

Association between components of food literacy and demographic characters among young students



A cross-sectional study in assessing food literacy status in rural and urban schools of Nepal

Aalborg University, Copenhagen

Submission date: July 1, 2016

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Title page

Title: - Association between food literacy components and demographic characters among young students

Subtitle: - A cross-sectional study in measuring food literacy among students in rural and urban schools of Nepal

4th Semester, MSC. Integrated food studies

The faculty of engineering and science

School of Architecture, Design and Planning (SADP) Aalborg University, Campus Copenhagen

Assignment type: - Extended master thesis, 45 ECTS

Submitted in fulfillment of the requirements for the Master degree of “Integrated Food Studies” (IFS)

Date of submission: - 1st July 2016

Supervisor: - Bent Egberg Mikkelsen (Department of clinical medicine)

Number of pages: - 138

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Abstract

The aim of the study is to examine association between food literacy components and demographic variables among school children in urban and rural schools of Nepal. The study participants were randomly selected from six different schools in total from Kathmandu and Chitwan. Web-based survey was conducted through social media and personal emails. Equal number of boys (72) and girls (72) were approached for participation. 99% of the total approached participants responded. In addition, semi-structured interviews were also conducted to investigate perceived behavior of the participants about components of food literacy. The study uncover that there is a contextual (location of residence) and gender differences in cooking skills, prioritization of nutrition while buying foods, interest in gardening and attention to food labels on food packages. Specifically, girls and students from Chitwan are better off with food literacy components than their counterparts' boys and Kathmandu respectively. Since, the study showed participants showing interest in gardening are involved in frequent field visits, have better cooking skills and tend to prioritize nutrition over other components while buying foods. This could imply that school garden could act as an ideal solution in enhancing food literacy knowledge.

Key words: food literacy, School garden, rational choice, food chain, demography, sustainability

ACKNOWLEDGEMENTS

We would like to gratefully acknowledge all those who assisted and supported us in the process of completing our research study.

Firstly, we are truly grateful to Mr. Bent Egberg Mikkelsen for his constant support and guidance along the way; we are incredibly thankful for his time and knowledge. It is an honor to work with him as he made us learn great things and help us boost confidence in and believe in the work that we do. A special thanks to Mr. Frantisek Sudzina for his assistance in statistical part of our thesis.

To the school of architecture, design and planning at Aalborg University, for being flexible, co-operative with students individually and understanding the difficulties and obstacles of foreign students and acting accordingly. Especially to Jette Neilsen for being so co-operative and friendly in assisting to overcome all sorts of personal and academic problems we faced throughout the degree period.

To our family for their unwavering support, encouragement and patience without which, we could not have completed this work. Thank you for believing in us and allowing us to pursue our dreams. Words simply cannot express our gratitude to you for your support and encouragement.

And, last but not least a special thanks to the Principals, class teachers, students and the School management committee of *Prashanti Sikshya Sadan Kathmandu*, *Puspapal higher secondary school, Kathmandu*, and *Tri-joyti higher secondary school, Kathmandu*. Similarly *Laxmi higher secondary school, Sunrise English boarding school and Holy vision public school* of Chitwan for their time, co-operation and support in the process of research. We owe you all a big time. We will cherish all the memories and laughs we shared while in Nepal.

Thank you

Buddhi Prasad Poudel and Manoj Sapkota

Acronyms

BMI- Body Mass Index

CBOS- Center Bureau of Statistics

FAO- Food and Agriculture Organization

GLM-General Linear Model

IFS- Integrated Food Studies

MOF- Ministry of Food and agriculture

MOE- Ministry of Education

NDHS- Nepal Demographic and Health Survey

NPC- National Planning Commission

PSS- Prashanti Sikshya Sadan

SCT- Social Cognitive Theory

SEM- Social Ecological Model

UNCT- United Nation Country Team

UNICEF- United Nations Children's Emergency Fund

WHO- World Health Organization

Chapter 1

Introduction

Obesity and overweight in childhood have been increasing rapidly in recent years. An estimated 42 million under 5-year-old children were overweight worldwide in 2014. More than 18 million Asian children aged less than 5 years were overweight in the year 2013, and they are prone to non-communicable lifestyle diseases like diabetes, coronary heart attack and hypertension (WHO, 2014). Similarly, under nutrition worldwide has attributed to early death for large number of children due to deficient of various micronutrients. Currently, over two billion people suffer from micronutrient deficiencies, in particular vitamin A, iodine, iron and zinc (FAO, 2014).

Food is defined as a material; produced by plant or animal consists of essential nutrients such as fats, proteins, carbohydrate, vitamins and minerals to produce energy for growth and development (Eruvbetine, 2009). However, food nowadays is not merely source of energy it is considered as a mean of social interaction and a way to enhance personal relation; and also considered as an essential part of social norms and values (Counihan, Van Esterik, 2013). Excessive consumption of energy dense foods is associated with physical, mental and social health imbalance, which impairs with quality of life (Pérez-Cueto et al. 2010). Foods at the moment, are found in the supermarket, street and in the restaurant rather than directly from farm, which is making current generation unaware of global food chain and its impact on sustainable development (McGrath, Diaz. 2010)

Globally, the food system and the relationship of the individual to food system continue to change and are growing into complexity day by day as a result of increased industrialization and globalization. The distance that food travels from producer to consumers has increased (Vidgen, 2014). Consistency in diet is difficult to achieve as food and eating are part of everyday life and are challenged by numerous factors surrounding food such as availability and accessibility at individual, household, community and national level (Ghimire 2014).

In a recent research by (Dyg et al, 2014) the integrated approach to food literacy is given priority with the practical approach of introducing it at school level where it could be integrated and could make some significant change in behavior. Before that many research studies overlooked it as a theoretical approach and have ignored the practical aspect of food literacy and how it can be used in our daily life. A trend can be seen in recent times where few research have been done in food literacy focusing on young adult population despite knowing that they do have poor knowledge of food and have unhealthy dietary habits (Colatruglio, 2015).

Since, food literacy is food related competencies, which can be achieved by continuous practice in daily life; it needs an inclusive way to learn and develop skills related to it. Food literacy is a holistic approach to strengthen individual competency on food and its relation to health, community and sustainable development. An ideal model could be the integration of this approach into the education system as a school garden, where the learning process is integrated with gardening (Dyg et al. 2014). The focus on school as a point of intervention for promoting healthy and sustainable food habits can be a shift of focus nowadays. The integrated approach of food literacy involves farm and school in order to educate and promote a sustainable and healthy eating environment. This enhances knowledge needed for healthy lifestyle among school children (Ratcliffe et al. 2011). Food literacy is not just providing knowledge on food system but also developing school children's' values, skills, and competencies to make a rational decision that are environmentally, economically and socially sustainable. Food literacy needs to be understood and developed as an essential life skill through which an individual can make his/her own choice of food (Dyg et al. 2014) (Vidgen 2014) (Mikkelsen et al. 2005).

1.1 Problem statement

How food literacy is associated with different demographic indicators among young Nepalese students? Does understanding of food literacy differ between students from rural and urban schools of Nepal? Does school garden serves as an ideal solution in enhancing food literacy from early childhood?

In order to answer the problem statement following **sub-questions** has been formulated.

- What are the factors that influence the food choices among Nepalese youth?
- Does farm activity affect the understanding of food literacy? Do hands on activities enhance food literacy among school children?
- Does food literacy enhance knowledge in making rational food choice considering health and environment among students from rural and urban area schools of Nepal?

1.2 Pre assumptions (hypothesis)

- There is a difference in food literacy components between students from Kathmandu (Urban area) and Chitwan (Rural area).
- There is a rural-urban difference on paying attention to food and nutrition labeling on food packages.
- Boys and girls differ in components of food literacy and nutritional labeling on food packages.

1.3 Research problem

Being new research area food literacy may have many unfolded issues to investigate in the future; as food literacy is recently defined by various researchers. Though, in the future it will be followed with redefined and refined definition from upcoming researchers. Since it is related with the everyday practicalities it is utmost important to make food literacy easily understandable in all aged population group. Food literacy is nowadays getting

priority as a key food related policy; some initiation has been already taken in western world by giving main concern to food literacy while making policy to improve nutrition by integrating it in to food based intervention (Vidgen, 2014, Dyg, 2014). A risk can now be observed in general understanding of food literacy as it is sometime only perceived as cooking skills instead of the knowledge and skills needed to make rational choice considering health and sustainability; therefore it can be undermined by policy makers in prioritizing food literacy as food policy.

The world today is at a stage of unprecedented diet-related diseases such as overweight, obesity, hypertension and other non-communicable diseases as a result of consumption of high-fat/cholesterol and high-energy food due to poor food choice; it is possible to change the situation by making rational food choice (Shihabuddin, 2016). Global merchandising has played a huge role on individual's choice to food through advertisement, and branding. People have less time to prepare their meal as processed, precooked and packed food are considered as a convenient food items and have no time to think about food origin and what is a rational food choice. So focus for the new research should be finding a convincing way in making people aware of what they are consuming and how it is related with their health, surrounding environment and sustainability. Similarly, upcoming research should also focus on suggesting a child-centered intervention from the early school age.

1.4 The study rationale and purpose of study

The complexity around food is so vast that a lot of people lack the knowledge, skills, attitudes and understanding the values surrounding food environment. Researchers are exploring the best possible and effective ways to promoting healthy eating, although there is no a quick fix formula to it. The effect of practices around food and surrounding goes beyond healthy lifestyle and a well being of a person. The term "food literacy" has been emerge as a possible missing piece which provide people with knowledge, skills, attitudes and values related to food although the explanation varies from (Vidgen, 2014) define food literacy as a collection of knowledge, skills and behaviors require to plan, decide, manage prepare food at different level. Dyg and colleagues (2014) define food literacy as a skill that is developed from childhood as an attachment to nature, and other daily practices, which

could be enabled through the environment to behavior through a life experience. Those definition are more comprehensive in scope and therefore served as an important lens when developing this study and analyzing the research data. Food literacy is increasingly being used in policy and practice without a common understanding of what it is and how it could relate to health and wellbeing. There are other cases of food literacy studies, which focus on the qualitative aspect of behavior and explain them in the contextual term. No survey has ever been made to show the relationship between food literacy and the behavior of an individual in Nepal. This study will particularly focus on both aspects of research: explanatory and more direct study to find out the factors affecting food literacy in general.

In Nepal, no studies related to food literacy studies have ever been performed till date, therefore this thesis could help to fill the gap by explaining the existing situation of Nepal through qualitative and quantitative method such as interview and survey along with review of scientific literatures. The theoretical and practical foundation of this research could be a milestone in developing practical recommendation. It will also add a new dimension of food literacy, which has not been explored in Nepalese context.

As described in the “literature review” and “state of art” section that food literacy through school garden is a valuable idea to enhance healthy food choice among school children. The concept however, is new in Nepal and limited research has been done till the date. The study is motivated to provide baseline information for further research in relation to the area of food literacy and school garden in context of Nepal. Furthermore, the purpose of this mix study (qualitative and quantitative) is to explore the factors affecting food literacy in two different context in Nepal with the help of existing knowledge through literature review and answers from the study, following aims and objective section briefly specify the purpose of the study.

1.5 Food literacy

“Food is a basic necessity of life for the development and survival, human can experience food as pleasure, joy, happiness and satisfaction and at the same time, food can be a problem or can even be seen as a risk” (Colatruglio, 2015). Food literacy is the understanding of how is food grown, how they are placed in market, what is the science behind production and distribution as well as how food choice impacts health and environment. Food literacy is about learning to cook and prepare healthy and nutritious meals. It also emphasizes on buying locally, which is better choice not only because the imported food are viewed unhealthy but also are considered unsafe to consume as they treated with chemicals. Choosing local products support our own community and hence enhance the local economy, which inspires farmers to be motivated towards farming (Colatruglio, 2015). Food literacy is also considered as a tool for solving other educational problems like mathematics and science. Children with food literacy are more likely to practice healthier lifestyle and go on to be healthier adult because of the essential knowledge, skill, motivations which enable them to practice healthier life style. “Food is more than feeding but fueling their mind, which includes the social and the cultural aspect surrounding food” (Mikkelsen et al. 2005).

The Canadian conference board (2013) characterizes food literacy as individual’s knowledge, skill and attitude towards food and food products. In a broader sense, food literacy is connected as an overall handling of food in a household level from perception, assessment to risk management. A different perspective has also been included in food literacy, which focuses in making individual capable to understand the label and information written on the food packets (Woodruff, Kirby, 2013).

To enhance knowledge and skill of food literacy school gardening could be a milestone. School garden reflect the diversity in community on its own by the help of variety of plants grown in a small piece of land (Dyg, 2014). An outdoor school garden gives student hands-on opportunity to plant, practice and watch the whole plant cycle. Teaching math, arts, science, social and physical education could be integrated into it. Researches also indicated

that school food garden contributes to increased student academic achievement, engagement and self-confidence (Dyg, 2014).

1.6 School garden

School gardens basically are cultivated areas around or near to school, which can be used mainly for learning purposes but could also grow some food and generate income for the school (FAO, 2010). School Garden activities usually refer to horticultural practice and it may include small-scale animal farming and fishery, beekeeping, fruit production, ornamental plants as well as small-scale staple food production. Such practices are gaining prominence in western parts of the world aiming at promotion of good diet, nutrition education and the development of livelihood skills (FAO, 2010).

School garden can positively impact children's food choices by improving their preferences for vegetable and increasing their nutritional knowledge (Morris, Briggs & Zidenberg-Cherr, 2000). School gardens as a component of nutrition education can increase fruit and vegetable knowledge and cause behavior change among school children. Findings also suggest that school administrators, classroom teachers, and nutrition educators should implement school gardens as a way to positively influence dietary habits at an early age. School garden have emerged as an innovative and potentially engaging strategy to improve vegetable intake among children as they increase students exposure to vegetables, which may positively impact on their attitudes, preferences and eating behaviors (Wright et al. 2001). Schools with garden have also reported increase in student's fruit and vegetable consumption by enhancing their nutritional education (Twiss et al. 2011). In addition, gardening can be a beneficial component of an educational environment that provides teachers with an excellent opportunity to teach nutrition as well as address other subjects like science, math, health studies, and develop important cognitive skills (Vanduyne & Pivonkal, 2000).

According to Kids Gardening, *"Gardening benefits all children in ways that are particularly evident for those with special needs, such as fostering inquiry and developing motor skills"* (Blair, 2009). School gardens can also serve academic, social, environmental

remediation and other purposes while positively impacting student's science achievement too. *"Instead of telling students about the growth cycle, teachers can act as coaches by helping students actively explore and manipulate soil, worms, seed, different part of plants learned in the classes. Students can use their hands to show and point to different plant parts rather than be taught using one-dimensional techniques based solely on paper and pencil"* (Lineberger & Zajicek, 2000).

1.7 State Of Art

Following the literature on what on the development so far in the sector of food literacy and school garden this topic has become the topic of interest for policy makers. The knowledge and evidences which already exist is point of departure of this master thesis, So some of those studies has been summarized and critically analyzed in brief as well as the strength of the research has been mentioned in this section.

In a PH.D research conducted by Dyg and colleagues (2014) in Denmark where farm to school collaboration is given more priority, so that the students get a closer connection to nature and farming. It also focuses on providing hands on knowledge on entire process of how food products end up in the market. It reflects on the barriers and practical difficulties about farm-school collaboration and also indicates significant benefits on the food chain, sustainable development and environment at primary level. It concludes that the garden-based and farm-based integrated approach of learning is largely neglected in Danish society and there is a lot that could be done to help the children learn about food literacy by practical means. So, this analytical research indicates that even in country like Denmark where health, nutrition and children education are given very much of priority by state, researchers, municipality and schools, they still have lot to do to help children learn about food literacy through practical ways.

In another research done by Vidgen (2014) in Australia where two qualitative studies were done 1) A Delphi study of Australian food expert 2) A case study of young and disadvantage. Each study looked at all element of research question based on the chain behavior of eating. In the study, eleven component of food literacy were identified which

were under four main domains: Planning and management, selection, preparation and eating. The result from this study defines food-literacy as a collection of inter-related context, which is dependent upon knowledge, skills and behaviors. It concludes that food literacy is the collective effort or strength that gives a person to identify, plan and decide what to eat over a period of time with the behavior change that could be at individual, household or at community level. It also states that food literacy has a role in nutritional status, food security and body weight and other chronic diseases.

A small research done in Australia by De Campo (2011) on the boarder understanding of food literacy rather than what is grown, cooked and eaten focused on a wider prospective of learning and getting their behavior involved. In this field research, a qualitative research was conducted interviewing staffs and participants whether food literacy have an impact in food, learning and behavior. It concludes that the better understanding of food through gardening, cooking and eating may increase the capacity of children to decide and act in a meaningful and healthier way of practice than they live today. Although this study was a very small piece of qualitative research and has no concrete finding but the implication of this study is that the increase in personal food literacy has the potential to motivate students and their behavior. So, it can not only have a positive influence over current health crisis in young people but also help to provide constructive strategies to engage with the disengaged youth and other social issue that are occurring in modern world. So, it mainly suggests that food literacy has a potential to motivate and direct the youth to act healthily and also to be engaged with other social issues that surrounds them.

A report by World Health Organization (2006) focuses on the healthy nutrition interventions needed to take place in early childhood and adolescence in order to prevent overweight and poor eating habits. It states that schools are the ideal setting to discuss the primary health problems faced by European children to improve children's eating behaviors, health and nutritional knowledge.

A review research done by Benn (2014) on food, nutrition and cooking literacy; the article presents a review based on 14 articles about the concept of food literacy. It point out that the definitions and explanations of food literacy varies from understanding food literacy as

ability to read food messages to a broader interpretation aimed at empowerment and self-efficacy, decision making and management skills related to food and nutrition. It rises from simple cooking skills to life skills and education along with understanding food in a broader context. The review has shown a difference of understanding but also some similarities and common agreements on components of food and literacy. Narrow understanding as stated as food literacy being narrow, gendered, oppressive, individualistic and “victim-blaming” approach. On the other hand, most of the authors see it as an opportunity towards self-efficacy, empowerment, acquiring competencies regarding sensory, and practical, theoretical and ethical field. It emphasizes food literacy to be included in all level. The teaching content must be adjusted to the age group and their level of understanding and perceptions. It also suggests that many other authors put emphasis on the practical aspect of learning as enjoyment, which is very important at personal level. It summarizes food literacy as an essential part of children development and advocate for it be part of individual, school, society and home.

A research study by Colatruglio (2015), explored the concept of food literacy and its relation to overall wellbeing from the perspective of Canadian adults who recently transitioned to living alone, from their family. In this qualitative study 17 individual in-depth interviews were conducted with university students. Result from this study reveals that young people who are living independently and eating separately from their family are lacking the necessary knowledge on food literacy in order to make healthy food choices, within the complex food environment. It further suggests that there are challenges and barriers hindering the process of acquiring and utilizing the food literacy knowledge, which have a direct effect on food behavior and overall wellbeing of a person. The conclusion of this study was food literacy is vital aspect of living well, beyond individual physical health. These findings indicate that food literacy should be examined within a larger context of wellbeing and young adults could potentially benefit from expanding their views on food to encompass cultural knowledge, environmental stewardship, and family connectedness. This Study does not define how and what were the indicator of individual food literacy measures but come with a new dimension to food literacy and focused on group of adults who are living independently and preparing or buying food for themselves as a vulnerable

group, which the other studies could further explore using this target group. The table below shows the definitions of food literacy from different researchers from their point of view.

Table 1 Definition of food literacy by researchers

Source	Definitions of the term “Food Literacy”
Vidgen, Gallegos (2010)	The ability to understand the food, its importance and its nature in order to be able to analyze process and make decision upon it.
Fullan, 2014	Food literacy is the understanding of where food comes from; the impacts of food on health, the environment and the economy; and how to grow, prepare, and prefer healthy, safe and nutritious food.
Dyg, Mikkelsen & Wistoft (2014)	To understand and analyze the food system from farm to table process, to access the quality and nutritional aspects of food with the help of skills, attitude and action towards food habits that is environmentally sustainable by promoting local economy.
De Campo (2011)	Food literacy is not solely the understanding about what we eat but it rather provides a fundamental knowledge for making the sense of our place in the world through wise action, which is beneficial for us as well as for environment.
Ellen Desjardins (2013)	Food literacy is a set of skills and attributes that help people prepare a healthy, tasty and affordable meal for themselves with the resources that are around them. So food literacy is about skills of techniques, knowledge and planning ability or the confidence to simplify and solve the problem around the food environment.
Benn (2014)	Food literacy is about knowing, wanting, doing, sensing and caring by being practical at personal level but at the same time being critical about food and meals together with other in day to day life.
Nowak (2012)	“The relative ability to basically understand the nature of food and how it is important to you, and how able you are to gain information about food, process it various, analyze it and act upon it”

1.7.1 Components of food literacy

According to Vidgen and Gallegos (2011, 2012) a person with food literacy skills tends to adopt a behavior, which is healthy in nature, variety in food with balanced diet, which leads to an improved nutritional outcome. The table below explains the food related activities that are interconnected and requires knowledge and skills to act upon and analyze according to the context and environment.

Table 2 Components of food literacy (Vidgen & Gallegos, 2011:2012)

Planning and Management Skill	<ul style="list-style-type: none"> • Make rational choices of food based on time, money, and materials • Manage time and money for food preparation • Make decision based on the availability and accessibility of food and its nutritional values irrespective of changed environment
Selection	<ul style="list-style-type: none"> • Critically analyze the food chain, source and its quality • Knows food from environmental sustainability perspective • Knows food its content and handling method
Preparation	<ul style="list-style-type: none"> • Compose a meal with good taste based on availability • Knows the cooking procedure, nature of food, food hygiene and storage
Eating	<ul style="list-style-type: none"> • Understand food is more than feeding • Act accordingly to the need and quantity • Understands the social importance of food and act socially

It seems self preparation of food has got less priority nowadays than before, though it is not that tough to manage time and money if health outcome and quality of life is given more priority. A person move forward to self- cooking and avoid the pre-cooked, or processed food or food from fast food shops and restaurants thus avoid the high fat and energy food; which leads to improve in diet quality and health outcome. And “selection”- A person who

selects food that are environmentally sustainable and economically local food rather than food which are transported from a distance that help in promoting local farmer and help in reducing the emission of carbon dioxide from the transportation of food.

1.8 An insight on Health literacy, Agricultural literacy and Food literacy

A: Health literacy

Health literacy is defined as the degree in which an individual have the capacity to acquire process and understand the fundamental health information and service to make correct health decisions in daily life. The latest definition of health literacy focuses on the particular skill needed to trace the health care system, how it functions and how to reach to it. It also emphasis the communication and understanding between health care providers and health care receiver, in order to convey the right information and hence act accordingly. Health literacy is not only about being able to read but also being able to collect and synthesize information analyze, listen and make appropriate decision related to health. But it does not mean one should be able to know the complex medical terms and metabolic process involved in it. However, the understanding of daily used things such as being able to understand the information in drugs bottle, appointment receipts, medical brochures, admission forms and ability to navigate the procedure of health system (Wolf et al. 2007).

B: Agricultural literacy

Agricultural literacy is defined as the understanding and possession of knowledge needed to synthesize, analyze, and communicate the basic information about agriculture (Frick, 1990). It is basically the understanding of how food is grown, what is the procedure of growing food, along with the understanding of latest technological innovations. The broad term includes the economic and societal impact of agriculture, environmental and natural resources surrounding agriculture. Moreover, it includes marketing of agricultural

products, policies and practices regarding agricultural products, the global significance of agriculture and process nature of distribution of agricultural product. As a whole it is about being able to navigate the whole agricultural products, trade, marketing and communication (Dyg, 2014).

C: Food literacy

Food literacy is defined as an understanding of the impact of food choices on individual's health, the environment and the economy in general. The broad food definition includes personal ability to understand where food comes from, how is it produced, and what are the social and cultural significance of food which encourages individual to make healthy and rational choices and recognize the impact of food we eat on personal health, environment, social, cultural and politics (Dyg, 2014). In another word, the interconnection between food and its importance on human lives and the ability to be critical in person's attitude on how food is brought to the final product and navigate the story of food item is food literacy (De campo, 2011).

1.9 Outline of thesis

This extended master thesis consists of thirteen chapters. The first chapter includes general idea of the study; including introduction of research area, problem statement and research Problem. Similarly general introduction of the two main components of the thesis; food literacy and school garden also described briefly, together with overviews of the most contemporary studies in food literacy. Second chapter comprises the context analysis where study took place with brief introduction of food related issues in study context. In the third chapter the theoretical foundation used in the study has been elaborately explained.

Similarly, research strategy and philosophy of science for this study has been included in chapter four. General methodology used to collect data and the strategy used to search literatures has been presented in chapter five; details of data collection tool, sample size and technique are also presented in this chapter. Chapter six sum up the results from both

methodologies used. In chapter seven, analysis of the both results have been presented with different themes. Chapter eight comprises the part discussion related to food literacy with different paradigm. An illustration of implication of the study, limitations, and strengths of the study is presents in chapter Nine, Ten and Eleven respectively. Chapter Twelve concludes the study whereas chapter thirteen presents a prospective foodscape project as school garden in Prashanti Sikshya Sadan(PSS).

Chapter 2

Context and Justification

2.1 Context justification

Nepal is considered as one of the poorest country in Asia. A high proportion of its' population still lives under the poverty line. An estimated 80 percent of the population depends on the agriculture sector for food and income generating activities. However, food insecurity remains a major concern for the Nepalese government. As population growth is rapidly increasing; the agriculture productivity has not been increasing enough to feed them due to subsistence-oriented farming. Nepal is divided into three different geographical regions namely Terai, Hilly and Mountain; there is a huge disparity between these regions in terms of physical development and resource allocation. An average 38 percent population was food energy deficient in 2011; in some urban and rural part of the country the energy deficient percentage was even higher than 38 percent at the same period (Shrestha, Manohar & Klemm, 2012). The table below shows the percentage of Nepalese population deficient to food energy all over the country.

Table 3 Diet quality as per daily energy intake (NPC, 2013)

Population	Average Kilocalories Consumed Per Capita Per Day	Percentage of the Population Food Energy Deficient
Nepal	2536	38
Urban	2525	43
Rural	2539	37
Regions		
Mountains	2403	45
Urban-Kathmandu	2481	53
Urban-Hill	2524	42
Urban-Terai	2552	38

Rural Hills - Eastern	2542	43
Rural Hills – Western	2452	42
Rural Hills – Mid and Far Western	2331	49
Rural Terai – Eastern	2640	28
Rural Terai – Central	2762	23
Rural Terai – Western	2590	34
Rural Terai – Mid and Far Western	2515	37

According to National Planning Commission (NPC), poor nutrition among children and mother has a long-lasting significant public health problem (NPC, 2013). A study done by UNICEF in 2013 revealed that only 3.5 percent participants have broad understanding of the term “nutrition”. The research however, was only conducted in two districts out of 75 districts. In this case, it is hard to generalize the people’s understanding on nutrition; it is obvious that those participants, who were not familiar with the term “nutrition”, were also unaware of nutritious foods around them (Shrimpton, Atwood, 2012).

Poverty is widespread in Nepal and it varies from Mountainous region to Hilly and Terai region as Hilly region being as the most prosperous region. The United Nations Development Program (UNDP) report 2013 estimated that over 25.5 % of the whole population lies below poverty line earning only 200 USD per year (World Bank, 2013). Poverty being the underlying factor of food insecurity, under nutrition, poor hygiene practices, and lack of accessibility to health care are the prominent factors hindering public health and nutrition. According to Nepal Demographic and Health Survey (NDHS, 2011), stunting rate among children of 40.5% at national Level and 59.5 % in Western and far-western region of Nepal, with lowest 31.3% in hilly region. So the health status and food security status differs with regional variation (UNICEF, 2014).

2.1.1 Food availability, accessibility and affordability

Food availability, accessibility and affordability triangle comprises with other complex factors. This is clearly true with regard to food availability, accessibility and affordability. If there is no production or import, there is no availability. Yet adequate production does not necessarily ensure accessibility or affordability as it depends on other factors such as economy, food habit or culture. Reasonable food prices also do not ensure adequate intake for poor households, or caregivers with inappropriate behaviors or poor food hygiene. It is also dependent to the knowledge level, skills related to cooking, planning, managing and preparing. All these factors are interrelated, and sorting them out to enable a government to make decisions about priority interventions is very difficult (Ghimire, 2014).

2.1.2 Food utilization

Food availability and accessibility are main factors of food security but the proper management, handling, planning of food is equally important in order to prepare a good diet every day. Proper food utilization requires proper food handling, adequate education on health and nutrition, childcare, hygiene and sanitation and health care. A total of 55% to 85% of drinking water sources are micro-biologically contaminated (UNICEF, 2014), this contamination has led to a high prevalence of seasonal water-borne diseases.

2.1.3 Food habit

In Nepal, diet is typically high in carbohydrate and low in protein, fat and other essential micronutrients. Rice is considered as a main staple food and is consumed twice a day (FAO, 2010). As a result of culture, women usually receive less quantity and quality food. In many parts of the country, women are obliged to eat only leftover food (Ghimire, 2014). Approximately, 16 % of rural populations have poor food consumption patterns, consuming maize as main source of energy complemented by rice, millet, barley and tubers, depending on seasons (FAO, 2010). A 2005 nationwide survey found that 30 % of rural sample population consumed a nutrition poor homogenous diet everyday that exposes them to an increased risk of nutritional deficiencies. Intra-household food

distribution discriminate against women and girls is more common in several parts of the country. This pattern is reflected in areas where literacy rate is very low for instance: women in Terai are most likely to have inadequate diets due to intra-house discrimination. Women in the Terai have been found to have the highest incidence of low Body Mass Index (BMI) at 40%, almost twice the level of women in the hills (22%). This is partly due to cultural practices that restrict their access to a balanced and adequate diet (UNCT, 2007).

2.1.4 The rituals of eating

Food intake is very much influenced by social and cultural determinants surrounding food. The food culture is nowadays very much manipulated by advertising of food industry, fast food shops and restaurants. It is also influenced by the cooking time, procedure and complexity around the management of eating together, so people tend to search for an easy option with less effort that obviously leads to the trend of not cooking food at home. The individualization where one can buy pre-cooked food in market and fast food shops as per their choice and interest has also an effect on food culture (Dyg, 2014). However, it is still different in Nepalese context where most of the families live and eat together twice a day; it is only lunch, which could differ from each other, only in case they buy their lunch outside home. The one who prepares, plan and manage day-to-day meal is the one who is responsible for what to prepare for family which is unlikely to happen in the western world.

Some studies suggest that keeping to a conventional meal pattern is related with the care of body, they also suggest that planned meals are more likely to be healthy (Vidgen, 2014). As Nepalese conventional food pattern is homogeneous in nature, the variation in diet is necessary in order to acquire all required nutrition. In Nepal, normal diet is rich in carbohydrates as rice being a main staple food. So, the chance of lacking other protein, vitamin and other micronutrients are higher as a result of homogenous diet (Ghimire, 2014).

Food literacy, like health literacy can be considered and conceptualized as an asset rather than a risk factor or an enabling factor to healthy life. Food choice capacity of an individual is considered as a food management skill. Changes in behavior through food literacy could be at individual, family, and societal level (Vidgen, 2014).

Chapter 3

Theoretical foundation

Theoretical framework in this study has been used both in pursuing the cause of behaviour related to food literacy and identifying the alternative of those behaviours in order to deal with them. Because of the theme of the research problem and results derived from the interview analysis and answers from the survey; Social Cognitive Theory (SCT), precede – proceed model and Social ecological Model (SEM) have been chosen as base for the research. These three theoretical frameworks complement and incorporate each other for building conceptual foundation.

3.1 Social cognitive theory

Social cognitive theory (SCT) model explains the triadic reciprocal relation between behavior, person as cognition and environment. It describes human behaviors are internal events, caused by their own

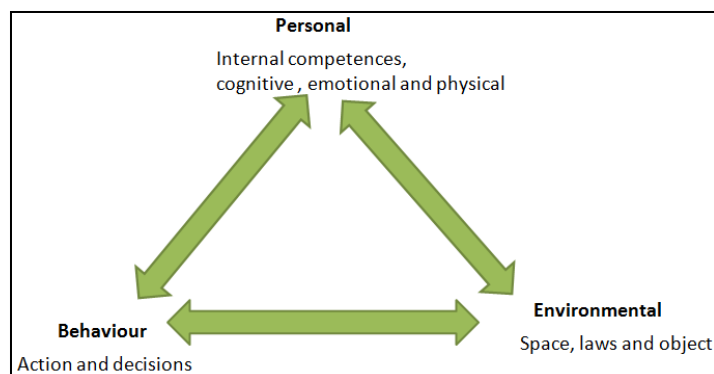


Figure 1 Social Cognitive Theory (Bandura & Wood, 1989)

motivation that is influenced from environment. In reality human

posses' reflective and self-reactive capability that controls their thoughts, feelings, motivation and self regulated actions. Therefore, human functions are regulated by interplay of self-regulations and external source of influence (Bandura, 1991). For example comparing these three deciders, among students in school shows that there is not only one determinant, which has influence in their food related behaviors. Students in school are educated not only by their own personal ability but also by environmental factors such as teacher, teaching material, teaching environment and friends which have huge influence in early school age.

Bandura also explains that these three set of determinants are constantly influencing each other but not necessarily meaning all determinants are of equal strength (Bandura & Wood, 1989). Environmental influences may be stronger than behavioral or personal factors in some situation. As some of the participants said that they want to have a garden in school, the school administration could discourage them, as that might be extra burden to the school. In this case, the environment where student are studying influences young children and act as negative environment. The scenario could have been different if the school had school garden and student obliged to learn from the garden about food, the environment would influence positively for behavior change. For instance, in school with highly standard curriculum, may reflect on self-regulated study which a student can use personal idea to strategically change behavior (Zimmerman, 1989).

Bandura also emphasizes the mechanisms that involve a central role in this regulatory process as people's belief, which contributes for behavior change through their personal efficacy. As self-efficacy is one of the strongest personal characteristic in behavior change, encouraging young students for healthy food choice through the garden based intervention will ultimately enhance their capability to move forward from the existing unhealthy food behavior. Use of SCT can be justified by fueling positive attitude in target group by encouraging them for positive change (Bandura & Wood, 1989).

3.2 Precede-proceed model

Food literacy is one of the individual competencies surrounding food and its handling. Defining healthy eating, identifying factors effecting eating habit and allocating role of different stakeholder needs to be in one single framework to make a comprehensive study. In order to assess the factors associated with perceived behaviour of students' related to the food, the precede-proceed model has been chosen. The precede-proceed model is a framework that helps to plan, implement and evaluate health promotion intervention. It focuses on consideration of both individual and environmental factors that influence health and quality of life (Green & Kreuter, 2005). This model basically consists of two different parts, the first part PRECEDE aims at planning an intervention for making young students

aware of rational food choices. The second part PROCEED aims at strategic implementations and evaluation of the intervention, that is implementing of school garden for target population (Green & Kreuter, 2005). The first part PRECEDE refers Predisposing, Reinforcing, Enabling constructs in educational/environmental diagnosis and evaluation, while the second acronym PROCEED refers to policy, regulatory, organizational constructs in educational and environmental development. Precede- proceed model is a structured participatory model which incorporate ideas from multilevel societal component for possible intervention.

Precede-proceed model consists of eight phases from social and epidemiological

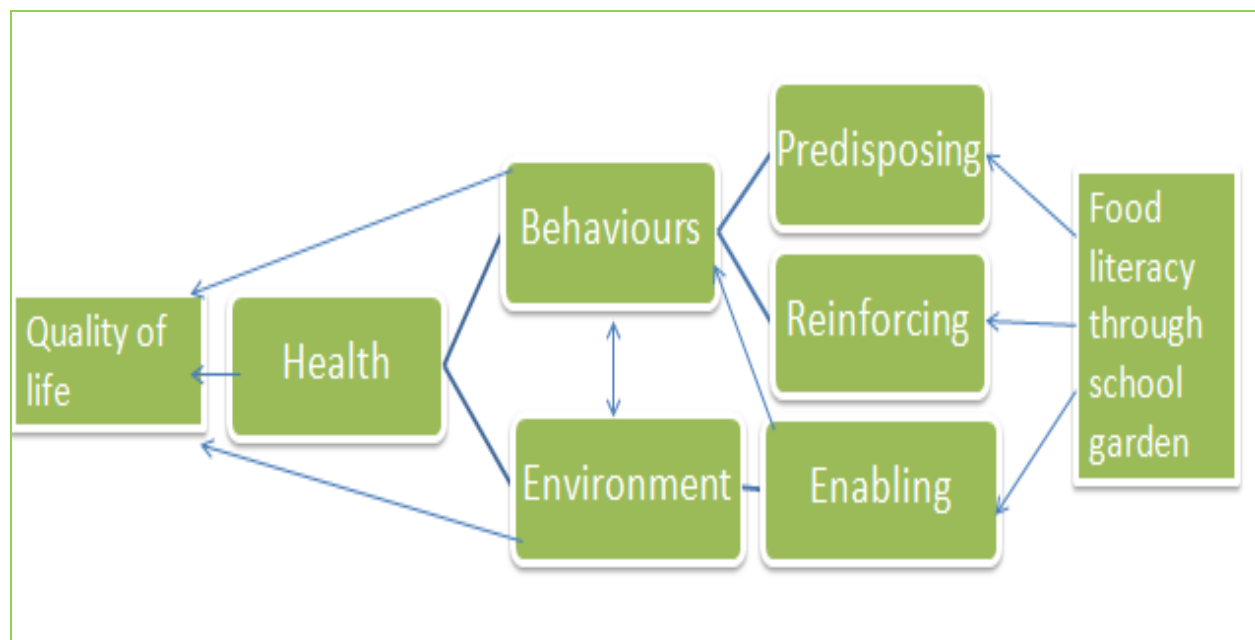


Figure 2 Precede-proceed model (green and kreuter, 2005)

assessment to impact and outcome evaluation. Social and epidemiological assessments in this study have been done through problem identification and context analysis. Behaviour and environmental assessment have been done through outcome analysis of interview. Finally, this study proposes a garden based intervention in one of the school where student could be equipped with necessary knowledge on food literacy. This thesis also comes up a suggestive evaluation plan after implementing the intervention. Therefore, the use of PRECEDE-PROCEED model is justified by using key component of this model mainly in designing intervention.

3.2.1 Predisposing factors

According to Green and Kreuter (2005), the predisposing factors motive or provide a reason for behaviour; these factors are person centric such as genetic and attitudinal. It advocates for the individual interest that leads to adopt particular behaviour by using cognitive skill and self-efficacy. The predisposing factor as the motivation, bring individual to a behavioural or environmental choice that may pull a person away from specific actions. Self-motivation, skill and personal knowledge regarding food are considered as key factors in enhancing food literacy among school children.

3.2.2 Reinforcing Factors

Reinforcing factors are those supporting factors that an individual receive as inspiration or pressure (Green & Kreuter, 2005). It is mainly the attitudes of influential people, family, peers, teachers and media, which lead to behaviour change. An intervention sometime, might aims to focus on these backstage players because of their influential role in order to most effectively reach the real target group. Reinforcing factors in this study has been identified are school teachers and family member who have influence in making rational food choice for the target group. It is also reflected in the interview and survey outcome that individual's food related behaviour is not solely dependent to the personal interest.

3.2.3 Enabling Factors

According to Green & Kreuter (2005), enabling factors are those resources or barriers that can help or hinder the desired behaviour; these are those internal and external condition directly related to the issues that help people adopt healthy/unhealthy lifestyle. In general availability and accessibility of goods and services are considered as enabling factors of food behaviour. Furthermore, factors that contribute to availability such as laws, policies and market structure also come under enabling factors. Presence of certain conditions in the environment may facilitate the food related action; at the same time the absence of adequate enabling factors may inhibit action (Phillips et al. 2012). Food literacy is not introduced in policy discussions in Nepalese context; as a result food literacy is not

considered as an important issue to delimit the consequences of various health related problem. Similarly, availability of fast food in the market has attributed the growing fast food consumption pattern among school children. These issues have been pointed out as major factors that enabling unhealthy food practice in school aged children.

3.3 Social Ecological Model (SEM)

Social Ecological Model (SEM) is a theory-based framework, which provides a description of understanding the multilevel social structure. It aims for the interaction between person and surrounding to find out the possible promotional activity to the social issues (Stokols, 1995). SEM is a combination of five different components of social structure: individual, interpersonal, community, organizational and policy enabling environment. The diagram below illustrates the different actors come under the SEM model.

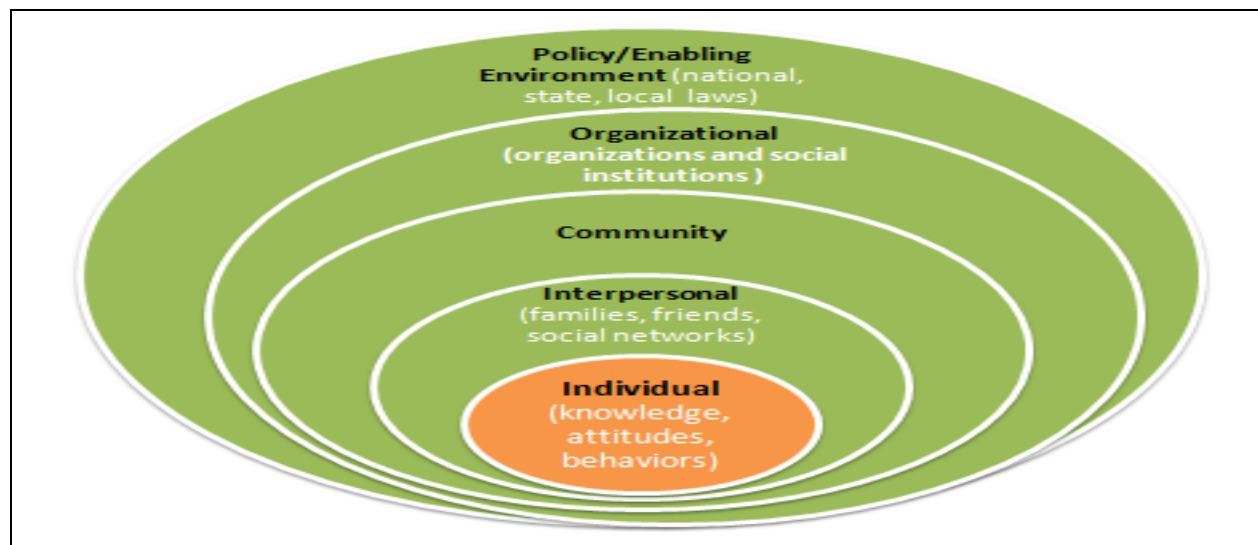


Figure 3 Social Ecological Model (Stokols, 1995)

Food literacy aims to strengthen community in long run; it can be a valuable asset to empower future generation by educating them about the different aspect of food, which strengthen the community. Even though food literacy is a personal competency, it needs a collective effort from other components of society to achieve it. Multilevel approaches in establishing school gardening to ensure the positive changes in student's performance can

be a leverage point to holistic approach of food literacy (Glanz et al. 2008). Educating younger generation through school garden to achieve food literacy can be introduced as an innovative concept in Nepal though, it may face some challenges in developing and implementing policy regarding school garden. Some practical issues such as provision of funding, developing course material and empowering teachers might come with some serious concerns for school administration and local government however; it can be dealt with dialogue and discussion.

The table below highlights the components in various level of SEM. Moreover it gives some glimpse of possible actors related in enhancing food literacy.

Table 4 various levels in SEM in relation to food literacy

Level	Description
Individual	Individual characteristics that influence the food related activates and have some role in behavior change including education, age, attitude, interest, literacy and self- efficacy
Interpersonal	Networks and social support that can influence personal behaviors including friends, family, teacher and partner
Community	A locality with specific boundary such as village, city or municipality
Organization	Social organization with own rule and regulation like school and college
Policy/enabling environment	An institution, that enforces law, develop policy in particular matter such as local government or municipality or state

Chapter 4

Research strategy and philosophy of science

4.1 Research Strategy

The research strategy applied in this study to investigate the research problems has been influenced by different element of social research. Research strategy guides entire research process with knowledge how data should be interpreted, coded, which theoretical foundation should be chosen, and also suggests how/why it should consider ethics and values during research process (Bryman, 2004).

The diagram below illustrates how the different philosophical instruments influence social entire research process.

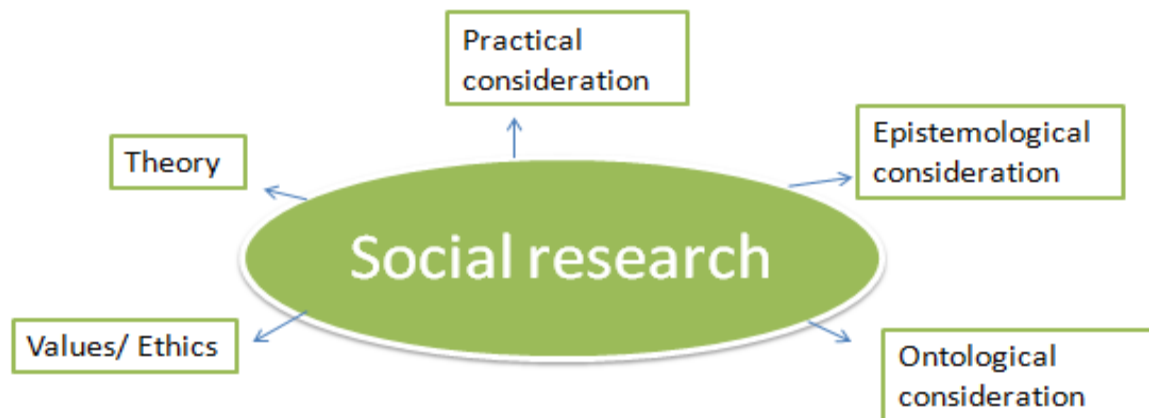


Figure 4 Influences on Social Research (Bryman A. 2004)

4.2 Epistemological and Ontological Consideration

Philosophy of science offer means to select succinct information needed for the professional research in research process. In social science, there is no universal agreement on how the concept should be defined; it may differ from context to context. However, the core idea of any social issue remains the same, which is regarded as the acceptable knowledge/fact in particular subject (Bryman, 2004). Therefore, in this study authors have tried to put some acceptable meaning/definition on related matters such as food, health and quality of life. Questionnaire in quantitative method is designed to obtain information on how respondent has perceived their food choice, nutritional status and food literacy, and it also calls for a suggestion to tackle them with possible intervention which gives an insight of students awareness in related to the study area. Similarly interview, questions have been designed to collect the information from interviewee on how they define healthy eating and how they see the other aspect of food such as production techniques and food marketing in general.

4.2.1 Positivism

Positivism is known as an epistemological position that advocates the use of the method of natural science to the study of social reality and beyond. It basically focuses on the measurable facts (Bryman, 2004). In this study positivism is used to quantify data from quantitative method, which ultimately supplies the numerical collection of raw data relating with food related behaviour of participants. Similarly, some scientific studies included in the part “state of art” as experiment from the different geographical parts in similar topic. So, some experiences from previous researches have been also used as a significant source of information, which is also a part of positivism.

4.2.2 Interpretivism

Interpretivism is also an epistemological position that deals with the subjective meaning of social action; it is an individual perspective on how a person makes sense of his/her personal behaviour/habit in relation to the particular subject (Bryman, 2004). This

approach in the study has been used to develop interview questions which authors intended to get individuals view on how they define their food literacy status, how they see their eating habit and what they think about factors influencing their food choice. Similarly, some questions have been designed to reflect the current policy on food literacy and school garden in Nepalese context and later examine how the participants see the policy. Moreover, the viewpoint of the researchers from various literature reviews on how school garden is perceived as a medium to improve food literacy among children in developed countries is also included in the study as part of interpretivism.

4.2.3 Social constructivist approach

Social constructivist approach is an ontological approach that advocates how social structure can influence the human behaviours in both positive and negative way (Bryman, 2004). A social phenomenon is believed as a factor triggering the individual action/perception regarding food intake, the information on structure of Nepalese society, school environment and market situation is analysed briefly through its association with food related activities of Nepalese student.

4.3 Hermeneutics and Phenomenology

Questionnaire used in this study is a combination of the questions that are expected to receive both quantitative and qualitative answers from the participants. Questions were mainly designed to obtain the information on how individual make sense of the world around them, which provided the subjective experience of the people involved in the study context. Similarly, some open-ended questions were

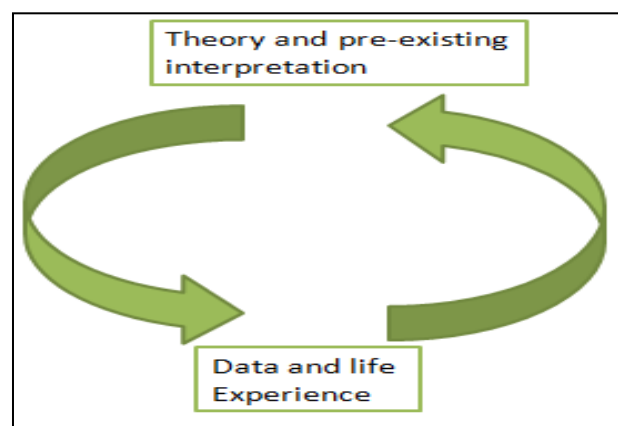


Figure 5 Hermeneutics Circle

included with the intention to get an understanding of participant's worldview as they see it. As authors already have some preconception regarding the study topic; the conceptions of the participants and the authors interacts with each other to produce new

understanding in study area (Lindseth & Norberg, 2004). Hermeneutics is process where pre-existing theory, new data and experience are interacting to explore new perspective. According to the hermeneutic cycle, the interpretation and analysis of data is on-going process (Butler, 1998).

4.4 Ethical consideration

This study is inspired by the school garden visit in Denmark during the study period. Some inspiration has also been taken from the second semester assignment “*Assessing the benefits and barriers of school garden in Nepal.*” The interest then began in exploring food literacy status in Nepalese young students. Different database were visited during the study, scientific reports/studies has been used as a reference rather than as part of the study by showing respect of right on intellectual property. Theme taken from any literature has clearly stated as source to avoid plagiarism. Participants were well informed about the time they may spend to fill the questionnaire, which was approximately 15 to 20 minutes; no negative response on exceeding time was received from them. Respondent were allowed not to answer any question if they think that is out of context or unnecessary. Some sensitive information of participant was kept consent strongly as promised such as religion and family status. Student’s recorded tape from the interview was deleted carefully after putting them in to computer.

4.5 Practical consideration

Several practical issues were taken into account while conducting research. Equal number of boys and girls were approached in order to make equal participation. 24 students from each school were included for the survey, which made comparison easier in rural and urban schools. Participants were randomly selected without making any special criteria, which helped in time management. The survey and interview were conducted in the break time to avoid interruption in school’s schedule. Meeting with principle and teachers was arranged after school on Friday when they have early off and kept as short as possible by taking care of time. School management was informed in advance about the survey and interviews.

4.6 Literature search strategy

Most contemporary analytical and descriptive studies relating to food literacy and school garden to improve food choice in target population has been chosen for enhancing general knowledge. As electronic database is enormous in availability of literature, it needs to be filtered according to the requirement of the study. Therefore, a literature search strategy was made to avoid un-necessary literature occurrence in search engine. The strategy was helpful to collect relevant research articles within the area of interest by limiting literature followed by given key word or given specific sentence. Databases like Pub med, The Lancet, Google Scholar, Sage, Springer links, American Journal of Clinical Nutrition, Wiley, Aalborg university database, UNICEF database system and factsheets from WHO website were used to collect relevant studies on school garden and food literacy. Internet search was performed by using key words or sentence like 'food literacy ', 'school garden ', 'garden based nutritional intervention ', 'food choice ', 'sustainable development with school garden and perception of healthy food '. Only full-length articles published in English were considered for inclusion.

4.7 Theory applied to the research process

Following theory and model have been used in the research process.

- **Social Cognitive Theory (SCT):** - Social Cognitive Theory is an interpersonal theory which focuses on how human behaviour is influenced not only by intrinsic factors but also by extrinsic factors.
- **Precede-Proceed model:** - It is a structured participatory model which incorporates idea in multilevel setting for effective planning and evaluation of intervention.
- **Social- Ecological Model (SEM):-** SEM is a model focuses on interaction of various actors in order to achieve specific goal.

These theory and model will be further explained in the section theoretical framework later in the thesis.

Chapter 5

Methodology and Study Design

Both quantitative and qualitative methods have been used to collect empirical data for the study. Survey through electronic media, Google survey docs was done, similarly; semi-structured interviews were performed to complement the survey outcomes. Literature review has also been done as secondary data collection; the outcome however is only used as a supporting source instead of empirical focus. Pilot testing was also conducted with 10 sample students to figure out whether the survey questions were understandable to the target group.

The diagram below illustrates both empirical and supportive data collection methods used in the study.

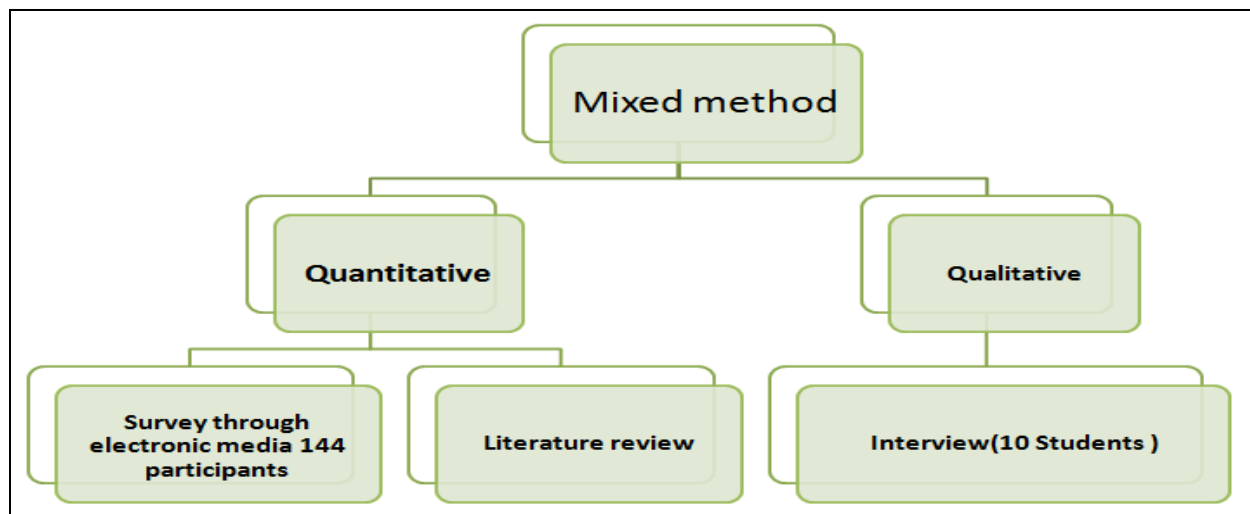


Figure 6 Overview of methodologies used

5.1 Study population

The populations of interest for this study are students from six different schools from two cities of Nepal. 1) Kathmandu- the capital city of Nepal 2) Chitwan: A mid-sized city that is located around 160 km from the capital in the Inner- Terai region of Nepal. Students from grade 8-12 and age group of approximately 14-19 years were selected as the target group. There were no such inclusion or exclusion criteria as far as the participant does not want to participate or does not belong to the above-mentioned grade.

5.2 The contextual difference

This study focus on whether the contextual difference between urban and rural school (situated in two different geographical location) have an impact on children's food behavior or overall food literacy. Because Kathmandu is a densely populated city with a population of 2,800,000 (2.8 million) among them around 80 percent population is migrated from the other parts of the country (CBOS, 2012). Schools have very limited space, and the students either have a house or a rented apartment; where only few of them have kitchen garden at home. On the other hand, Chitwan is sparsely populated city with population of around half million (5, 79,984). It covers an area of 2,238.39 square kilometer (CBOS, 2012). The area chosen for survey in Chitwan is an area where children are very familiar with agriculture and farming and most of the children are from the families that have farms, or at least have kitchen garden. So they are two contextually very different cities, it would be interesting to explore where the context could be a factor.

5.3 Sampling

Participants were purposively selected from the schools of the two contextually different settings. There are two aims of doing a purposive sampling: The main purpose of this sampling is to make sure that research aim and objectives are well covered and addressed.

- 1) To make sure that all the components of food literacy are covered.
- 2) To ensure the diversity in study rather than a specific area or setting, this will provide a new dimension or give a better picture of the research since not much research has been done on this topic. Participants were recruited by approaching different schools in those two locations through personal networks.

5.4 Validity of questionnaire and indicators

The indicators of food literacy were drawn with the help of different literatures and their researches.

Measurable components of food literacy

- Food skills (techniques, knowledge, planning, management)
- Self- efficacy and confidence
- Ability to adopt to new environment and act accordingly
- Ability to explore social and other support

The questionnaire was developed based on those different components of food literacy (knowledge, skills, behavior etc.) (Hess, Trexler 2011, Colatruglio 2015, Dyg, 2014)

5.5 Qualitative method

The qualitative method has been used in the study to gain an understanding of underlying reasons and motivation to existing eating habit of the interviewees, which provide insights on root cause of their behavior related to food (Bryman, 2004). Qualitative research is generally exploratory and is useful when the researcher does not need to examine variables statistically. This approach has been partly used in the study where explanation

needed to answer research question in form of respondents view point rather than numerical outcome. As practiced in the field of research, information is being collected through unstructured or semi-structured techniques like individual depth interviews or group discussions under qualitative method. In order obtain in depth information, 10 semi-structured interviews from two different contexts were conducted with young Nepalese students and analyzed according to the need of the study. Interview outcome is basically focusing on the understanding of food literacy among student from grade eight to twelve in both locations.

5.5.1 Qualitative interview

Based on research question and to be able to analyze the survey in a way that it explores in depth reason behind the food behavior and practices, semi- structured interview guidelines were developed. The interview conducted during the study is based on the following structure so that it covers the intended prospects of the study.

- Background information of Interviewees in terms of their living status, age and educational status along with their parent's educational status.
- Knowledge and understanding of food literacy in relation to cooking skills and selection of appropriate food and interest in involving in hands on activities.
- Determining factor of food purchasing behavior for example Socio-economic, convenient and taste.
- Understanding of organic farming in relation to environmental sustainability and sustainable development.
- Assessing in what extent the school curriculum and school activity is helping to create a fostering environment to food literacy?

The interview started up in a non-formal way meaning that it did not necessarily follow a strict order mentioned above, without breaking up the flow of the interview by leading questions. The interviewees were thanked for agreeing for the meeting and given an assurance regarding confidentiality.

To be sure that the interview covers the purposed value, follow up questions were asked regarding food knowledge, food skills, interest in working in kitchen and farm. The authors of the study as interviewer described the whole process like approximate number and the range of question to be asked and the time is likely to take. The complex and difficult terms like food skills, sustainability, food literacy, organic food were made easier in order to be sure that the interviewee understand the meaning of interview question as same as the researchers do. The interviews of students were face-to-face interview and the time was from 15-20 minutes.

Interviews were conducted in Kathmandu and Chitwan district (5 interviews each). Those students who already participated in the survey were excluded in order to make sure that they do not repeat the answer since in this can lead to the bias. The entire interview were recorded and later transcribed except 4 interviews, which were cancelled in the middle. Only relevant and finished interviews were transcribed.

Interviewees were approached through the school administration and interviews were conducted by both of the author of this study. The participants made a formal signature in order to be able to use and record the interview before the interview take place. The participants were given a code name such as KT1, KT2 for those who were from Kathmandu, and CT1, CT2 for those from Chitwan to maintain anonymity. The summary of their interview was presented to the participant for the verbal agreement or disagreement of the meaning of their responses. Majority of the students spoke freely and provide their opinion but 4 of them ended up and walk in the mid-way as they feel odd. There was some awkwardness in the participants where they were supposed to talk about the socio-economic condition that leads to food choice and preferences. The table below briefly explains the information of interview participants.

Table 5 Information of interview participants

Sex	Grade	Location	
		Chitwan	Kathmandu
Boys	9	1	1
	10	1	2
Girls	9	2	1
	10	1	1
Total		5	5

5.6 Quantitative method

Quantitative research method is normally used to quantify data and generalize results from a sample to a population interest. Furthermore, it measures the incidence of various views and opinions of a chosen sample. It is sometimes followed by qualitative research when it needs to explore some further findings (Bryman, 2008). Quantitative method in this study has been used in two different ways, one by including quantitative questions in survey and another by doing literature review as form of secondary data collection method. Moreover, this method in this study has been used as a source of statistical measurement which provides with numerical outcome of the research questions though it did not explained and explored itself the context and situation where study was based on. In order to understand the phenomenon the qualitative method has been used as supportive method to the quantitative measures.

5.6.1 Quantitative survey (Methods and Procedures)

The survey includes 144 participants from 6 different schools (24 participants from each school) from 2 different cities (Kathmandu and Chitwan) and 3 schools from each city. The schools without school garden were approached and students from Grade 8 to Grade 12 within the age of between 14 to 19 were selected. One response however, has not been used for the analysis because of the error, so it was 143 participants who took part in the survey. Students from secondary level were selected in order to make sure that the participants understand the terms related with food literacy. Because the students from Grade 8 have reasonably well developed English language skills and can use computers as the survey questionnaire were distributed online and were in English language. The participants were to use computers from their school lab. The authors provided a small toffee and no further compensation was provided. School were approached in that way that all the participants willing to participate were sent to the computer lab and those not willing to participate were not involved. The authors were present in each setting physically themselves in order to conduct the survey and explain the procedure and questions if necessary.

A) Pilot test: In order to methodologically access, validate and measure the reliability of questionnaire, a pilot test was conducted. 10 participants were recruited for the purpose of pilot study to analyze their response and understanding of questions and the terms used in the survey questionnaire. The term like “food chain”, “consumption pattern”, “marketing”, “High calories and fat diet”, “food production”, “sustainability” were the terms difficult to understand and were than simplified with explanation for the participants to make them understandable.

B) The survey protocol: - The questionnaire was designed based on previous tested questionnaires on food literacy (Hess & Trexler, 2011, Colatruglio, 2015, Dyg, 2014). The questionnaire comprised topics such as knowledge, attitudes, skills and behavior of the participant. So, open ended questions, multiple choice questions, choice boxes questions,

and scale question were designed to access their overall knowledge and behavior on food literacy issues. Same questionnaire was distributed to students in each location.

5.7 Mixed method

A mixed methods design is useful to find out the best of both quantitative and qualitative approaches. Triangulation approach helps to support different data collection techniques by complementing each other (Hammersly, 2008). In this research, triangulation has been justified through survey results, interviews' findings and evidences from literature review. Findings from one research methodology are complemented with findings from two other research methodologies. In a way, mixed research method contribute to complement both qualitative and quantitative outcome by presenting the findings of one method in the form of another method; it means the mix method allows the qualitative finding to be measured into quantitative way (Yeasmin and Rahman, 2012). The combination of two methods thus gives more strength to the study, as food behavior, knowledge and skills are not always quantifiable and measurable. They are surrounded with many other social and economical factors related with it. So, the mix method will explore both the explanatory and the statistical part of the research (Creswell, 2013).

5.8 Literature review

The literature review below presents the broad aspects of school garden and its contribution to food literacy in school children. Furthermore, these literatures provide the evidence on how school garden has been used to enhance student's food related behaviors.

A study by Klemmber and colleagues (2005) conducted a study that had a sample of 647 students from seven different elementary schools in Texas (United States). Students from experimental groups were the students who participated in school gardening activities as a part of science curriculum. It was found that students from experimental group had significantly higher in science scores compared to the control group. There was no significant difference found between boys and girls of experimental group meaning that the effect of integrated science teaching was equally effective between girls and boys. Gendered difference in grade was also observed.

A study by Smith and friends (2005) conducted an experimental study to quantify the effects of school garden and science curriculum of fifth grade students. The first four chapters of hands-on gardening curriculum (junior master gardener handbook level-one) were introduced on three elementary schools in Louisiana as an informal education program conducted by East Baton Rouge parish master gardener volunteers and Louisiana State University students. The curriculum takes place once a week for 2 hours. Science achievement test for junior gardener was given before and after student participation to the gardening activities to determine the effect of school gardening.

The result from the pre-test and post-test show, the science achievement was significant ($p \leq 0.0167$) in the experimental group. Whereas, no significant differences were found between pre-test and post-test scores of the control group. Although, the result may be affected by several variables but the results show that gardening once a week improves science achievement score.

Blair and company (2009) evaluated the review of the benefit of school gardening. The review article reviewed the U.S literature on children's gardening and its potential effect, school-gardening outcome and teacher's evaluation of gardening as learning and methodological issues. Quantitative studies show the positive outcome of school gardening to science achievement in particular with improved food behavior and food choice ability. But they did not demonstrate the attitude, behavior if they have any improvement through school gardening. Qualitative studies indicated the wider outcome other than science performance but also social and environmental behavior but yet to be justified.

Ratcliffe and colleagues (2011) investigated the effect of garden-based education on children's vegetable consumption. As part of pre and post panel study 236 students completed the garden vegetable frequency questionnaire and 161 completed a test study. Result indicates that school gardening may have an effect to the student's vegetable consumption including the improved recognition of attitude towards preference for and willingness to taste for vegetables. It also increases the variety of vegetables eaten. It suggests that further study should explore whether those behaviors persist over time and if

the changes affect behavior of parents or their care providers. Implication of this study towards the policy making and health promotion intervention is recommended.

Miller and friend (2007) explored pre-school and kindergarteners learning while provided with hands-on activities in the garden and greenhouse areas of a model outdoor classroom. Key findings of this study suggest that when young children are participating school garden or garden related outdoor activities they are:

- Communicating their knowledge about the world to other
- Learning to work for common purpose
- Convey the learning process
- Developing important skills to manage (initiative, self-confidence, literacy, math, science) which will help to be more successful at school and also help to navigate world.

Hess and colleagues (2011) conducted a semi-structured interview to compare urban elementary students understanding with nationally developed benchmarks for agro-food system literacy. Finding indicates that no participants had ever grown their own food, raised a plant, or cared for animal. Participation in school field trips to farm and a visit to a relative's garden were the most frequently mentioned agriculture experience. Participants could easily name food item but could not accurately elaborate the origin of the particular food, neither the life cycle. Post production of food like processing, packaging, were not understood. The food chain from farm to plate were not identified as a result of a clear picture of how is food brought to their plate from farm was not navigated.

A study was done by McAleese (2007), to investigate the effects of garden-based nutrition education on adolescent's fruit and vegetable consumption using a non-equivalent control group of 122 sixth grade students in southeast Idaho. Study's findings show that garden-based nutrition education did have a significant effect on adolescent's consumption of fruits and vegetables. Students participating in the nutrition education curriculum along with garden-based activities increased their numbers of fruit servings, vegetable servings, Vitamin A intake, Vitamin C intake and fiber intake more than those students who

participated in the nutrition education curriculum without garden activities (McAleese & Rankin, 2007).

In another study conducted in 2006, to find the effects of after school gardening program in children's reported vegetable intake and physical activity. In this research 43 children completed the pre and post evaluation questions provided. There was a significant increase in the proportion of children reporting. "I eat vegetables every day and I am physically active everyday" after the education and gardening program. The implication of this study was incorporating gardening along with food preparation, nutrition and physical activity, which was an effective way to improve children's vegetable intake and physical activity. The school principal reported that he observed use of the school salad bar doubled following incorporation of after- school gardening program. (Hermann et al. 2006)

In general, school gardening concept has shown huge potential to develop food literacy among school children by enhancing their awareness in relation to food. Similarly, it has shown improvement on teaching outcome in science and math. School garden has also helped student to make rational food choice by increasing fruits and vegetable intake.

The table below states the summary of scientific research papers related to the school garden and its benefit.

Table 6 Summary of literature review on relation between school garden and food literacy

S.N	Authors Name, Year	Title	Method	Findings
1	Klemmer, Waliczek & Zajicek (2005)	Growing minds: The effect of a school gardening program on the science achievement of elementary students	Case control study	Students from experimental group scored significantly higher in science compared to those of control group
2	Smith, Motsenbocker (2005)	Impact of hands-on science through school gardening in Louisiana public elementary	Case control study	Science achievement was significant ($p \leq 0.0167$) between the

		schools		experimental group comparing the pre-test and posttest. No significant difference was found between pretest and posttest scores of the control class.
3	Blair (2009)	The child in the garden: An evaluative review of the benefit of school gardening	Review article	Quantitative studies show the positive outcome of school gardening to science achievement in particular with improved food behavior and food choice ability
4	Ratcliffe et, al. (2011)	The effect of school garden experience, on middle school aged students knowledge, attitudes and behavior associated with vegetable consumption	Cross-Sectional	Gardening may have an effect to the student's vegetable consumption including the improved recognition of attitude towards preference for and willingness to taste for vegetables
5	Miller (2007)	The seeds of Learning: Young children develop important	Cross-Sectional	Communicating their knowledge about the

		skills through their gardening activities at a mid western early education program	Study	world to other convey the learning process and Developing important skills to manage (initiative, self-confidence, literacy, math, science)
6	Hess, Trexler (2011)	A qualitative study of Agricultural literacy in Urban Youth: What do elementary students understand about the Agri-food system?	Cross-Sectional Study	Finding indicates that no participants had ever grown their own food, raised a plant, or cared for animal.

5.8.1 Relation between food literacy and school garden

In previous section the literatures related to food literacy were discussed where many findings suggested that food literacy is a collective set of knowledge and action towards food, which not only focuses on having information or knowing about food but also developing skills related with food preparation, planning and acting upon it (Ellen desjardins, Dyg, 2014, De Campo, 2011). So it is clear that food literacy is not only a theoretical part of knowledge but also a holistic approach, which is more, connected to nature, hands-on activity, and skill development (Dyg, 2014). The change in food supply has affected in our understanding of the origin of food and its role to our lives. Supermarket shopping and televised shopping have a huge influence on public perception on food. Children are brought up with the surreal environment about food and hence lack food literacy knowledge. In this sense gardening offers a vehicle to bridge the gap between modern food supply chain and firsthand knowledge of food (Ball, Flett & Geissman, 2005).

Chapter 6

Results

6A Interview results

Following are the results found from the interviews, results basically are presented in specific theme made by the authors in order to cover different sociological aspects related to food.

6a.1 Socio-economic status and food literacy

As described by (Vidgen & Gallegos, 2011) health outcomes are very much inter-related or sensitive to socioeconomic factors. The result showed that higher social economic status leads to better health outcomes or health care opportunity. Interestingly, this study findings report that students from a low-economic background whose parents are either unemployed or farmers are more sensitive to food literacy components than those whose family have other professions.

A girl from Chitwan said, "My father and mother are most of the time working in the farm and that's why it's me who take care of what to cook in the dinner and lunch. I am also responsible for the choice of vegetables to be cooked from the family's farm. My brother assists in cooking but he is not much involved in groceries shopping as he is not much familiar with food items to be bought and cooked".

A girl from Kathmandu responded, "My father and mother are both working; we are living in a 3 room apartment in Kathmandu, which has a quite expensive rent to be paid. I am the one who prepare dinner every day as my big brother is playing football after school and my small sister is not big enough to cook or help me in preparing."

From the evidences presented above it indicates that, it's a middle class family involved in day to day work with a low income; where children help their parents in household chores beside their studies.

6a.2 Food Preparation: - Knowledge, skills, attitudes

The present study also uncovered that the food preparation method and knowledge of the participants are limited and follow very unvaried, unhealthy and often choose nutrient poor diets.

A girl from Kathmandu stated, *“ I learned to cook from my mother and the style of cooking is very similar to her’s style. I cook rice, some green vegetables or beans with lentils soup and the way I prepare green vegetable are frying them with potatoes like what my mother does”*.

A boy from Chitwan stated *“There is a similar nature of food that is prepared everyday in my home; I am also very familiar with the process of cooking, handling and preparing although I am not really cooking everyday”*.

6a.3 Decision making power and competence

A girl from Chitwan responded *“I know about healthy food and healthy eating, nutritious diet and what our body needs, but while I cook I follow the way and the taste that my family is used to with some stable food. My father and mother don't encourage me to make or buy different products than the usual ones because they are hesitant to try different meals with different taste and nutritional values. And, I don't have confidence that the new food and process will end up being a good meal or a crap. So, I just follow the way that my mother does”*.

6a.4 Food and health

All the participants’ perceived food and health are inter-related and the perceptions were that balanced diet is need and need to eat nutritious diet. Also, they felt that they need to eat more vegetables and fruits. Most had necessary knowledge what it needs to be in a nutritious diet but lacked skills to incorporate them in their diets.

"My friends who never cooked and don't want to give a try; they are ready to eat what is prepared and will not even scratch a single thing to prepare food. I cannot understand how they can eat that, they should be learning to cook food and eat as per their interest" A girl from Kathmandu was referring to some of her friends who have never cooked.

6a.5 Gender and food literacy

The semi-structured interview unveiled gender as a factor of food literacy. Boys are passive and almost are not involved in food making, Girls are the one who are involved and in most of the cases compelled to make food for their family.

A boy from Kathmandu said, "I have never tried to make food" and said he is very poor at it. I am not the one preparing food as my sister is cooking in absence of my mother and I hang out with my friends: playing football. I just eat what is prepared either by mom or sister. It does not matter, the only time I choose my food is while buying my school lunch".

A girl from Chitwan said, "My brother never help me in kitchen my father and mother are working and I need to prepare food, I don't know in Nepal boys are given more freedom, he can hang up with his friend whole day and is no problem with parents, but if I just go to my friend than my father will say where I have been and object but not to my brother"

6a.6 Space / Geographical condition

Almost all of the participants from Kathmandu state that there is no space at their home to grow vegetables. Only few mentioned having space but they were used for planting flowers.

"We don't have space outside our house as we are renting a 3 room apartment so we have nothing to work on. Our school does not have space either. I have heard some of the richer schools in Kathmandu have gardens and students are involved in doing plantation etc. it would be interesting if my school have such space."

"We have space in front of my house but that is used for planting flowers, as it's not enough space for growing plants."

One student from Kathmandu gave some glimpse on how internal migration within the country has left agriculture activity behind with shift in profession.

"My father moved to Kathmandu for work from Khotang district 25 years ago. We still have our field out there and my father used to work in the field while he was young. But now in Kathmandu, we can't afford to have land for cultivation and agriculture"

6a.7 Knowledge level: Understanding of healthy eating

In response to the question what do you understand by healthy eating? Mixed responses were received from participants in both urban and rural schools. Their knowledge on unhealthy eating has also been reflected in their actions as some interviewees reported that they love to eat outside everyday if possible. Conversely, some respondents have defined healthy eating as eating homemade food. Two students put their word against consumption of alcohol and smoking, and relate them with negative health. A boy from Kathmandu said:

"I don't really care what is healthy or not. If there is something ready in the plate ... its food ...and is going to satisfy my hunger"

Another participant from Kathmandu had comparatively different view on healthy eating however; he was also not sure what healthy eating is:

"I am not quite sure, what is healthy diet, may be food with meat at least 3- 4 times in a week or drinking a lot of water"

6a.8 Understanding of local and organic food

With regards to knowledge on local and organic food, student seems to be aware of local food and it might be because of the term 'local', which refers to 'somewhere near'. However, they accept that they do not know what its' impact is in environment. Four out of five students from Kathmandu said they do not know about organic food and its impact in ecosystem. Only one student from Kathmandu said he knows about local and organic food is about.

He said, *"Most of the vegetables we purchase are from local farmers outside of Kathmandu valley. The taste and an appearance of organic food are always better and satisfying, as it contains no extra chemicals and fertilizers. Yes I think organic food production has a big impact on environment and ecosystem"*.

Three students from Chitwan said they do know about organic and local food. Others said they do not know about it. One student from Chitwan seems to have better understanding on local and organic food than other as he said,

"Local food is produced locally Means these foods are not from so farit's somewhere from near to usorganic is like producing crops without pesticides ...and without heavy equipment....I think it saves soil quality"

6a.9 Motivation and practice

Responses from semi-structure interviews suggest that many participants learn healthy eating, food, hygiene, and its importance from classes, books and from teachers. But participants are not provided with any hands on activity through other means; which seems less effective and reflective in their behavior. Less reflective education seems to add less hands on skill and less competent on food hygiene and appropriate food selection in daily life.

"Hands on classes on food preparation, plantation and demonstration will in my understanding help in motivating us towards the better understanding of food. School

gardening or field visit on regular basis could help us understand the life cycle of plant and animal” states a student of agriculture and forestry from grade 11 Chitwan.

6 B Survey results

The quantitative part of this research involves hypothesis testing, and the hypotheses are tested by statistical tests using SPSS.

Following hypotheses were formulated in answering research questions.

Null Hypothesis: There is no difference in food literacy components between girls and boys of Kathmandu and Chitwan.

Table 7 Distribution of participants

Sex	Grade	Chitwan	Kathmandu	Total
Boys	8	0	1	1
	9	1	4	5
	10	6	7	13
	11	16	10	26
	12	16	11	27
Girls	8	0	3	3
	9	8	4	12
	10	10	14	24
	11	24	25	49
	12	34	21	55
Total		72	71	143

A total of 143 students (mean age 17.67 ± 1.96 years) were included in the final analysis. Among them 72 were boys (mean age 17.81 ± 2.38 years) and 71 were girls (mean age $=17.52 \pm 1.41$ years). There were 72 participants from Chitwan (39 boys and 33 girls) and 71 from Kathmandu (33 boys and 38 girls).

From 143 participants, 3 were from grade 8, 12 from grade 9, 24 from grade 10, 49 from grade 11, and 55 from grade 12. 91.6% of them were living with either parents or partner.

In regards to healthy eating practices at school, 21.7% reported they have not learned about them, and remaining 78.3% reported that they have learned them at their schools. Nearly three-quarters (70.6) said of having no school garden or farm while roughly one-quarter (29.4%) responded that they have school garden or farm.

Additionally, 14.1% responded that they didn't know about cooking and 85.9% said they knew to cook. Almost 16% more school children in Chitwan (75%) knew cooking than children in Kathmandu (59.2%). This indicates higher percentage of students in Chitwan can cook food.

Participants were also asked for their cooking skills and 42.7% responded that they have either bad or very bad skills. 18.9% responded 'Neither good nor bad' and 38.5% responded they have either good or very good cooking skills. Gender differences in cooking was observed as considerably higher number of girls (43.7%) rated their cooking skills as "good" than that of boys (11.1%). Furthermore, urban-rural difference was also evident as significantly higher number of participants from rural (Chitwan=31%) knew about cooking than participants in urban areas (Kathmandu=23.6%).

Interest of participants in working in school garden and farm were studied and 14.7% responded that they were not at all interested in doing so. 28.7% were uncertain, and 14% said that they were interested. 25.2 % were fairly interested and 17.5% were highly interested. It appeared participants from Chitwan were more 'fairly interested' (30.6 %) and "very much interested" (23.6%) in comparison to participants from Kathmandu ("fairly interested" (19.7%) and "very much interested" (11.3 %).

Sexes inequality in interest for school gardening and farm was also observed .Girls were more interested (“fairly interested” (31%), “very much interested” (23.9%) boys (“fairly interested” (19.4%), “very much interested” (19.4%). The study also unveiled that participants have limited role in suggesting their parents for buying healthy food products as more than half of the participants (56%) responded that they do not suggest or recommend.

Similarly, respondents were asked if they had any say on their school lunch and 66.4% responded they decide on their own, 27.3% were found to eat what their parents decided to offer. 6.3% of the participants responded that school provides them the school lunch (figure 7).

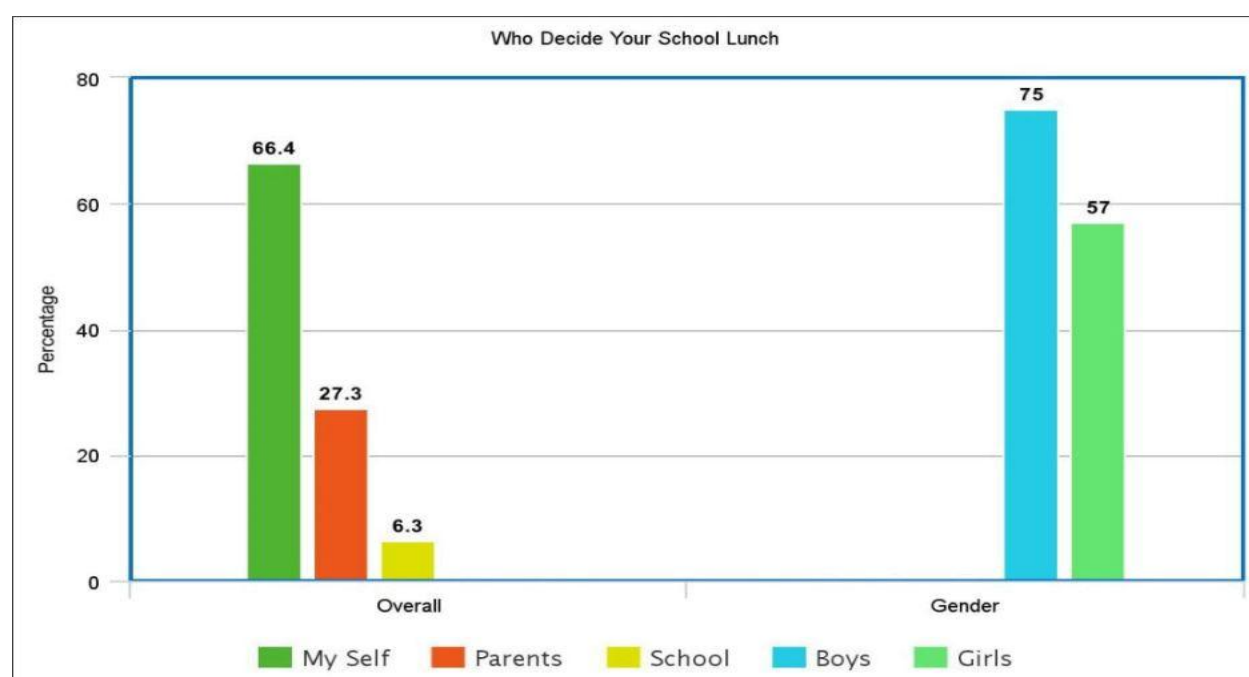


Figure 7 who decide your lunch

From figure 7, it can be inferred that substantially higher numbers of boys (75%) decide their school lunch than girls (57%)

In response to the question about how often they were involved in cooking, 28.7% responded as they were never involved in any cooking, 14.7 % responded as they cook once a week, 28.7% responded they cook 2 to 3 times a week, 15.4 % responded they cook 4 to 5 times a week and only 12.6 % were involved in cooking every day (figure 8).

Comparatively, girls were involved more in cooking as 19.7% girls were engaged in everyday cooking while only 5.6% boys in daily cooking. Also, only one tenth percent of

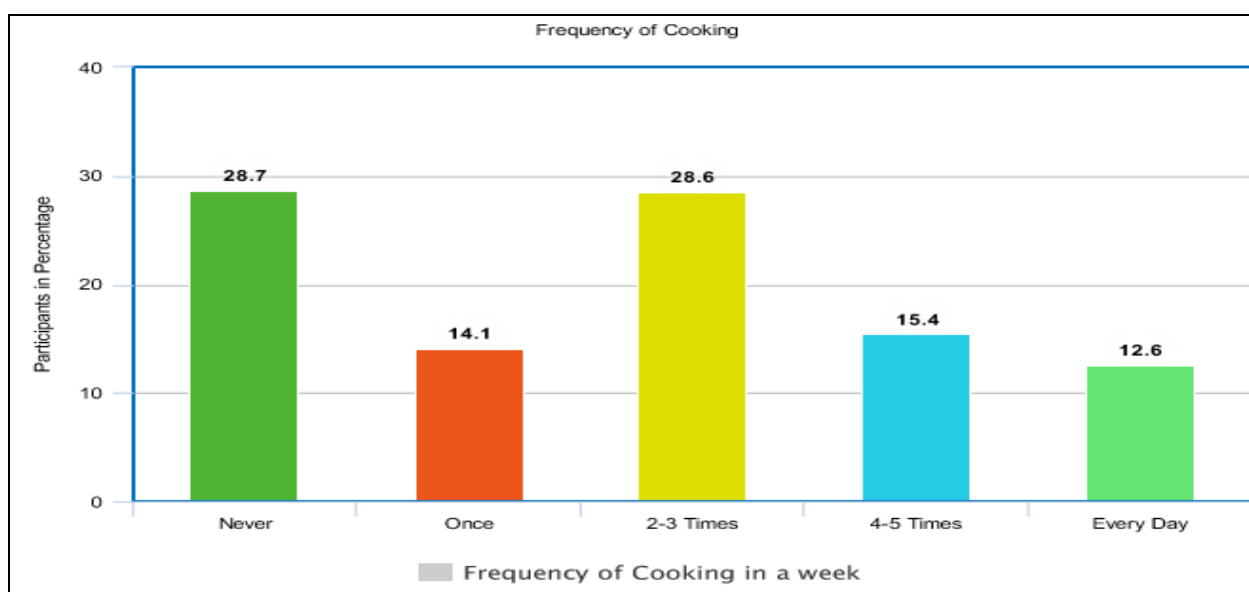


Figure 8 Frequency of cooking per week

girls (11.3%) said they never cook while nearly fifty percentages (45.8%) of boys never cook.

The study participants were asked about food labelling on food packets and 23.1% reported that they always read and understand the labels on food packages. 44% reported that they sometimes read and understand the labels, and 32.9% reported they don't read them at all ("Never"). Higher percentage of Girls' (26.8%) read and understands food labels than boys (19.4%). Rural (31.9%) students tend to read and understand label than urban students (Kathmandu: 14.1%). In particular, girls of rural areas (Chitwan) have habit of reading and understating food labels as higher proportion of girls from Chitwan found to read and understand nutritional profiling on food packages.



Figure 9 Priority while shopping

The research groups were asked what they prioritized while they shop and all most half of them appear to be driven by prices (43.4%), 21.7% by convenience, 21% based on taste and only 14% prefer to select on the taste of food items. Considerably, more participants from Chitwan (20.7%) to Kathmandu (7.0%) made selection of foods on their nutritive value. It appeared that there is no urban-rural difference on selection of food items based on price as equal percentages of student in both areas equally prioritize price (43.7% each).

6b.1 Cooking knowledge

The following logistic regression explores the association between if participants know how to cook, and location, gender and age.

Table 8 Cooking knowledge

Do you know how to cook food?		B	Std. Error	Wald	DF	Sig.	Exp (B)
No	Intercept	5.917	2.291	6.671	1	.010	
	Age	-.303	.130	5.446	1	.020	.738
	Chitwan	-.908	.429	4.489	1	.034	.403
	Kathmandu	0 ^b	.	.	0	.	.
	Sex = 1	=2.170	.454	22.833	1	.000	.114
	Sex = 2	0 ^b	.	.	0	.	.
a. The reference category is : Yes							
b. This parameter is set to zero because it is redundant.							
c. Sex 1= Girl, Sex 2= Boy							

It shows that there is association of being able to cook food with location ($P=0.03$), gender ($P<0.001$) and age ($P=0.02$). Meaning that participants from Chitwan are more likely to know to cook food more than those from Kathmandu, Specifically, girls are more likely to cook food than boys, it also shows that age is also associated with being able to cook food.

6b.2 Frequency of visiting farm or school garden from school

The following General Linear Model (GLM) explores the association between frequencies of visiting farm or school garden from school with location, gender, age.

Table 9 Frequency of visiting farm

Parameter Estimates				
Dependent Variable: Frequency of visiting farm or school garden from school				
Parameter	B	Std. Error	t	Sig.
Intercept	2.420	.878	2.755	.007
[Sex=1]	-.269	.190	-1.418	.158
[Sex=2]	0 ^a	.	.	.
Chitwn	.439	.194	2.262	.025
Kathmandu	0 ^a	.	.	.
Age	-.030	.050	-.602	.548

It shows that there is an association between frequency of visiting farm or garden from school with Location ($P=0.025$), and not with sex and age, suggesting that participants from Chitwan, visit school gardens or farms more frequently than those from Kathmandu.

6b.3 Self rating of cooking skills

The following General Linear Model explores the association between cooking skills with location, gender and age.

Table 10 Self rating of cooking skill

Parameter Estimates				
Dependent Variable: Self rating of cooking skills				
Parameter	B	Std.Error	t	Sig.
Intercept	.437	.963	.454	.651
[Sex=1]	1.162	.208	5.584	.000
[Sex=2]	0 ^a	.	.	.
Chitwan	.018	.213	.086	.931
Kathmandu	0 ^a	.	.	.
Age	.102	.054	1.872	.063
<p><i>a. This parameter is set to zero because it is redundant</i></p> <p>b. Sex 1= Girl, Sex 2= Boy</p>				

The table 10 presents that cooking skills are strongly linked with gender status. The self-rating of cooking skills is significantly higher in girls than boys and it's statistically significant ($p < 0.001$) however, not statistical relationship was found between rating of cooking skills, and location and age.

6b.4 Self rating of interest in working at school garden or farm

The following General Linear Model explores the association between interests in working in garden or farms are associated with location, gender and age.

Table 11 Interest in working at garden/farm

Parameter Estimates				
a. Sex 1= Girl, Sex 2= Boy				
Dependent Variable: Self rating of interest in working at school garden or farm				
Parameter	B	Std. Error	t	Sig.
Intercept	2.579	.967	2.667	.009
[Sex=1]	.828	.209	3.964	.000
[Sex=2]	0 ^a	.	.	.
Chitwan	.852	.214	3.990	.000
Kathmandu	0 ^a	.	.	.
Age	-.023	.055	-.413	.680

Self-rating of interest in working in farm or garden was found to correlate with sexes and place of residence but not with age ($p=0.68$, $p>0.005$).

6b.5 Frequency of cooking (per week)

The following General Linear Model will explore the association between if frequency of cooking is associated with Location/Gender/age.

Table 12 Frequency of cooking per week

Parameter Estimates				
Sex 1= Girl, Sex 2= Boy				
Dependent Variable: Frequency of Cooking				
Parameter	B	Std. Error	t	Sig.
Intercept	-.909	.900	-1.010	.314
Age	.148	.050	2.936	.004
[Sex=1]	1.726	.273	6.326	.000
[Sex=2]	0 ^a	.	.	.
Chitwan	.533	.273	1.952	.053
Kathmandu	0 ^a	.	.	.
[Sex=1], Chitwan	-.622	.384	-1.619	.108
[Sex=1], Kathmandu	0 ^a	.	.	.
[Sex=2], Chitwan	0 ^a	.	.	.
[Sex=2], Kathmandu	0 ^a	.	.	.

It shows that there is an association between frequencies of cooking (per week) with Location ($P=0.05$), gender ($P<0.001$) and age ($P=0.004$). Meaning that participants from Chitwan, and especially Girls are more likely to be involved in cooking food than boys and students from Kathmandu. It also shows that there is the evidence of association between age and frequency of cooking.

6b.6 Frequency of involvement in purchasing food groceries

Table 13 Frequency of involving in purchasing

Parameter Estimates				
Dependent Variable: Frequency of involvement in purchasing food groceries				
Parameter	B	Std. Error	t	Sig.
Intercept	-.572	.919	-.622	.535
[Sex=1]	1.065	.199	5.363	.000
[Sex=2]	0 ^a	.	.	.
Chitwan	.505	.203	2.488	.014
Kathmandu	0 ^a	.	.	.
Age	.159	.052	3.052	.003
<p>a. This parameter is set to zero because it is redundant.</p> <p>b. Sex 1= Girl, Sex 2= Boy</p>				

The General Linear Model above explores the association between the frequency of involvement in purchasing food and groceries are associated with location, gender and age. It shows that there is an association of frequencies of involvement in purchasing food groceries with location ($p=0.01$), gender ($p<0.001$) and age ($P=0.003$).

6b.7 Priority given while purchasing food (Nutrition/Price of food/taste/ convenience)

The following General Linear Model explores the association between of different priority factors with location, gender and age.

Table 14 Priority while purchasing food

Parameter Estimates				
Dependent Variable: Priority given while purchasing food at home				
Parameter	B	Std. Error	t	Sig.
Intercept	2.103	.740	2.844	.005
[Sex=1]	-.282	.160	-1.765	.080
[Sex=2]	0 ^a	.	.	.
Chitwan	-.472	.163	-2.888	.004
Kathmandu	0 ^a	.	.	.
Age	.044	.042	1.043	.299
a. This parameter is set to zero because it is redundant.				
b. Sex 1= Girl, Sex 2= Boy				

The results revealed that there is an association between factors that are prioritized while buying food, with location, gender and age. The prioritization of nutrition while buying food was higher in Chitwan than Kathmandu and it's significant ($p=0.004$). Moreover, students in Kathmandu prioritize price while shopping. However, nutrition prioritization was not linked with age as well as the sex of the students.

6b.8 Who have a say (decision making) on your school lunch)

The following General Linear Model explores the association between decision-making power with location, gender and age.

Table 15 Decision making power in school lunch

Parameter Estimates				
Dependent Variable: Who have a say to decide about your school lunch				
Parameter	B	Std. Error	t	Sig.
Intercept	1.113	.403	2.758	.007
[Sex=1]	-.231	.087	-2.654	.009
[Sex=2]	0 ^a	.	.	.
Chitwan	.146	.089	1.640	.103
Kathmandu	0 ^a	.	.	.
Age	.041	.023	1.784	.077
a. This parameter is set to zero it is redundant.				

The table above presents there is evidence of association between the decision making power with sex ($p=0.009$). Girls are more likely to be dependent on other's decision than boys. No association between decisions making and location and age was observed.

6b.9 Reading and understanding of labels in food packages

The following General Linear Model explores the association between reading and understanding of labels on food packages with location, gender and age.

Table 16 Reading and understanding food labels

Parameter Estimates				
Dependent Variable: Reading and Understanding of labels on food packages				
Parameter	B	Std. Error	t	Sig.
Intercept	.493	.563	.877	.382
[Sex=1]	.203	.122	1.670	.097
[Sex=2]	0 ^a	.	.	.
Chitwan	.210	.124	1.694	.093
Kathmandu	0 ^a	.	.	.
Age	.068	.032	2.139	.034
a. This parameter is set to zero because it is redundant				

Only age appeared to affect the reading and understanding of labels on food packages ($p=0.034$) whereas gender and place of residence (location) show no association with them.

Chapter 7

Analysis (Interview and Survey)

As explained in the research strategy and philosophy of science chapter, various philosophical techniques have been applied to interpret data obtained from both quantitative and qualitative method. Below, the process of analysing data has been summarised in brief.

1. ***A careful Reading of obtained data*** -first understanding of the received data in general.
2. ***Thematic Structural Analysis*** - seeking to identify and formulate themes that convey an essential meaning of lived experience.
3. ***Comprehensive Understanding***- the themes are summarized and reflected upon relation to the research problems and existing research/literature.

In order to interpret the text, the first step was *making* general view on the answers from the interviews, survey outcome and evidence based literature. The purpose of conducting naïve reading is to get the meaning of the received data as complete as possible. Next step was the *Structural thematic Analysis* in which themes are being identified and formulated. This is done by dividing the text into meaning units in that process some parts of the interview and survey was considered not relevant to the study themes and further excluded. Based on the careful reading the themes were developed considering the purpose of the study.

Afterwards that condensed meaning units were read thoroughly and reflected upon in order to find similarities and differences; they were further sorted out and developed into sub-themes, which were assembled to themes as all part of the main theme of the study. When the common themes of all 10 interviews and 144 survey outcome were made, in which 1 response was excluded the actual or summarized saying of each participant placed in a scheme according to person and theme, which gives a clear overlook for further

analysis of the data. Afterward, each theme was compared as reflection of food literacy from respondent point of view.

Results clearly demonstrated that the complexities and challenges exist in the development and utilization of food literacy. Young participants from two different cities experience very different challenges with regards to the knowledge on healthy eating and learning. The main reasons for all the challenges are disinterest towards food and agriculture, lack of passion towards food and skills related to food preparation and consumption. Moreover, lack of space, the isolated learning environments, lack of hands on activities, and in many cases parent's knowledge and awareness, occupation along with other socio economic factors.

In this particular research food literacy refers to the various indicators of food literacy – Knowledge, skill, attitudes, values and action those identified by participants and were conceptualized. This research carries a potential significance and understanding of food and how young student perceive food how it is influences by the surrounding environment.

7.1 Gender and indicators of food literacy

One of the main findings of this study is there is association between gender and food literacy indicators. Nepal being a male dominated society, it might have an impact that females are more involved or are obliged to be involved in preparing food. The data clearly demonstrate that female participants have better understanding of food and are much more involved in daily food purchasing, producing and preparing phase of food and they know more about food and its' nutrition value.

26.8% of girls in comparison to 19.4% of boys responded that they read and understand the labels in food package where as 28.2% of girls to 37.7% of boys responded that they never check or read labels of food packages. Although there was a difference in percentages between boys and girls it was not significantly significant.

The current study also find that 37.5% of boys and 28.2% of girls participant responded that they never check the label in food packages, which is very interesting in a sense that the young and educated individual are rarely involved in reading, checking, understanding and acting accordingly. Even though labels contains a valuable piece of information from energy percentages to other important nutrient information more boys rarely read them.

The food literacy component of knowing how to cook was strongly associated with gender ($p < 0.001$). Significantly higher number of girls (85%) knew to cook than boys (48.6%) even though their mean age was 17 years. This is quite interesting to see the vast difference between two genders of same age in term of being able to cook food. It calls for an attention to intervention targeting gender and suggest for the need of equality in terms of rights between genders. In an interview session one of the girl participants expressed her obligation to be involved in cooking but not her brother.

In another test of self-rating of cooking skills, the statistical test found out the strong evidence of association between gender and self-rating of cooking skills ($p < 0.001$). 22.6% of girls responded that they are very bad or bad in rating their cooking skills whereas 62.5% of boys responded same. 57.8% of girls in comparison to 19.4% boys rated their skills as very good or good category. This further hints the vast difference in cooking skills and competences. This could possibly be because of their differences in interest in field activities and gardening.

There was a strong evidence of association between the interest in working in garden or farm with gender ($p < 0.001$). 26.8% of girls and 59.8% of boys responded that they are not all interested or uncertain about the interest. Whereas 23.9% girls and 11.1% of boys said that they are very much interested in working in garden or farm. This demonstrates the lack of motivation especially among boys to work in garden or farm.

Their frequency of involvement in cooking demonstrated that 11.3% girls and 45.8% of boys never cook food, only 5.6% of boys and 19.7% of girls cook food every day. The involvement of boys in cooking came to be statistically significant ($p < 0.001$).

It was also found that significantly higher number of girls (17.5%) than boys (8.3%) help in buying groceries every day and it was statistically significant ($p < 0.001$).

All the components of food literacy demonstrated that there is a vast difference of knowledge, attitude, skills, competences and action between boys and girls of the sampled population. Boys seem to be less interested in food preparation and shopping in compare to girls. Similarly, girls seem more competent than boys in selecting right food, food preparation and food handling.

7.2 Decision making: Gender perspective

Gender discrimination in household level is evident in Nepalese families. It is also reflected in the responses from the survey as 57.7% of girls in compare to 75.0% of boys have a say on deciding theirs' school lunch. Similarly, 38.0% of girls and 16.7% of boys responded that their parents are the one who decides about their school lunch. It was further tested by a statistical test and it came out to be significant ($p < 0.001$). This shows strong evidence of association between gender and decision-making. It showed that, although lots of girls are involved in shopping, preparation process and are more aware than boys, they have less power to decide their own lunch. Girls are dependent on their parents. Contrastingly, boys are less skillful to select right food while shopping and less competent to read label while buying but have right to decide what they want to eat for their school lunch and at home.

7.3 Location and indicators of food Literacy

Another important finding of this study is the association of location and food literacy component. 31.9% participants from Chitwan and 14.1% from Kathmandu responded that they always check food labels. Although, the association while tested was not statistically significant, respondent were asked if they know cooking and considerably higher number of participants from Chitwan (40.8%) responded "yes" while only one quarter participants from Kathmandu (25%) replied "yes". And the difference was statistically significant ($p = 0.034$).

Even though there was no statistical difference ($p=0.08$) between participants of Chitwan (31.7%) and Kathmandu (43.7) categorizing their cooking skills as “bad” or “very bad”, it’s worth noting a notable difference between two places. The difference in percentages could mean that participants in urban areas are worse off in cooking than participants of rural areas. This notable difference could also be that participants from Kathmandu are less interested in working in garden as it was observed that substantially ($p<0.001$) higher number of participants from Chitwan (54.2%) were “fairly interested” than participants responding “fairly interested” from Kathmandu (31%).

The present study finds that there is association between frequency of cooking with place of residence (location) but not statistically significant ($P=0.053$). Less number of participants from Chitwan (23.6%) responded that they never cook than researched participants from Kathmandu (33.8%).

While measuring the frequency of involvement in purchasing groceries 22.2% of participants from Chitwan to 12.7% from Kathmandu responded that they were involved in the process of purchasing groceries every day. In another category 11.1% and 22.5% of participants from Chitwan and Kathmandu said they never get involved in shopping groceries respectively. 20.8% participants from Chitwan to 7.0% from Kathmandu responded that they consider nutritional value as priority and 13.9% and 28.2% of participants from Chitwan and Kathmandu prioritized taste while food is purchased at home. Many different components above present that there is difference in food literacy knowledge between those from Kathmandu and Chitwan, as participants from Chitwan were found to be more involved and aware on different food literacy components. It clearly calls for an attention or intervention especially for the youth of Kathmandu as they lack the motivation and interest towards food and its preparation. It is also clear that the lack of space also influence in gaining food literacy knowledge. Participants from Kathmandu expressed their frustration of not having space in their home prevented them from working in garden or farm. They also expressed their interest if school could initiate and establish a school garden where they could participate to enhance their food literacy knowledge.

Chapter 8

Discussion

8.1 School- based Gardening, Food and nutrition education

Schools have been identified as a potential point of change in current health and food behavior. But, there are issues within the school systems, such as lack of essential infrastructure, space, equipments and trained teachers (Dyg et al. 2014). Although some initiation has been taken to change in school environment; either solely by school management or by ministry of education, which mainly focused on the eating environment around school by banning the sale of fast food such as noodles and chocolates in school canteen. In some schools it is not allowed to go out from the school boundary at break time to prevent children from eating junk food. But that does not necessarily solve the problem as students lacked the knowledge about negative consequences of junk food.

The primary focus of schools in Nepal is theory-based education through instructor and books rather than hands on practical education such as cooking classes, planting and gardening to explore about the food related subjects. Home economics, cookery are undervalued subject than math and science (Colatruglio, 2015). So, it is very important that educational institution take an initiative in development of practical aspect of food skills and behavior such as proper use of kitchen equipment, knowledge on environment, sustainability and local food. Similarly, priority should also be given to make children competent to understand food labels and to enhance skills related to planning, shopping and preparing of food.

The issues discussed above have affected food literacy knowledge in general for both urban and rural students; those issues could be also described as the barriers of food literacy in this case.

8.2 Food and Nutrition Trends

In Nepal, eating with family is very much the nucleus of family life, every morning and evening all the family are together eating meal prepared mostly by mother or daughter in the family. A trend of eating rice as the main source of energy with vegetables and lentils soup is very common in Nepalese family. The trend of eating together is slowly diminishing as more people are migrating to cities for work and eating together with family may not be feasible everyday because of different work schedule of each family member.

Previous studies have shown positive association between eating in family and consumption of fruits and vegetables (Colatruglio, 2015), but this is not the typical case in Nepal as the main staple food consists of mainly carbohydrate and fruits normally are not the part of daily meal. So, the chances of lacking the same kind of nutrition and vitamins could be justified by the homogeneous eating pattern in Nepalese family. However, the skills and food behavior with food culture and habits are basically the positive aspects of this trend as most of the respondents said that mother and her cooking skill are followed by the children in Nepal; the food trend and culture is basically transformed to children from the older generation.

8.3 Social positioning

Being a male dominated country, Nepalese women and girls have very little to say in family matters, as most of the male participant said it is their mother and sisters who cook food and buy groceries for home. Intra-house gendered equality has been shadowed because of the controlling power is only given to male; it has two-folded effect in understanding of food literacy among girls and boys. In one respect, social positioning has attributed the girl's knowledge, skill and attitude in relation to food; as they are self empowered by taking part in cooking and shopping regardless their interest in it, this is however a result of a forceful condition which may not sustain for longer period. In another respect, boys are being lazy and careless about their eating by not participating in preparing food and in shopping. The culture worked here as catalyst and become part of social thinking that has defined cooking and shopping grocery is girl's/ women's work. As derived from the

conservative aspect of gender and work division within the family, where men is defined as breadwinner and women as homemaker; by the time being in Nepal there is a risk of women to go 'back in the kitchen' instead of being empowered through education and equality (Kimura, 2010).

8.4 Perception of healthy diet

A notable number of participants seem to have some understanding about healthy diet as it matches with the definition given by World Health Organization (WHO) to some extent. World health organization defines healthy eating as "Eating adequate amount of fruits and vegetable, legumes, nuts and grain at the same time with less consumption of sugar salt and fat, lowering saturated fat and trans fatty acid"(WHO, 2014). This definition however, is not the ideal definition of healthy eating/diet; but it has been used as a baseline definition in the study to compare the definition given by the participants.

Some students defined healthy eating even more inclusively by talking about the consistency on meal, some were talking about exclusion of alcohol and smoking, at the same time some student were also talking about consuming less fatty and sugary foods; an understanding of what food and how food should be eaten is a reflection of food literacy. Apart from 3 interviewees from Kathmandu, remaining participants defined healthy eating/diet quite well and similar to the WHO definition; it means they are quite competent enough to differentiate what healthy diets differ from unhealthy diets.

8.5 Consciousness about environment and eco-system

One component of food literacy by Vidgen (2011:2012) is becoming informed about how food is produced and how it is related environment. Modern agriculture aims at producing in huge quantity to make profits; by using modern technology, seeds and agro- pesticides, which is responsible for current deterioration of eco-system (Lang & Heasman, 2015). Global food trade has made food available at any place, food nowadays travels more than before increasing carbon footprint. Food Storage and preserving facilities have also been releasing more carbon, which is responsible for climate change. Soil quality is diminishing because of the use of intense pesticides and product enhancer chemical (Weber &

Matthews, 2008). An alternative food production system is now spreading rapidly as organic farming; aims at stopping use of pesticides and chemicals along with heavy equipment while producing food, taking care of environmental sustainability and ecosystem (Francis , 2009). Similarly, promoting local small-scale food producer to minimize carbon food print by limiting transportation and storage has also been practiced everywhere (Foster, Green and Bleda, 2007). Four students out of ten involved in interview had very clear view in what is local and organic food along with the production techniques. Those students who knew about the organic and local food were able to discuss about how organic production can save soil quality and have positive impact on ecosystem. In spite of that, the remaining participants did not know about the positive health and environmental impact of local and organic food. Some of them have not even heard about organic food and production. In context to Nepal, organic movement is not new; it is been supported by government of Nepal and have provisions in act for organic certification. Some neighbouring districts to Kathmandu are producing organic foods since the last past decades. Similarly, some supermarkets in Kathmandu have given high priority to local organic production and have given relatively good space in supermarket (Bhatta et al, 2009). Majority of Nepalese students lack information on how food production is inter-related in making environment sustainable; therefore student should be well equipped with the knowledge, which could ultimately help students choose foods that are less harmful for the ecosystem. As proposed before a garden based education can be a solution for providing knowledge with organic approach to improve attitudes of school children's to the nature and environment (FAO, 2010).

8.6 Learning about food and Nutrition

The majority of participants in this study (interview) said parents or mother as their source to learn about food preparation at home. Home based nutrition education is very rare as nobody of the participants mentioned that they have learned from home about selecting right foods, handling of food and maintaining food hygiene as do not expect to learn from home because everybody work. Busy time schedules of parents provide less time for teaching about the meal at home, which limits the ability of children to visit to grocery store with parents or help with food preparation. Only 17.5% of the total

respondents go to shop or help to shop groceries in daily basis with 16.8% responding that they never go to shop groceries. Especially participants from Kathmandu 22.5% reports that they are never involved in shopping groceries whereas only 12.7% responded, as they were involved in shopping groceries every day.

These results are consistent with the existing body of literatures which focuses the concern of the limited time with parents to demonstrate, monitor, help and assist on their skills regarding the basics knowledge of food preparations and dependent on fast food, restaurants and supermarkets (Colatruglio, 2015). However food prepared in home nowadays especially in middle class family in Nepal is mostly a homogenous food as described by participants with less creativity and variety focuses on easy staple food, rice and lentils soup with some vegetables. Unfortunately, these foods are very poor in nutrients but are rich in energy and carbohydrates. Women are the one who are responsible for feeding the family regardless of knowing right food sources and cooking skills, which lead the food being poor in nutrition and unhealthy. Since mother is not well equipped with food knowledge, children obviously do not get facility to learn about food in their home. Despite the fact that, studies have found that childhood food experience have a positive association to food skills and health, as those who are involved in cooking in early or late childhood are the one who are involving and practicing in cooking in the late stages of life (Colatruglio, 2015).

8.7 Home economics food and nutrition: A subject of very less importance in Nepal

Schools have been identified as a potential mediator of change of the current health and nutrition problems (Ghimire, 2014). A result from this study indicates that children in Nepal are not being taught about the basic food skills knowledge. Home economics, food, nutrition are given less or no priority ahead of math and science. So the mentality of teachers and parents is just to provide knowledge on subjects such as math and science. They do have misconceptions that their children have a bright future in doing so, instead of providing education that needed for the daily life.

The existing health population and environment education focus on giving information and not much on food skills and nutrition. The participants did not perceive this education to be helpful with regards to being able to make rational choice and well equipped with food skills for independent living. Significant challenges exist in current curriculum related to health and food, curriculum is very much informative and outdated and hence children have less interest, which de-motivate students towards food and health. To be able to prepare youth to effectively navigate the complexity of food system it calls to a mandatory introduction of Health, food and nutrition education with tools to provide youth with all the skills required.

8.8 Food literacy in practice

55.6% of the participants out of 143 responded that they do not suggest their parents on what to buy while they go for shopping. Although, the participants have some knowledge on what to eat and what is healthy and nutritious and what consists of balance diet, they are not really involved in making the decision on what is cooked or prepared. Participants in the interview expressed that the taste and the pattern of food is almost same everyday and with no changes. Some other individuals who were living alone explain that price as a factor for choosing food as they cannot afford for example broccoli, carrots every day which cost relatively higher than potato and rice.

8.9 Collaboration

The participant's active and enthusiastic participation in this study reflect participant's commitment to food and its surroundings. All the youth participants were curious about the fact that the study unfolded and most of them identified the food they eat have an importance on their life although not everybody was involved. Most of the participants express their opinions about that school have a passive way of teaching and learning and school lacked hands on activities. Public schools do not want any extra burdens although they have space around the school, whereas other private school does not have any space around. Student's interest or passion only would not be enough in establishing school garden. For the change, there needs to be change from policy and curriculum on teaching

and learning. Here it seems like there is a lack of collaboration between those who are actually doing changes in society and those who are the one governing the society. Policy makers, nutritionist, school administrators, students, teachers and civil society for the benefit of all should materialize this effort.

Summary of Discussion

Background literature and outcome of this study have found that food literacy in current era is an indispensable need of human being because food is connected with every aspects of life including health, culture, personal interest and environment. There is however, very less work has been done in making general population aware of food related issues leading to adverse health impact, deterioration of ecosystem, food loss and food insecurity. As world is divided in to two very altered economic condition, a part of world who have enough resources and abundances of food, with food is considered and is developed as luxurious commodity, and on the other part of the world where people are insecure about food have very limited resources and feeding is the main purpose of food as they do not have enough resources (Godfray et al. 2010). This dilemma has put people in conflict to make selection between rational and random food choice. Current global food system aims at producing highest quantity without taking care of environment; as a result the soil quality is degrading and weather is being unpredictable following global warming.

A severe condition can be observed in relation to the diet related disease; non communicable life style related disease has been plunged at its higher in both developed and developing countries (Alwan, 2011). An initiation should be taken immediately to fight with this condition before it goes beyond the control. A comprehensive diet related intervention is now required to make people aware at individual, household, national, regional and international level, regarding rational consumption of food. Theoretical foundations in this study have assessed how human behavior related to food has been affected by the different factors including environment, peer pressure, law, availability, accessibility and cognition. This is further proven by the outcome of survey and interview, as student behavior has been seen as a reflection of those factors transformed into actions; Some other social issues that have identified as barrier in making children competent to

rational food choice are gender bias in family, girls positioning in society and bias on right to take decision. These above mentioned issues could only be solved with practice in empowering those disadvantaged groups.

Literature review shows that there is an ideal way to make young students aware of diet related issues by engaging them in to the garden based intervention where they learn different paradigm related with food. A change is only sustained when it is applied through the appropriate method; school garden is identified as a potential mean to change. Findings of this research also support the inclusion of school garden as a useful component of experimental learning strategies for nutrition education. A better understanding of adverse effects of modern farming system in environment would enhance the utility of knowledge given through school garden.

As school garden aims to add a new dimension to the old pattern of education system and creates opportunities for new practice and actions in relation to food. School garden along with school meal could better address the issue of micro and macronutrients deficiencies. School garden also has a scope to improve the environmental condition of the entire city if it is accepted as a need of every school. The city can have better urban planning, creating more green spaces with fresh air and water; which can create a livable environment with beauty along with health and environmental benefits.

Chapter 9

Implication of the research

The result from mixed methodology and outcome from the subsequent data analysis have brought both opportunities and challenges in planning and implementing a garden based intervention to nudge student towards rational food choice. As experienced in other part of world there is no any other effective intervention than school garden to enhance food literacy. Some challenges have been identified which is mostly based in the context, similarly several reasons has been detected behind youth being increasingly de-motivated in cooking or in agriculture activities. Therefore, author of this study have seen significant implications for educational interventions of school garden as the potential motivational tool for change. School based food literacy and nutrition education is an area where a significant change could be expected with a positive impact on the current health and environmental problems.

This study has also opened a door for other garden based intervention in motivating parents and other community members such as community garden and kitchen garden because students being food literate will not bring the influential change on what they eat at home as the parents are the one who have a say, what is to be eaten in everyday life in Nepali context. So, a boarder prospective of intervention focusing on different stakeholder related with the project to change in their awareness level regarding food is another possible challenge to deal with.

Coping and collaboration in multilevel social structure is another challenge in making them actively involved in project as they may have their own interest and power to influence the project. So, this could be an opportunity to work together to strengthen social capital. There will of course be some issues in provision of resources, designing curriculum and allocating time for school garden. This is however can be dealt with common agreement of different actors involving in. As school garden has huge potential to spread in whole country; a focus should be given for girls and rural area because those disadvantage group

and area can be facilitated to get empower through the holistic approach of school garden. Similarly, a strategy in engaging more male in food related activities should be accomplished to change people's thinking that cooking and shopping is girl's job.

Chapter 10

Limitations of the study

This study has several limitations that should be taken into account. Researchers faced with time and resource constraint in covering wider paradigm related with the research. There are some other issues that have limited this study in interpreting and generalizing the result and its outcome. The study is conducted in an academic environment in very small sample size 153 in total including 143 survey and 10 interviews in two different cities of Nepal; this sample size may not be generalizable to the wider group, age and gender, from different socio-cultural, educational and geographical representatives.

Food literacy is not a familiar topic in Nepalese context; a comparative study would help in polishing its outcome if other study had been done previously in given context. Similarly, an analysis of trend and development on food literacy could have been done if similar study were found. Only newspaper articles and some seminar reports were found but not included as those sources were not authentic and evidence based. As mentioned earlier a pilot test was conducted before survey to make survey questionnaire as understandable as possible. All participants sat in a lab, at the same time they were allowed to talk with each other so there was a chance of manipulation in the answer, which might have affected survey outcome. Some cultural bias has also been observed while choosing sample student; students were asked politely to take part in survey and in interview. The students that came first were given higher priority but it could be the case that students who were academically clever and extrovert might only have been selected and this could have affected the study's outcomes. Another limitation has been encountered during the statistical analysis because the food literacy indicators are not very easy to measure due to its relation with social, cultural influence on food. A standard food literacy score would have been a better way to assess the overall knowledge on food literacy. Researchers' preconception could have also influenced in questionnaire designing and while conducting interviews therefore it could have slightly affected the outcomes of the research.

Chapter 11

Strengths of the study

In spite of having some limitations, this study carries a huge potential explaining the understanding of food literacy at individual level; a new and challenging topic to carry on in Nepalese context. This study can serve as baseline information for future research in Nepal. Similarly, mixed method approaches to explore the findings and reviews of existing literatures have complemented each other, which can be seen as strength of the study.

The overall study is a cross-sectional study on suggesting school garden could be an ideal way to make children food conscious to enhance food literacy by using triangulation, which provides room for generalization and validation than those studies following a single method. This study include sample population from two geographically, demographically different cities which could represent a more diverse representative sample.

However, further research is required to explore the scope and boundaries of food literacy with a bigger sample size and more in depth interview to see how food literacy could have an influential effect on public through educational institution to family, society and other public and private sectors.

Chapter12

Conclusion

The objective of the study was to measure the food literacy level among Nepalese student to design a garden based intervention, which aims at making student competent to make rational food choice from the early school age. The study reinforced and explored the perceived diversity in understanding food literacy in a given sample. The study found that there are different determinants that have positive or negative influences in students food related behavior, which is reflected in their actions willingly or unwillingly. Some socio-cultural practices, which have been practiced from over the period such as male domination on decision-making power in family, will take some more years to be resolved. By exploring the status of food literacy and its potential components and proposing a model for its relation to school garden and its importance, this study gives a useful and straight forward view to the possible stakeholders who have potentiality and willingness to bring changes in food and nutrition system in Nepal.

The growing concern in relation to health and environment by the individuals that connects food and food related an activity has led to the condition where the current food related behavior should be reviewed. It should be reviewed in such a way; that gives high priority to the individual's health along with environmental sustainability through rational food choice. Some developed countries has taken initiation in making action plan for achieving this goal by including food in political agenda and in public discussion. Making every individual aware of food and its multi-sectorial impact is the ultimate goal in achieving the ideal situation where everyone is equipped with the knowledge and competency regarding every aspect of food. The study concluded that Nepal is facing food related nutritional problems such as overweight and obesity leading population to several non-communicable diseases. To overcome this situation, food and health related interventions should be introduced targeting the disadvantaged group. Policy makers, politicians, public health workers, nutritionists, teachers and students together with

decision makers and management could put a novel shifts on the current trends and practices on food literacy.

Chapter 13

Foodscape Project

Demo Foodscape Project (School Garden) at Prashanti Shikshya Sadan (PSS)

The demo school garden project will be located in Prashanti Shikshya Sadan (PSS) located at Kathmandu, Nepal. PSS is one of the schools approached for the survey and an interview. School is situated in the heart of Kathmandu, and considered as one of the popular private school within middle class family in its surrounding. School is equipped with 2 buildings, computer lab, library and own sports ground. School has one canteen inside the school premises operated by outsiders however; school has nothing to say about the meal prepared in the canteen till date, apart from alcohol and cigarette. Fee paid by students and donation from other community member is the school's main source of income. PSS do not have any other income generating activity than rent collection from canteen. The project focuses on the school garden inside the school boundary; seeking for better educational activity along with food and food related activities that ultimately enhance the food literacy among students. School has plenty of unused space which observed during the school visit; although the formal agreement has not being made beside some discussion about the school gardening concept in which the teachers and students seems excited.

Based on the context information of PSS; a simple and achievable school garden project has been designed as foodscape project inside the boundary of PSS. Needs assessment has been done after analyzing survey and interview results; that seek for a garden based intervention in making school children competent in rational food choice considering health and environment. A deep understanding of the chosen reality has allowed in defining problem; together with mapping the acting role of the stakeholders involved. A timetable strategy with GANTT chart to establish a milestone strategy has been done to finish project on specific time. As project is interest of different agencies related with it in

making project successful with their power, legitimacy and urgency; agencies has been figured out in both backstage and front stage. By using local community foodscape assessment tool (LC-FAT). Similarly, a project can always face some uncertainties and problem during its life course; a plan for risk and contingency has also been design being based on the ground reality. Finally an evaluation plan for along the way has also been designed in order to evaluate the project outcome.

As a school, to have a properly cured school garden means to be able to offer a multilevel approach on different food sciences by involving the pupils with both theoretical and practical activities so as to stimulate their knowledge, curiosity and to positively shape their habits toward healthy lifestyles (Hawkes, 2013). Students will become aware of where food comes from and will be generally acknowledged about the modern food system along with different agriculture practices; which is considered as a breakthrough in understanding food literacy (Dyg, 2014). The practical approach in school garden would stimulate student's natural curiosity leading them to get back a knowledge, which is not given priority in the educational program through school curriculum (Blair, 2008).

It is evident that gardening counts as physical activity, so breaking the sedentary routine of the lessons, which oblige students to sit for several hours watching television and playing games (Wells et al. 2014). Creating teachable moments within the field by farm to school collaboration is also a valuable tool for implementing good eating habits enhancing the consumption of fruits and vegetables (Dyg, 2014). Indeed, it is for sure that kids involved in gardening activities, such as growing edible plants and vegetables, are more likely to become less picky as vegetable eaters and to explore and appreciate new flavors from different fruits and vegetables (O'brien et al. 2009).

Another aspect directly linked to food literacy is the understanding of the relationship between human, nature and food as part of it; how food production and consumption have indispensable relation with environment (Bhattarai, 2015). To know about food seasonality and what eating different food is good for can surely help younger generations to gain healthy habits from early age, as most of participants engaged in school garden activities reflects their knowledge when going for shopping, being active in home, showing

interest kitchen garden activities (Joshi et.al, 2008).

13.1 Stake holder analysis

Stakeholder analysis is an essential part of project planning as stakeholders are groups/individuals and organizations that have potential to influence the project aim and actions for their interest (Burgha and Varvasovszky, 2000). Actors identified in the project at PSS mainly are the teachers, students, local community, parents and the municipality; all these are integral part of community where school is based on. The role of each stakeholder is important in order to implement the foodscape project in the school area; because each stakeholder has some power to influence project in negative or positive way. The table below illustrates the potential actors in implementing school garden in PSS.

Table 17 Stakeholder involved in the project

Stakeholders	Stakeholders role	How do we meet what stakeholders want
Prashasnti Sikshya Sadan (PSS)	Facility owner/Implementers	Proof of success:- Educational and health; students cognitive skills
Local community	Continuation/Support	Proof of success: community building and participation
Students	Target group/ Active participants	Enhancing knowledge and skills in food related behavior, different approach to teach math, science and environment
Parents	Support/Participation	Proof of success: Quality of life of all family member
School teachers	Expanding learning and educational experience/time	Skill development, training/seminar increasing

	management	teaching competencies
Municipality	Fund raising, political support, legislative support	Project proposal: evidence of success, increasing community assets
Researchers/IFS students	Idea development, consultation and research	Involving to make change in society

13.2 Agencies

Agencies normally are the human actor that have interest in the project; and are defined as an important part of local community foodscape assessment tool (LC-FAT); which is mainly used for selecting appropriate actors related to the project (Mitchell et al. 1997). As given in the LC-FAT a simple categorization technique with three scores has been used in order to figure out right actors; based on power, legitimacy and urgency in relation to school garden in PSS. The table below shows the agencies related to the project in which school principle and municipality have been identified as main agencies assessing their power legitimacy and urgency in the project planning and implementation.

Table 18 Agencies in school garden at PSS

Agency and preparedness	Power	Legitimacy	Urgency	Rate the important of stakeholders base on PLU (From 1 to 3) low, medium and high
Front stage				
Principle	X	X	X	3
Parents association		X		1
President of operating committee	X		X	2

Teacher (Health, Population and Environmental studies)		X	X	2
Backstage				
Municipality Physical planner/ Engineer	X	X	X	3
Researcher (IFS students)			x	1

13.3 GANTT-Chart

Gantt chart is a tool to present visual overview of key dates in any projects. It is an essential tool to keep project in track with its time framework and tasks. At the beginning it was however only used as a production-planning tool to track actual production against daily goals. Gantt chart is not a solution technique but is a tool to facilitate an effective communication tool for project planner (Wilson, 2003). The table below illustrates the detail of the project timetable for the foodscape project at PSS; the project is expected to finish in 10 weeks. Starting from the second week of July to the second week of September; the session will be closed before festival holidays begin from mid of last week of September. First 3 weeks will be preparatory week; visiting school administration and teachers explaining possibilities having school garden inside the school area with proper project proposal.

Similarly, Third and fourth week will be allocated for stakeholder meeting and an event with them concerning support and fundraising, stakeholders will be asked for their view on proposed matter which will be an ice break regarding their interest and power. Week fifth and sixth will be focused in preparing field, fencing, making roof, arranging lighting and water. The seventh week will be the week for planting seasonal vegetable and fruits in the

prepared garden. In eighth week there will be a special event with all stakeholders took part in the project; hand over ownership of school garden to PSS will be in the same event. The evaluation and follow up will continue up to week 10 in order to avoid possible problems.

Table 19 GANTT- CHART with key dates

Activities	July				August				September		Estimated time (Approx.)
Week	28	29	30	31	32	33	34	35	36	37	
Preliminary planning, approach method	X										15 hours
Project planning with expected outcome		X									10 hours
Visiting LHSS to with project proposal		X									3 hour
Preparatory meeting with teachers			X								1 hour
Preparation for stakeholder meeting			X								2 day (full)
Workshop with stakeholders and teachers				X							1 day (full)
Field preparation					X	X					3 day (full)
Planting							X				1 day (full)
Handing over								X			3 day (full)
Evaluation and follow up					X	X	X	X	X	X	1 day (full)

13.4 Budgeting

Budgeting is an overview of the money required for the project, at the same time it is also an outline of the allocated fund in different project related activities. Expenses in project normally divided in to two basic categories as direct and indirect (Crawford et al. 2003) in the foodscape project in PSS some fund is allocated as indirect expenses that is information and administration expenses. Project cost is valued Three hundred forty one thousands, six hundred and thirty nine rupees (3, 41,639 NPR) in approximate. Some cost can be increased or decreased due to the market value of the material needed. Fund is expected to receive from municipality and community member, the representative from municipality however should be convinced in the stakeholder orientation meeting in order receive fund for school garden. The table below shows the expected budget to be spent in different activities.

Table 20 Preliminary budget allocation in different heading

S.N	Headings	Nepalese rupees
1	Preparatory meeting: (Snacks, travel, pen and papers, documentation etc.)	3,000
2	First meeting with school administration and teachers: with project proposal	1,000
3	First Event: workshop with responsible teacher: approach meeting (Poster, pamphlets, food and drinks)	2,000
4	Second Event: Orientation meeting with stakeholder in the school building (poster, pamphlets, food drinks)	5,000
5	Third Event: Preparation of school garden identifying/collecting necessary equipments, management of water and sanitation, plumbing, lighting and field preparation	1,50,000
6	Seeds, Gloves, Tapes, Fence; Organic manure, Plastics, Covering roof, Bamboos, small working equipments	1,50,000
7	Handing Ownership Event	5,000

8	Follow up cost	3,000
9	Project Cost	3,19,000
10	Information activities (2% of project cost)	6,380
	Subtotal	3,25,380
11	Administrative fee (5% of subtotal)	16,269
	Total	3,41,649

13.5 Contingency plan

Uncertainty in project can always come into sight any stage of project life; planner always cannot predict possible risk that can appear on course of project implementation. Though, problems and risks cannot be ignored but it is dealt with alternative solution; that alternative plan to mitigate the risk is called contingency plan (Andersen, 2008). In the foodscape project of PSS, there have some possible risks identified and contingency plan is proposed if in case the problem appear during the implementation. Firstly, it is very possible that even school management agree on making garden, the related course teacher may not be convinced to teach through school garden because some teacher may think it is a dirty job to work in field. However, it is also possible to convince them by an open discussion where researchers present some inspirational example from other countries, such as political figures and celebrity are also working in the field to make future generation competent to rational food choice. It may change their perception on fieldwork for educational purpose; if they still do not agree a pressure from school management would work better way to make them agree on their responsibility. Climate in this particular place it is also seen as a risk factor; during July it is very common in Kathmandu to have heavy rain and wind. To save school garden for that situation a plan to cover garden with plastics knitted with bamboo roof is made, similarly a hard plastic fence is also planned to lower the risk of heavy wind. The table below illustrates the possible problems that have been seen as a challenge in risk management.

Table 21 Contingency plan for possible problems

Analysis of Possible Problems		
Possible Problems	Measure that reduces the risk the problem occurring	Measures that reduces the consequences of the possible problem
Teacher and school staffs not motivated to start school garden	Open talk on the benefit of school garden	School management inspire or put pressure on teachers
Taking care of garden in winter vacation	Meeting with local community	Choose responsible volunteer for winter time
Heavy wind and rain during July and August	Pre-plan for the rain and heavy wind Making garden resistant to rain and wind	Making drains, water management, fencing, roof with plastic knitted with bamboo layers.
Operation and maintenance (continuity of the project)	Handing the ownership or dividing the task on groups	Division of work to do in school garden class wise with help of teacher.

13.6 Evaluation plan

Evaluations of the project need to be done in order to determine whether the intervention was successful in meeting projects goals and objectives (Crawford & Bryce 2003). Moreover, it is also needs to be done to know the reason behind the failure. Evaluation can be done both ways considering the need; it can be done in between the course of the project or at the last. As mentioned in the GANTT chart the evaluation will go throughout the project life even though the last two weeks has been allocated for the evaluation.

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Appendixes

1) Distribution of participants

Sex			Location		Total	
			Chitwan	Kathmandu		
Boy	Grade	8.0	0	1	1	
		9.0	1	4	5	
		10.0	6	7	13	
		11.0	16	10	26	
		12.0	16	11	27	
	Total		39	33	72	
Girl	Grade	8.0	0	2	2	
		9.0	3	4	7	
		10.0	4	7	11	
		11.0	8	15	23	
		12.0	18	10	28	
	Total		33	38	71	
Total	Grade	8.0	0	3	3	
		9.0	4	8	12	
		10.0	10	14	24	
		11.0	24	25	49	
		12.0	34	21	55	
	Total		72	71	143	
Descriptive Statistics for Age						
2. Are you a Boy or a Girl		N	Minimum	Maximum	Mean	Std. Deviation
Boy	1. Please specify your age	72	15.0	28.0	17.819	2.3814
	Valid N (listwise)	72				
Girl	1. Please specify your age	71	15.0	20.0	17.521	1.4128
	Valid N (listwise)	71				

	N	Minimum	Maximum	Mean	Std. Deviation
Age (both sex combined)	143	15.0	28.0	17.671	1.9601
Valid N	143				

1. Do you know how to cook food?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No	47	32.9	32.9	32.9
Yes	96	67.1	67.1	100.0
Total	143	100.0	100.0	

2) Cross tabulation between different components of food literacy with various demographic characters.

A) Where do you study? * 7. How often do you visit farm or school garden from school? Cross tabulation

		7. How often do you visit farm or school garden from school?					Total
		Never	1-2 times week/	3-4 time week/s	5-6 time week/s	Everyda y	
4.	Chitwan Count	32	14	13	6	7	72
Where do you study?	% within 4. Where do you study?	44.4%	19.4%	18.1%	8.3%	9.7%	100.0%
	Kathmandu Count	30	33	4	3	1	71
	% within 4. Where do you study?	42.3%	46.5%	5.6%	4.2%	1.4%	100.0%
	Total Count	62	47	17	9	8	143
	% within 4. Where do you study?	43.4%	32.9%	11.9%	6.3%	5.6%	100.0%

B) Where do you study? * 10. Do you know how to cook food?**Cross Tabulation**

			10. Do you know how to cook food?		Total
			No	Yes	
4. Where do you study?	Chitwan	Count % within 4. Where do you study?	18 25.0%	54 75.0%	72 100.0%
	Kathmandu	Count % within 4. Where do you study?	29 40.8%	42 59.2%	71 100.0%
Total		Count % within 4. Where do you study?	47 32.9%	96 67.1%	143 100.0%

C) Where do you study? * 12. How do you rate your cooking skills?**Cross tabulation**

			12. How do you rate your cooking skills?					Total
			1 Very bad	2 Bad	3 Neither bad nor good	4 Good	5 Very good	
4. Where do you study?	Chitwan	Count	17	13	16	17	9	72

do you study?	% within 4. Where do you study?	23.6%	18.1%	22.2%	23.6%	12.5%	100.0%
Kathmandu	Count	18	13	11	22	7	71
	% within 4. Where do you study?	25.4%	18.3%	15.5%	31.0%	9.9%	100.0%
Total	Count	35	26	27	39	16	143
	% within 4. Where do you study?	24.5%	18.2%	18.9%	27.3%	11.2%	100.0%

D) Are you a Boy or a Girl * 12. How do you rate your cooking skills?

Cross tabulation

		12. How do you rate your cooking skills?					Total
		1 Very bad	2 Bad	3 Neither bad nor good	4 Good	5 Very good	
2. Are you a Boy or a Girl	Boy Count	28	17	13	8	6	72
	% within 2. Are you a Boy or a Girl	38.9%	23.6%	18.1%	11.1%	8.3%	100.0%
Girl	Count	7	9	14	31	10	71
	% within 2. Are you a Boy or a Girl	9.9%	12.7%	19.7%	43.7%	14.1%	100.0%

Total	Count	35	26	27	39	16	143
	% within 2. Are you a Boy or a Girl	24.5%	18.2%	18.9%	27.3%	11.2%	100.0%

E) Cross tabulation

		8. How do you rate your interest at working in school garden or farm?					Total
		1 Not at all	2 Uncertain	3 Interested	4 Fairly interested	5 Very much interested	
2. Are you a Boy or a Girl	Count	13	30	7	14	8	72
	% within 2. Are you a Boy or a Girl	18.1%	41.7%	9.7%	19.4%	11.1%	100.0%
	Girl Count	8	11	13	22	17	71
	% within 2. Are you a Boy or a Girl	11.3%	15.5%	18.3%	31.0%	23.9%	100.0%
Total	Count	21	41	20	36	25	143
	% within 2. Are you a Boy or a Girl	14.7%	28.7%	14.0%	25.2%	17.5%	100.0%

F) Cross tabulation

			8. How do you rate your interest at working in school garden or farm?					Total
			1 Not at all	2 Uncertain	3 Interested	4 Fairly interested	5 Very much interested	
4. Where do you study?	Chitwan	Count	8	11	14	22	17	72
		% within 4. Where do you study?	11.1 %	15.3%	19.4%	30.6%	23.6%	100.0 %
	Kathmandu	Count	13	30	6	14	8	71
		% within 4. Where do you study?	18.3 %	42.3%	8.5%	19.7%	11.3%	100.0 %
Total		Count	21	41	20	36	25	143
		% within 4. Where do you study?	14.7 %	28.7%	14.0%	25.2%	17.5%	100.0 %

G) Cross tabulation

			11. How often do you cook food?					Total
			2 to 3 times a week	4 to 5 times a week	Everyday	Never	Once a week	
4. Where do you study?	Chitwan	Count	24	6	13	17	12	72
		% within 4. Where do you study?	33.3%	8.3%	18.1%	23.6%	16.7%	100.0%
	Kathmandu	Count	17	16	5	24	9	71
		% within 4. Where do you study?	23.9%	22.5%	7.0%	33.8%	12.7%	100.0%
Total		Count	41	22	18	41	21	143
		% within 4. Where do you study?	28.7%	15.4%	12.6%	28.7%	14.7%	100.0%

H) Cross tabulation

		11. How often do you cook food?					Total
		2 to 3 times a week	4 to 5 times a week	Everyday	Never	Once a week	
2. Are you a Boy or a Girl	Boy Count	16	3	4	33	16	72
	% within 2. Are you a Boy or a Girl	22.2%	4.2%	5.6%	45.8%	22.2%	100.0%
	Girl Count	25	19	14	8	5	71
	% within 2. Are you a Boy or a Girl	35.2%	26.8%	19.7%	11.3%	7.0%	100.0%
Total	Count	41	22	18	41	21	143
	% within 2. Are you a Boy or a Girl	28.7%	15.4%	12.6%	28.7%	14.7%	100.0%

I) Cross tabulation

			13. How often do you help to buy or buy groceries (Vegetables, fruits) yourselves?					Total
			Never	1-2 times a week	3-4 times a week	4-5 times a week	Almost everyday	
4. Where do you study?	Chitwan	Count	8	15	13	20	16	72
		% within 4. Where do you study?	11.1%	20.8%	18.1%	27.8%	22.2%	100.0%
	Kathmandu	Count	16	15	21	10	9	71
		% within 4. Where do you study?	22.5%	21.1%	29.6%	14.1%	12.7%	100.0%
Total		Count	24	30	34	30	25	143
		% within 4. Where do you study?	16.8%	21.0%	23.8%	21.0%	17.5%	100.0%

J) Cross tabulation

		13. How often do you help to buy or buy groceries (Vegetables, fruits) yourselves?					Total
		Never	1-2 times a week	3-4 times a week	4-5 times a week	Almost everyday	
2. Boy	Count	18	23	12	13	6	72
Are you a Boy or a Girl	% within 2. Are you a Boy or a Girl	25.0%	31.9%	16.7%	18.1%	8.3%	100.0%
Girl	Count	6	7	22	17	19	71
Are you a Boy or a Girl	% within 2. Are you a Boy or a Girl	8.5%	9.9%	31.0%	23.9%	26.8%	100.0%
Total	Count	24	30	34	30	25	143
	% within 2. Are you a Boy or a Girl	16.8%	21.0%	23.8%	21.0%	17.5%	100.0%

K) Cross tabulation

		Do you read?...undersand/			Total
		Always	Never	Sometimes	
4. Where do Chitwan you study?	Count	23	21	28	72
	% within 4. Where do you study?	31.9%	29.2%	38.9%	100.0%
Kathmandu	Count	10	26	35	71
	% within 4. Where do you study?	14.1%	36.6%	49.3%	100.0%
Total	Count	33	47	63	143
	% within 4. Where do you study?	23.1%	32.9%	44.1%	100.0%

L)Cross tabulation

		Do you read?...undersand/			Total
		Always	Never	Sometimes	
2. Are you a Boy or a Girl	Boy Count	14	27	31	72
	% within 2. Are you a Boy or a Girl	19.4%	37.5%	43.1%	100.0%
	Girl Count	19	20	32	71
	% within 2. Are you a Boy or a Girl	26.8%	28.2%	45.1%	100.0%
Total	Count	33	47	63	143
	% within 2. Are you a Boy or a Girl	23.1%	32.9%	44.1%	100.0%

M) Cross tabulation

			17. Who have a say to decide about your school lunch?			Total
			I buy myself	My parents	my school	
4. Where do you study?	Chitwan	Count	48	16	8	72
		% within 4. Where do you study?	66.7%	22.2%	11.1%	100.0%
	Kathmandu	Count	47	23	1	71
		% within 4. Where do you study?	66.2%	32.4%	1.4%	100.0%
Total		Count	95	39	9	143
		% within 4. Where do you study?	66.4%	27.3%	6.3%	100.0%

N) Cross tabulation

		17. Who have a say to decide about your school lunch?			Total
		I buy myself	My parents	my school	
2. Are you a Boy or a Girl	Count	54	12	6	72
	% within 2. Are you a Boy or a Girl	75.0%	16.7%	8.3%	100.0%
Girl	Count	41	27	3	71
	% within 2. Are you a Boy or a Girl	57.7%	38.0%	4.2%	100.0%
Total	Count	95	39	9	143
	% within 2. Are you a Boy or a Girl	66.4%	27.3%	6.3%	100.0%

O) Cross tabulation

			14. Do you read?...undersand/			Total
			Always	Never	Sometimes	
4. Where do you study?	Chitwan	Count	23	21	28	72
		% within 4. Where do you study?	31.9%	29.2%	38.9%	100.0%
	Kathmandu	Count	10	26	35	71
		% within 4. Where do you study?	14.1%	36.6%	49.3%	100.0%
Total		Count	33	47	63	143
		% within 4. Where do you study?	23.1%	32.9%	44.1%	100.0%

P) Cross tabulation

		14. Do you read?..undersand/			Total
		Always	Never	Sometimes	
2. Are you a Boy or a Girl	Boy Count	14	27	31	72
	% within 2. Are you a Boy or a Girl	19.4%	37.5%	43.1%	100.0%
	Girl Count	19	20	32	71
	% within 2. Are you a Boy or a Girl	26.8%	28.2%	45.1%	100.0%
Total	Count	33	47	63	143
	% within 2. Are you a Boy or a Girl	23.1%	32.9%	44.1%	100.0%

3) Summary table of the association between indicators of food literacy to various demographic characters.

Indicators of food literacy	Sex (P-value)	Location (P-value)	Age (P-value)	Remark
Know how to cook food	<0.001	0.034	0.020	Logistic Regression
Visit school garden or farm	0.158	0.025	0.548	General Linear Model
Self rating of interest in working at school garden or farm	<0.001	<0.001	0.680	
Self Rating cooking skills	<0.001	0.931	0.063	
Frequency of cooking (per week)	<0.001	0.255	0.005	
Frequency of involvement in purchasing food groceries	<0.001	0.014	0.003	
Priority given while purchasing food	0.08	0.004	0.299	
Reading and understanding of labels in food packages	0.097	0.093	0.034	
Who decides about your school lunch	0.009	0.103	0.077	

Interview Transcription**C1**

- How do you define healthy eating/diet?
 - For me healthy eating is balanced diet food with high amount of juice and fruits
- Do you connect individual's eating habit to overweight and obesity?
 - No , less workout is the main reason behind overweight
- Do the **price/ economic status/ taste** determine the food that is prepared in your home?
 - No ...light and balanced diet food are usually the cheapest food available in the groceries so I don't see the price is determinant
- Do you take care of food labels written in food packet? Like high sugar/ high fat? Low salt?
 - I don't care for the amount of sugar and salt level because my main food is homemade cooked meal. Since packaged food is my supplementary diet so I don't usually care for labels too.
- What do you know about local food or organic food? Does it have impact on environment, ecosystem?
 - I don't know
- Do you love to cook food when you have free time? How often do you cook?
 - No , I don't
- How often do you eat outside home?
 - I usually eat my snacks outside when I am not home probably 2-4 snacks a week.
- Do you take part in shopping, growing, and serving food?
 - Sometimes only
- Do you have someone in your family with diabetes and blood pressure? Do you know what kind food is restricted to him/her considering health?
 - No one in my family is suffering from diabetes or high blood pressure.
 -

C2

- How do you define healthy eating/diet?
.....I think eating a lot of green Salads, boiled food, less fat, less calories, home cooked food, lots of water during the whole day is healthy eating
- Do you connect individual's eating habit to overweight and obesity?Yes I do, Individuals eating habit is highly connected to overweight or obesity of an individual. Also the availability and accessibility and economic status of a particular family also make a difference.
- Do the **price/ economic status/ taste** determine the food that is prepared in your home?
.....No not so often Food is regarded very important and our family does not compromise the quality of food consumed on various factors.
- Do you take care of food labels written in food packet? Like high sugar/ high fat? Low salt?
.....No, not really. I don't really look into the labels. I go after taste and price of the food.
- What do you know about local food or organic food? Does it have impact on environment, ecosystem?
....Organic foods are produced within their natural habitats without the use of chemical fertilizers and addictive. Most of the food products we purchase are locally produced and organic.
.... I do not know much about the environment and ecosystem but organic food production should help the ecosystem and environment.
- Do you love to cook food when you have free time? How often do you cook?
.....Yes I enjoy cooking once a while.... May be I cook 3...4 times in a month or when I m home alone with my dad.
- How often do you eat outside home?
.....We eats outside very often. 910 times a month...Sometimes even more when my mom and sister are busy with their works.

- Do you take part in shopping, growing, and serving food?
.....yes almost every day. I go along with my mom but she decides the shopping part.
- Do you have someone in your family with diabetes and blood pressure? Do you know what kind food is restricted to him/her considering health?
.....No. None of my family members suffer from diabetes or blood pressure. But I have studied about the disease and little aware about the risks and importance of the food to be consumed.

C3

- How do you define healthy eating/diet?
.... Eating nutritious food ...Eating in enough time space and breakfast is very important meal of the day and don't skip any mealtime I prefer to eat less in fat and sugar containing food.
- Do you connect individual's eating habit to overweight and obesity?
.....yes, definitely Eating habit determines the overall health of an individual But ...Of course there is also the factor of working out and having an active lifestyle.
- Do the **price/ economic status/ taste** determine the food that is prepared in your home?
...Yes sometimes taste is the main determinant most of the days but these days the availability of the food and the price that comes along also affects the food choice.
- Do you take care of food labels written in food packet? Like high sugar/ high fat? Low salt? –
Yes..... I try to do it most of the time but is practically impossible as there aren't many choices available in our college canteens. At home most of the food is cooked by family members where the fat and sugar contain of the food are taken into consideration.
- What do you know about local food or organic food? Does it have impact on environment, ecosystem? –

.....ummm.....Locally produced foods are much better in taste and nutrients content. Organic food is much better in taste, nutrients and definitely helps to improve the degrading environment and ecosystem.

- Do you love to cook food when you have free time? How often do you cook? -
... Its little bit shameful to say that I am a lazy guy ...I usually do not participate in cooking because my mom and sisters are better in doing that. I participate in helping and learning how to cook special food once in a while.
- How often do you eat outside home?
.....Not so often...It Depends on the occasion may be 3-4 times a month.
- Do you take part in shopping, growing, and serving food?
....No, not so often.
- Do you have someone in your family with diabetes and blood pressure? Do you know what kind food is restricted to him/her considering health?
...Yes, my grandmother has recently been diagnosed with high blood pressure. Yes I have been looking around for information regarding that too.

C4

- How do you define healthy eating/diet?
.....in my view healthy eating is eating consistentlyNutritious food everyday according to need of the body No alcohol ...and no smoking..ya ..It's my definition
- Do you connect individual's eating habit to overweight and obesity?
.....of course ... its overeating that leads to overweight
- Do the **price/ economic status/ taste** determine the food that is prepared in your home?

.....I think its price ... not only my family..may be almost all Nepalese family consider itI may be wrong ..But in my family its priceand its related with our income

- Do you take care of food labels written in food packet? Like high sugar/ high fat? Low salt?

Yes ...In food packet I normally check use before date ...I have no idea if any neplease product have indication of salt and sugar labels

- What do you know about local food or organic food? Does it have impact on environment, ecosystem?

.....Local food is produced locally Means these foods are not from so far .its somewhere from near to usorganic is like producing crops without pesticides ...and without heavy equipment....i think it saves soil quality

- Do you love to cook food when you have free time? How often do you cook?

.....yes sometime I cook food ...normally Saturday when I don't have school...

- How often do you eat outside home?

.....umm....i eat my snack in my school canteen ...its like 5...6 times in weeks But main meal dinner we eat at home...

- Do you take part in shopping, growing, and serving food?

..... we go to buy vegetables in local market once in a weekwe also grow some herbs in our field ... but we sell them ...we don't use them all

- What kind of herbs?

..its ...basil and mint ...lemon grass ...

- Do you have someone in your family with diabetes and blood pressure? Do you know what kind food is restricted to him/her considering health?

.... Yes my mother She has high blood pressure so..she normally skip cocked vegetables in evening She eat less oil and less suger and saltshe doesn't eat meat

C5

- How do you define healthy eating/diet?

.....Eating habit with balanced nutrition which maintains our health...

- Do you connect individual's eating habit to overweight obesity?

.....I think yes, growth of weight connected to how and what kind of food person eat.

- Do the **price/ economic status/ taste** determine the food that is prepared in your home?

...well.....Taste and price both have combined role for preparing food in home.

- Do you take care of food labels written in food packet? Like high sugar/ high fat? Low salt?

... actuallyI don't remember if I have ever cared about sugar, fat and salt level in food packet but sometimes I check expire date of the food.

- What do you know about local food or organic food? Does it have impact on environment, ecosystem?

....In my knowledge, foods produced in local area, generally in grown in farm without using any chemical, are local or organic foods....I don't think organic foods have any bad impact on environment.

- Do you love to cook food when you have free time? How often do you cook?

... umm ...To be honest, I don't have passion for making food. I make once or twice a week.

- How often do you eat outside home?

.....I always eat food outside my home as lunchbox

- Do you take part in shopping, growing, and serving food?

.....Ah.....Sometimes, I go for shopping food....I have not taken part in growing and serving food.

- Why not?

.....Actuallyin here we have a lot of land ... but my parents do not want me to work in the field they don't work in the field as well We hire people to work when we need I also think its little bit dirty work ...

- Do you have someone in your family with diabetes and blood pressure? Do you know what kind food is restricted to him/her considering health?

.....I have none in my home with diabetes and blood pressure but I know some foods like foods with fat, sugar and sweets etc which are restricted for those diseases.....

K1

- How do you define healthy eating/diet ?
... I don't really care what is healthy or not If there is something ready in the plate ... its food ...and is going to satisfy my hunger
- What about alcohol and smoking??
.... Aahh Okey ...then if something is bad for health and society ... its unhealthy ...
- Do you connect individual's eating habit to overweight and obesity?
...I don't really know about it But I think less exercise is something responsible for it
- Do the **price/ economic status/ taste** determine the food that is prepared in your home?
... I think taste ... food should be tasty ...
- Do you take care of food labels written in food packet? Like high sugar/ high fat? Low salt?
.... No not really ... I normally do not go for shopping I am young now so I can eat anything I want ...I don't care about labels..
- What do you know about local food or organic food? Does it have impact on environment, ecosystem?
.... I don't know I can assume that..Local food means the food you can find near to your home or community ...
- Do you love to cook food when you have free time? How often do you cook?

..... I don't normally cook.. it's my mother and sister cook ... we go for movie , play video game ... when we are free....

- Don't you think you need to know how to cook ...
.....actually ...I think it takes long time to cook ...and do kitchen work And its ..so boring
- How often do you eat outside home?
.....I love to eat outside ... because it taste really good than home made food ...if it's me to decide I would eat everyday in restaurantbut it cost money ..and it's hard to afford for my family
- Do you take part in shopping, growing, and serving food?
.....I don't normally go for shoppingmy mother does ... if its sport material and clothes ... I go for shopping
- Do you have someone in your family with diabetes and blood pressure? Do you know what kind food is restricted to him/her considering health?
.....no we don't have anyone

K2

- How do you define healthy eating/diet?
.....-Healthy eating is defined as variety of food that contains all sorts of micronutrients and macronutrients.
- Do you connect individual's eating habit to overweight and obesity?
.....yes, individual eating habit leads to overweight and obesity.
- Do the **price/ economic status/ taste** determine the food that is prepared in your home?
.....Definitely.... We consider price ... our income and of course ...taste of food I think every other does it too...

- Do you take care of food labels written in food packet? Like high sugar/ high fat? Low salt?
.....As I do check food labelbut not all the time.
- What do you know about local food or organic food? Does it have impact on environment, ecosystem?
.....I know about local food it taste good and fresh ... not about organic food ...I have only heard in radio and televisionDon't really know about itand don't know how it is related with ecosystem...
- Do you love to cook food when you have free time? How often do you cook?
.....yes I love to cook in my spare time, 2 times a day
- How often do you eat outside home?
.....2 times in weekin average
- Do you take part in shopping, growing, and serving food?
.....I do shop but not in growing and serving
- Why not in growing..?
.....We live in Kathmandu city ... so we don't have enough landmy father was raised in rural area ... he was involved in growing foodsbut it's just impossible now in Kathmandu in my opinion....
- Do you have someone in your family with diabetes and blood pressure? Do you know what kind food is restricted to him/her considering health?
.....yes my father is a diabetic patients and he is restricted to high carbohydrate diet such as potato, rice,

K3

- How do you define healthy eating/diet ?
Umm..... I am not quite surewhat is healthy dietmay befood with meat at least 3- 4 times in week Or drinking a lot of water ...
- Do you connect individual's eating habit to overweight and obesity?

.....Yes I think eating too much ...

- Do the **price/ economic status/ taste** determine the food that is prepared in your home?

....sure.... its price and taste most of the time

- Do you take care of food labels written in food packet? Like high sugar/ high fat? Low salt?

No.... I don't check all details But ...date I check normally

- What do you know about local food or organic food? Does it have impact on environment, ecosystem?

..... I know local food ... produced locallybut I don't know about organic food ... i don't think really it has some impact on environment and ecosystemi think it's from vehicles ...and industries ...

- Haven't you heard about organic food
..... I don't think so Or I didn't care about it
- Do you love to cook food when you have free time? How often do you cook?
....No, I don't like to cookit's may be because I don't know how to do it ...
- How often do you eat outside home?

...i...normally eat my day meal in school canteenit's like every day ... but in holiday ...we go out for dinner in restaurant too..... probably ... 2 time in week....

- Do you take part in shopping, growing, and serving food?

....no not really I don't go for shopping to buy food for home But I buy some food for myselfWhen I am out home...its only biscuits, noodles and chocolate I do not have any experience in growing foods ... my father came Kathmandu from Khotang district 25 years agowe still have our field out there but we don't go therein

kathmandu, we don't have enough space to grow ... but my father did a lot of work in field when he was youngagriculture was our source of income

- Do you have someone in your family with diabetes and blood pressure? Do you know what kind food is restricted to him/her considering health?

.....yes my father is a diabetic patientAnd he takes insulin quite often he doesn't eat ...rice , potato and other sweet itemsActually I want to know what kind of food these patients need to eat

K4

- How do you define healthy eating/diet ?
.....Eating proper meals in time and drinking enough fluids along.
- Do you connect individual's eating habit to overweight and obesity?
....Yes Individuals eating habit is the main factor to determine overweight and obesity.
- Do the **price/ economic status/ taste** determine the food that is prepared in your home?
.....Taste is the main determinant of food product in our house. The price doesn't come above taste.
- Do you take care of food labels written in food packet? Like high sugar/ high fat? Low salt? –
.....No not really Food labels doesn't concern me at all and don't have the habit of checking food labels as the labels don't say much in Nepalese market.
- What do you know about local food or organic food? Does it have impact on environment, ecosystem?
.....Most of the vegetables we purchase are from local farmers who travel from outside of the capital valley and the taste and appearances of organic food is always better and satisfying, as it contains no extra chemicals and fertilizers. Yes I think organic food production has a big impact on environment and ecosystem.
- Do you love to cook food when you have free time? How often do you cook?

.....Yes I love to cook but something very different than the usual ones. I get the opportunity to cook when my mom is out of the home.

- How often do you eat outside home?

..... Not so often, depends on the occasion3-4 times a month.

- Do you take part in shopping, growing, and serving food?

..... No, not so often it's my family specially my mother does it ...

- Do you have someone in your family with diabetes and blood pressure? Do you know what kind food is restricted to him/her considering health?

.....Yes, my grandmother has recently been diagnosed with high blood pressure. Not now but I have been looking around for information regarding that too.

K5

- How do you define healthy eating/diet?

.....Healthy eating means consuming balanced diet Including all the necessary nutrition and minerals.

- Do you connect individual's eating habit to overweight and obesity?

...no ...

- Do the **price/ economic status/ taste** determine the food that is prepared in your home?

.....Yes those all things ..determine my food at home ..

- Do you take care of food labels written in food packet? Like high sugar/ high fat? Low salt?

..not usually

- What do you know about local food or organic food? Does it have impact on environment, ecosystem?

.....the foods which are locally grown without using any kind of chemical or naturally

.....Yes it has got ...impact on environment and ecosystem ...

- Do you love to cook food when you have free time? How often do you cook?

.....seldom ... I prepare food at home ...

- How often do you eat outside home?
... It's quite frequent ... I eat my breakfast out ...
- Do you take part in shopping, growing, and serving food?
.....Yes I do I do shopping ... and serve food but not growing ...
- Do you have someone in your family with diabetes and blood pressure? Do you know what kind food is restricted to him/her considering health?
.....yes my father is caught by diabetes as far as I know he shouldn't take rice, sugar etc....