study—the beginning stage of the (participatory) action research, identified multilevel factors extending from individual to the environment, which influenced the nutritional behaviors of children. Therefore, SBNEI was conceptualized