Knowledge Management for Improving Public Health Interventions: A Street Food Safety Problem in Bangladesh

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Doctoral Dissertation

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Abstract

There are a lot of complex and emerging public health issues that is causing double burden (both health impact and economic impact) especially in underdeveloped or developing countries. These are the thriving concerns and becoming complex societal challenges which need innovative solutions. Therefore, organizations have to be compelled to move beyond the boundaries of single firms or sectors and involve in collaborative networks. Multiple, diverse stakeholders are working together to co-create innovative values in these networks. Co-creation in a network creates new challenges in terms of modified behaviors, systems and outcomes.

This study is based on street food safety issues, one of the emerging public health problems in Bangladesh, on which, many studies and interventions have been conducted. Unfortunately, due to the nature of informality, lack of awareness among community (vendors and consumers), lack of proper collaborative service from government and NGOs in monitoring, improper health promotion and health education system and finally the improper knowledge sharing in both community and organizational management process are the key bottlenecks in achieving the sustainable solution for the street food safety problem.

Therefore, the overall goal of this dissertation is to identify the role of knowledge management for improving the public health intervention especially based on the developing countries perspectives. This goal has been addressed in three separate sections which aimed to answer the following questions respectively:

1. What are the social barriers that contributes in street food safety issue?

2. What is the role of developing community based stakeholders in confronting social barriers in SFS issue?
3. How an innovative model can be developed based on knowledge management to reduce SFS problem?

Methods

The study mainly adopted the action research strategy where the main method used was qualitative. In the first part of the study, data collection took place in the urban areas of Khulna and Dhaka city, the two major divisions in Bangladesh. The tools used for the data collection were the observation of the street food vendors and consumers, the interviews of street food vendors, consumers and some officials of government and non-governmental organizations (NGO).

In the later part of the action research, a pilot study was conducted in Khulna city. In this part, the major participants were the secondary school students, street food vendors, consumers, officials from government and non-governmental organization. Data collection tools were also observation, interviews and focus group discussion.

Study data were collected in between May 2017 and February 2018. All the data collected were thematically and manually analyzed. Field notes on interviews and focus group data were subject to content analysis, using a priori codes.

Results

Integrating the analyzed results, we found that SFS and other public health based intervention begins from a top-down approach, by getting funding and providing ad-hoc based services to a specific community, where before and after the intervention, knowledge creation and sharing with the community is a less-implemented approach. However, essential knowledge creation (both tacit and explicit) should begin with the communities where most of the wider social barriers exist.

Findings describes hidden social barriers that can only be explored by the community (vendors and consumers); in some cases, this hidden knowledge can only be shared with local people (students or local representatives). Therefore, selecting and motivating the students as community representatives is one major strategy for value co-creation in this study.

Findings also describes MSP as essential for knowledge sharing and providing necessary services through strong collaboration and co-ordination. In this study, students can be representatives for community participation and can be good micro-level stakeholders that collaborate with macro-level stakeholders. Therefore, micro-level stakeholders can create and share community knowledge with macro-level stakeholders to develop innovative solutions that improve SFS. In addition, the macro-level can verify their decisions and policies by sharing knowledge with the community based on the outcome of an intervention. This knowledge sharing is missing in the current system of interventions. Findings 3 demonstrates the area in which collaborative strategies can reduce social barriers with the help of the community.

Findings shows the strategy of using KM tools that can easily create, share, transfer, and translate knowledge both inside and outside of the community. Therefore, through pilot study, school students have been found to be proper KM tools in creating values among different stakeholders.

Finally, comparative results from two different cities showed where the role of collaboration and value co-creation through MSP and KM is distinctively visible.

Keywords: Street food safety, knowledge management, stakeholders, intervention, sustainability

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Chapter 1

Introduction

1.1 Introduction

It is a challenge for a single entity like the government, a private organization, or a non-governmental organization (NGO) to deliver all the specified experience, knowledge, and quality to develop innovative solutions for complex social and public health issues that are emerging worldwide (Lusch, Vargo, & Tanniru, 2010).

If we consider the complex but preventable problems in health sector like obesity, drug use, food safety, tobacco use etc. of this global world, these are becoming emerging concerns and needed to be focused in an integrated manner. The diverse organizational collaboration like public-private partnerships or multi-stakeholder partnerships (MSP) approach can play a significant role to create values and go beyond the boundaries of individual organizations (Nissen, Evald & Clarke, 2014).

In developing countries, many interventions are trying to improve public health behavior, policies, and services through health awareness, education, and campaigns. However, most of these interventions have shown poor progress in creating sustainable solutions. A lack of coordination and value co-creation among different stakeholders make

their efforts ineffective (Mohapatra, 2016). Therefore, more studies and initiatives remain to be done on how we can innovate sustainable approaches to get long-term outcome from interventions through developing co-creative values among different actors or stakeholders.

1.2 Definition of Intervention in Public Health

To understand public health intervention and its importance for community life, it is necessary to understand why public health knowledge is important. When a person is sick, the doctor can treat the illness, whereas public health knowledge try to prevent people from getting sick or injured. Public health also promotes wellness by encouraging a healthy behavior. The implementation of public health knowledge by sharing and educating the community people can improve the public health issues. On the other hand, public health intervention is considered as any effort or policy that can improve the mental or physical health at population level, which can be screening programs, providing vaccination or food and water supplementation or providing or sharing knowledge through health promotion.

To improve the general public health condition particularly in developing countries, evidence is extremely vital. Evidence based public health is outlined as public health endeavor within which there's vital, explicit and judicious use of proof that has been derived from science and social science study and analysis strategies. .

Therefore, evidence based public health requires knowledge, not only for effective interventions but also about strategies for successful implementation. On the other hand, ineffective implementation of intervention waste scarce resources and is neither affordable

nor sustainable. It is very important to understand the meaning sustainability of intervention in public health field.

1.3 Definition of sustainability of Public health intervention

Sustainability in the field of public health is defined as the capacity to maintain the intervention outcome or services at a level which can provide the prevention and treatment for a health problem. (Claquin, 1989) after termination or completion of financial, managerial and technical assistance from external donor. (Sustainability of Development programs, 1998). Several factors have been found why the intervention outcome is not sustainable after defunding occurs; among them intervention design, capacity building, administrative support, health education etc. have been appeared to be more related to sustainability. Therefore, innovative model needed to be developed for long-term sustainability of an intervention.

The expected sustainability can be achieved through continued commitment towards intervention goal and mission, increasing capacity in local system, changing knowledge and attitude, collaborating nature, improve service model and implement new policies.

1.4 Research Problem

From different literatures, it has been found that, there are gaps or loopholes in various areas where we need to address for making an intervention program successful. (Mohapatra, 2016)). However, there are two major reasons behind the failure or less effective, short-lived impact of many intervention programs that we want to focus on. One is poor co-ordination among different stakeholders. The sharing of values between macro level

(stakeholders like non-government, government, and policy makers) and micro level population (community people) is insufficient. The non-participatory behavior by community people has been developed due to lack of co-ordination among different stakeholders.

The other reason is fail to develop community based health education or literacy. Butsch have demonstrated that, due to lack of proper health communication and knowledge sharing ability, people become unaware about the impact of diseases on health and economy thus not able to seek and access the proper health services even there are free health services in the community (Butsch, 2008).

Therefore, considering many studies, it have been found that, the poor coordination, lack of community participation and poor health communication are the common reasons in most of the programs failure like nutrition program, family planning program, water and sanitation program, diarrheal programs etc. (Mohapatra, 2016))

Though, there are a lot of public health issues existing and different intervention programs are working to achieve the desired expectation, however, most of the problems have the similar gaps which we need to focus.

This study specifically have focused on street food safety problem, which is one of the burning issues especially in the developing countries. As an 'informal' sector of food business, street foods often escape formal inspection and control. They can be the source of food safety problems and cause of environmental hygiene. As the urbanization and population density is increasing, people with relatively low income, students and working women have taken the street food as a daily source of their meal. Many interventions have

been conducted to promote healthy practices of preparation of food focusing on vendors and producers. However, poor progress has been found after the completion of the intervention or programs. Moreover, gaps also have been found in the consumption behavior of unsafe food among the consumers which has not been focused by the stakeholders of the programs.

Based on the previous literatures, this study aims to explore the major areas or gaps which needed to be focused to achieve an intervention program successful and therefore, have focused on the street food safety intervention program for evaluation in the context of Bangladesh, one of the developing countries in South Asian region.

1.5 Research Questions

1.5.1 Main Research Question

The study aims to enhance the effectiveness of the interventions conducted to solve the public health issues, mostly in developing countries. Therefore the main research question (MRQ) is ` How to enhance the effectiveness of street food safety (SFS) interventions to achieve long term sustainability`?

To find the answer of the MRQ, the study concentrates on the related viewpoints of different concepts that will help to develop the structure for the MRQ.

1.5.2 Subsidiary Research Questions

The subsidiary research questions (SRQs) are as follows:

1. What are the social barriers that contributes in street food safety issue?
2. What is the role of developing community based stakeholders in confronting social barriers in SFS issue?

3. How an innovative model can be developed based on knowledge management to reduce SFS problem?

1.6 Concept Building of the study

The main aim of the study is to develop a conceptual model and verify the model to improve the street food safety intervention based on developing countries, Bangladesh. Therefore, Figure 1.1 describes the step by step approach towards the goal of the study.

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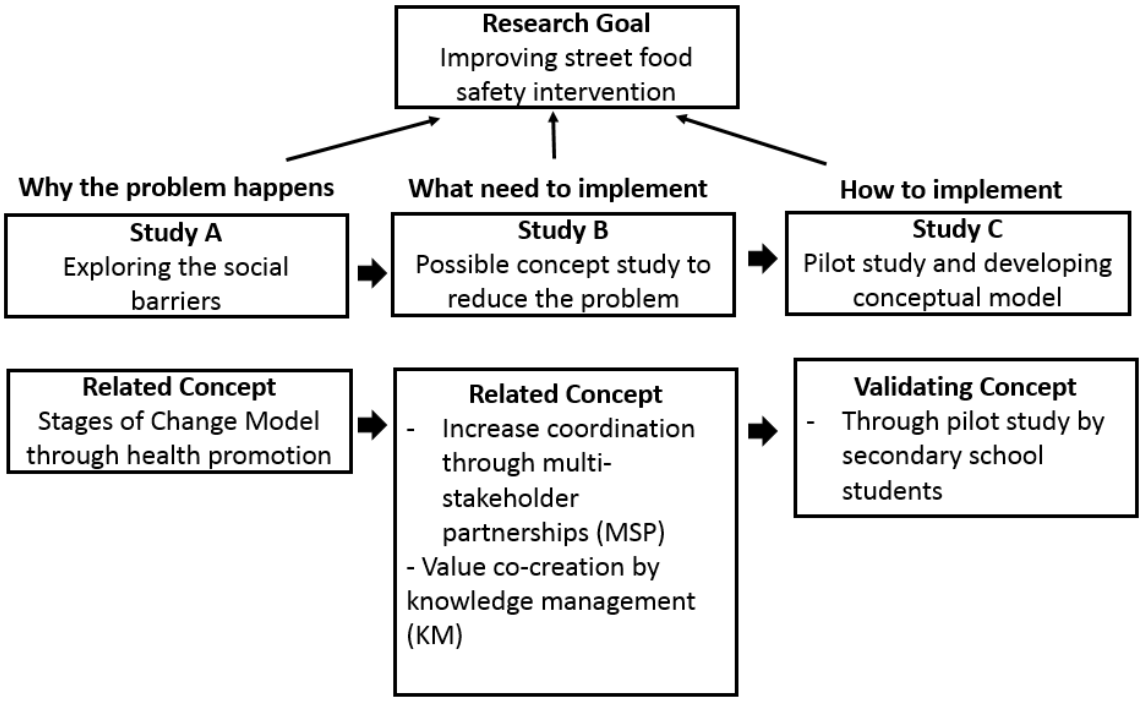


Fig 1.1: Step by step approach toward goal of the study

1.7 Structure of the Dissertation

There are eight main parts in this dissertation that includes `Introduction`, `Research Background`, ` Research Methodology`, `Results` of three studies, `Implications` and

`Conclusion and Recommendation`, as presented in Fig 1.2, details of these parts are briefly explained in the figure.

Chapter 1 is the introductory part that contains the overview of the public health issues, gaps in achieving intervention successful and effective and then focusing on street food safety problem based on developing countries. This parts also discusses about the concepts related to the study, by which, the effectiveness of the intervention can be well managed and sustainable especially in developing countries where resources are limited in terms of technical and financial inadequacy. This chapter also explains the research problem, aim of research and research questions.

The second part is `Research Background` which delivers research background in details. Viewpoints based on related concepts related to the study has been described that includes health promotion and health literacy, social determinants of health, the concept of multi-stakeholder concepts and KM concepts based on public health issues and special focus on street food safety problem based on Bangladesh and some other countries.

`Chapter 3` focuses on research methodology, which explains the general method, technique, tools and approaches used in the study. Information about the main study area and context are also discussed in this chapter.

The four to six parts are the study results. There are three sections of this study which have been discussed in Chapter 4, 5 and 6 respectively. `Chapter 4` ` or `Study A` discusses about the SRQ 1 of the research questions which focuses about the social determinants and barriers of the health and street food safety problem and what is the relationship or impact of health promotion and literacy on solving these barriers among the community.

`Chapter 5` `Study B` discusses about developing the community based stake-holders, its importance in developing the co-creative values in solving the street food safety problems and its role in coordinating and participating in decision making process. This chapter also explains the important concept of MSP in creating values for achieving maximum service from an intervention based on health.

`Chapter 6` `Study C` explains about the KM concept through developing conceptual framework through empowering the community with proper health literacy and applying the MSP concept. Explaining the step by step approaches through the chapters, each discusses about the data collection, and analysis procedures as well.

The seventh part is `Chapter 7` explains the implications of the study and its benefit and feasibility. This part strategic development plan both for social, health and economical aspects.

The last part `Chapter 8` explains the contributions and limitations of the study. The research questions are precisely highlighted and academic and practical implications are also described in this chapter. At the final part of this chapter, recommendations and future research areas have been discussed.

Chapter 2 Section A

2. Research Background

2.1 Introduction

This chapter highlights the key elements of the study in details, including barriers in public health awareness (especially in developing countries) challenges to achieve the sustainable solutions to reduce the problems and key concepts. The concepts includes health promotion and health literacy to empower community people, developing multi-stakeholder partnership approach to coordinate in creating values and lastly, conceptualizing the KM strategy from organizational boundaries to community level. There are many public health issues that needed to be focused urgently, however, this study has discussed about the above concepts based on interventions of street food safety problem in Bangladesh context, as this is an emerging sector of public health problems and need some study to explore the barriers in achieving the successful outcome from the interventions.

2.2 Reasons for intervention failure

In developing countries, a lot of public health issues, both communicable diseases and non-communicable diseases are existing and causes double burden for the community in terms of health impact and financial impact (WHO, 2005). The diseases pattern are similar in developing countries or in developing countries, so the problems in implementation of health programs are similar like lack of resources, poverty and ignorance or less awareness. However, the outcome of health programs or interventions are dependent on different countries cultural, educational, financial situation and the strategies needed to be modified according to those determinants.

A little or no research has been done on evaluation of the sustainability of the outcome of health interventions especially in the context of Bangladesh. Most of the academic studies, research reports and academic papers focused on the current health problems and the ad-hoc based outcome or results of the interventions. However, the significant part of any intervention should be developing the long term behavioral change among the community and empower community people who can be able to transfer the existing knowledge in the next generation. Along with the new intervention study, it is very important to evaluate the gaps or areas from previous intervention outcomes, which needs emphasis to improve the health interventions more successful, effective and sustainable.

A study was conducted regarding the gaps that needed to be focused for making an intervention effective in India, which is also South Asian country and possess similar type of cultural, social and economic situation. According to the study, there are several factors or reasons found responsible for the ineffectiveness and less sustainability of a health intervention. After carrying out SWOT analysis (Strengths, Weakness, Opportunities and

Threats) this study explored the gaps from different health interventions which needs sustainable approaches to be solved. Different reasons that has been demonstrated in this study varies with the nature of the public health issues, communities and other determinants. However, we have highlighted the common gaps that is related with every health and community based intervention in general.

Firstly, the study highlighted about the poor co-ordination among different stakeholders involved in each health program where every stakeholder needs proper, clear and specific communication and co-ordination with greater ownership and empowerment to lead an intervention to a sustainable level in long run. During the formulation of an intervention, each responsibilities like intervention planning, policy making, implementation, feedback, modification, knowledge sharing, knowledge transfer etc. are divided in many stakeholders like policy makers, government and NGOs, community representatives, researchers, technical persons like medical practitioners etc. However, it was found that, proper co-ordination among all the stakeholders to develop a synchronized and organized program is absent.

On the other hand, there are significant gaps present between the policy makers and program implementers. Policy and programs are framed with inadequate knowledge of existing bottlenecks at the field level. The key stakeholders or actors like community people unfortunately, have little involvement during intervention formulation. Due to the absence of knowledge management in the total system of an intervention, integrated co-ordination is absent. As a result, it is difficult to develop sustainable policies and retain the outcome of intervention in long run (Lenka, 2012).

Secondly, it has been found that, workforce in technical sector like medical practitioners are less concerned about knowledge translation. These group of workforce in health sector are always providing emphasis on treating people from diseases rather than emphasizing on prevention and promotion of health. There are no regular continuing medical education programs for government doctors; many of them have limited interest in gaining new skills. Management skills are grossly lacking in health care providers and poor monitoring and supervision have led to inadequate and ineffective implementation of programs. (WHO, 1998)). However, there is also poor co-ordination or rather non-cooperative attitude among the medical practitioners.

Thirdly, in most of the health programs, effective outcome does not last long due to lack of evaluating the previous outcome. Without proper evaluation of the previous outcome, new interventions are added each year. Not only that, lack of proper modification before implementing a new intervention, lack of community feedback about their perception, lack of understanding the contextual need and requirements are also responsible for the ineffectiveness of the intervention after the completion.

Fourthly, community participation is very important factor behind the successful outcome or rather sustainability of any program. The people for whom these programs are developed do not aware about the real problems due to lack of education, health literacy and knowledge. This develops less motivation to change their behavior and they become non-cooperative. Moreover, without their participation and perception, it is difficult to get proper feedback and therefore, understanding or exploring the real gap becomes more challenging. Proper communication and material of the knowledge can make them aware about the risks

of the diseases, its impact on health and economy, the importance of health programs and health services existing in the area. Efforts needed to be implemented to develop understanding the above facts through appropriate display in simple knowledge transfer methods and empower the community people to participate in decision making process and let them take the ownership of solving the health issues. Therefore, all the stakeholders should focus on innovating the community based management system to generate more sustainable solutions.

According to Mohapatra, the inadequacy in achieving intervention goal can be attributed to one or more of the following: (1) Technical insufficiency, (2) Administrative inanity and (3) Operational incapacity which has been shown in Fig 2.1. Even a single distraction of any of these determinants can be enough to make a health intervention less effective (Mohapatra, 2016).

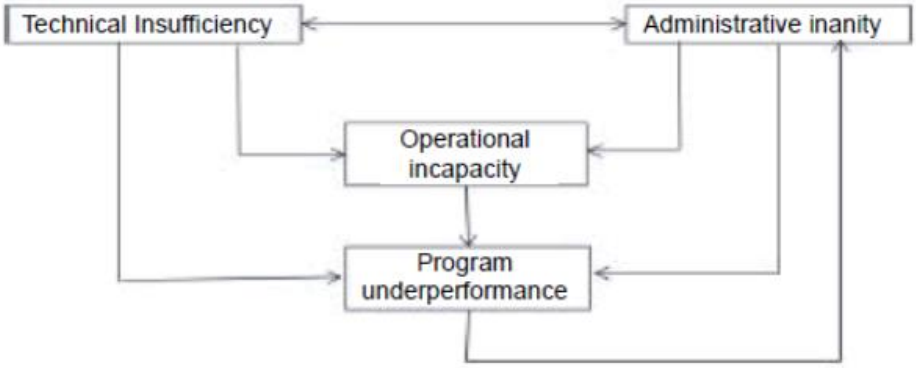


Fig 2.1: Reasons of intervention failure

Figure 2.2 : Street food vending in Bangladesh

2.3 Main Topic of the Study

While being one of the major public health issues in developing countries, street food is also an important source of nutrients and daily dietary requirements at all levels of a population, especially low- and middle-income people, day labours, students, etc. Street food not only assures the food security for low-income urban people and the livelihood for vendors (Tavonga, 2014), but its unique flavour and convenience also sometimes attracts people regardless of income level (Ackah, 2011; Cross, 2007; Muzaffar, 2009). However, street food is mainly sold by vendors and hawkers whose level of knowledge and education on food handling, sanitation, hygiene, nutritional benefits, sources of contamination, environment, handwashing, and raw materials like water, etc. is not satisfactory (Barro 2006, Mensah, 2002). Nearly two-thirds (74%) of the member countries. of the World Health Organization (WHO) have reported that street food is a significant part of their urban food supply (Fellows, 2015). It is, by definition, sold in public areas like school premises, commercial areas, near

markets, bus stands, train stations, beaches, etc. (Simopoulus, 2000), and nearly 2.5 billion people consume street food globally every day. In Bangladesh, about 2.5 million people eat street food every day (FAO, 2007). This shows that a major portion of business opportunities exists in the street food industry in Bangladesh. The street food safety vending in Bangladesh has been shown in Figure 2.2.

2.3.1 Issues

In 2015, scientists discovered that about half of the street food served in Dhaka, the capital of Bangladesh, is contaminated with bacteria that causes diarrhea. The contamination is due to dirty water and air, as well as poor hygiene practices. Street food can also carry bacteria that cause dangerous infections, such as cholera, shigellosis, and typhoid (Khan, 2017).

Along with improper hygiene practices among vendors and the lack of awareness among consumers, there are many other factors that contribute to this issue. According to the WHO, the major factors are: a lack of basic infrastructure and services (such as potable water supplies), difficulty in controlling large number of vendors, poor knowledge of basic food safety measures due to a lack of people educated on street food vending operation, poor knowledge of other regulatory issues related to unsafe food handling, inadequate knowledge of health and economic risks for both vendors and consumers, and a lack of proper health promotion activities about street food safety (WHO, 1996).

2.3.2 Controversies

Since street food safety is an informal sector, the challenge of sustaining healthy behavioral practices in both street food vendors and consumers is more difficult than any

other public health issue. The majority of disease outbreaks are caused by negligent food handlers (WHO, 2002). Many factors like level of education, income, knowledge of food safety, age, and gender are major driving forces for consumers' attitudes and perception of hazards in street foods.

Interventions might be successful or fail due to many reasons. However, a successful intervention investigates the target groups' knowledge and perceptions beforehand. According to one study, new knowledge or practices may not be effective or they might not change the behavior of a community; it might be too difficult, too expensive, and/or too time-consuming, or it may be opposed by other people due to cultural, socio-economic, or educational differences or other social determinants. In addition, on the expression of educational message, success or failure of an intervention depends, especially when it is difficult to match local perceptions and knowledge (Martinsen, 2008). For example, food-safety posters that was created in the USA used symbols for bacteria and slogans, like "fight bac," which the focus groups studied in Ghana did not understand (Hanna, 2015). Therefore, community participation is necessary and indispensable for designing a successful intervention and implementing it, changing a community's behavior, developing a proper system, and making decisions.

2.3.3 Problems

As mentioned earlier, there are several factors that cause the failure or ineffectiveness of an intervention program. One is poor coordination between different stakeholders. Negligible opportunities for the community to participate create less sharing of values between the macro-level (stakeholders like NGOs, the government, and policymakers) and

micro-level population (the community) (Mohapatra, 2016). The other reason is the failure to develop community-based health education or literacy. Butsch has demonstrated that a lack of proper health communication and knowledge sharing ability leaves people unaware of the impact of diseases on health and the economy (Butsch, 2008). Figure 2.3 outlines the issue of SFS and related causal reasons with the concepts that might be applied for solutions.

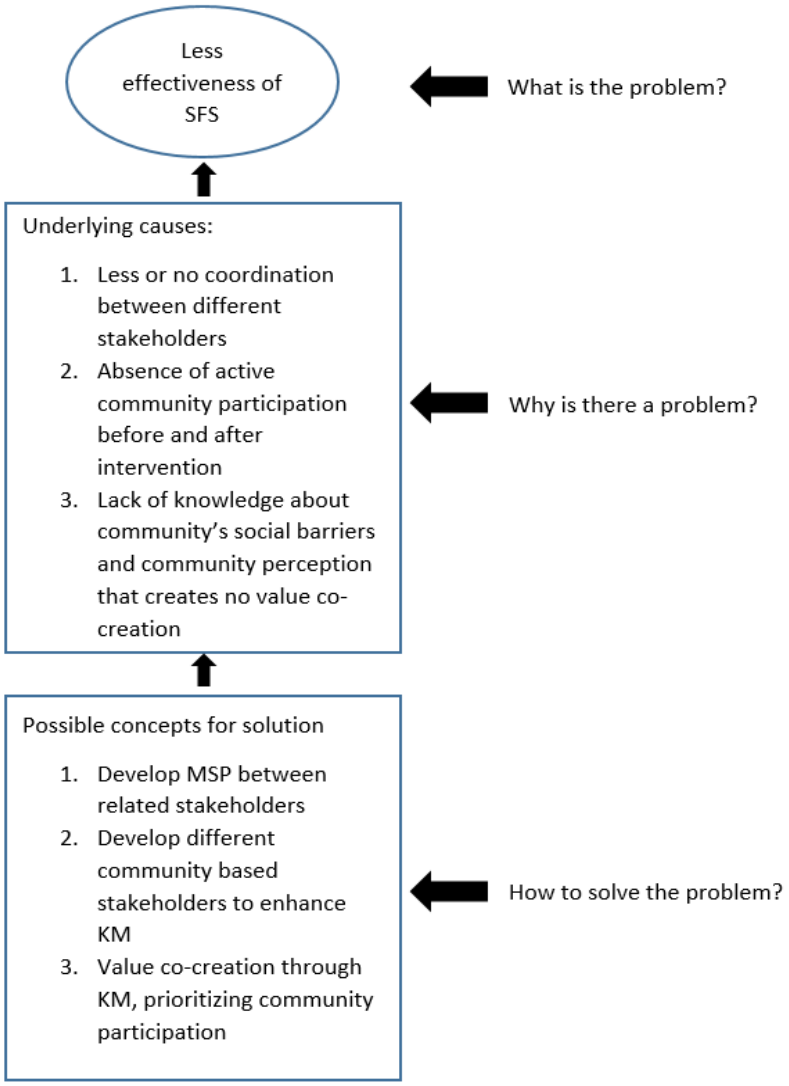


Figure 2.3: Reasons of ineffectiveness of SFS intervention

2.4 Features of Street Food Safety (SFS) in developing countries

2.4.1 Definition of Street Food and related information

Due to socioeconomic changes in many countries, especially in developing countries, urbanization and population growth is anticipated to continue in the next century. Street foods which are defined as the foods and beverages that is prepared and sold by the vendors in street and other popular public places like commercial areas, bus, taxi stands, stations, schools, markets etc. for immediate consumption or consumption at a later time which need no further processing or preparation. Fresh fruits and vegetables are also sold outside in the streets which can be also consumed immediately. (WHO, 1996)

2.4.2 Benefits of Street-Vended Foods:

It provides

- A source of reasonable, convenient and often nutritious food for urban and rural poor;
- Attractive and different tastes for tourists and the economically advantaged;
- An important source of income for many persons, particularly women; and
- A platform for self-employment and to develop business skills with low capital investment. (WHO, 1996)

2.4.3 The economic importance of street food

In most developing countries street food are under informal sector which is outside the regulation and monitoring of the governments. There is lack of official data or volume of trade involved as it is an informal sector and that is why the economic importance is not well

appreciated (Alimi, 2016). In most developing countries, it makes up the significant proportion of informal sector economy.

In Mexico city, over 120,000 vendors are employed street food sector that accounts 30.8% among 28.5% labour force who are working in various informal sector (Estrada, 2002). In Malaysia, the vending of street food is a multi-million US dollar trade providing direct employment for over 100,000 vendors with gross annual sales volume of about 2 billion US dollars (Dawson, and Canet, 1991). On the other hand, the significant contribution of microbusinesses made up largely from street food sector in the economy of Vietnam (Hiemstra, 2006).

2.4.4 Street Food Safety: A major public health problem

Though there are a lot of benefits provided by street food sector especially for the low – income urban population for their livelihood, this sector has become one of the major emerging public health issues not only in developing countries, but also in underdeveloped and developed countries as well. The lack of knowledge and unhygienic practice of street vended foods can pose significant public health issues and according to World Health Organization (WHO) the basic reasons are

- Lack of potable water supplies which is one of the basic infrastructure and services
- Difficulty in controlling the large number of street food vendors and vending operation because of diversity, mobility and temporary nature
- Insufficient sources of laboratory analysis and monitoring
- General factual knowledge of microbiological status of the food, accurate epidemiological importance of street vended foods

- Poor knowledge of basic food safety measures due to lack of educated people in street food vending operation, poor knowledge of other regulatory issues of unsafe food handling.
- Inadequate knowledge of health and economic risks both in vendors and consumers
- Lack of proper health promotion activities about street food safety. (WHO, 1996)

2.4.5 Value Chain of Street Food Production

Fig 2.4 shows the typical stages of the street food from agricultural sector, production, retailing, transporting, storing, processing and preparation and finally served at the consumers. However, according to the table 2.2, food can be contaminated at point of handling and distribution.

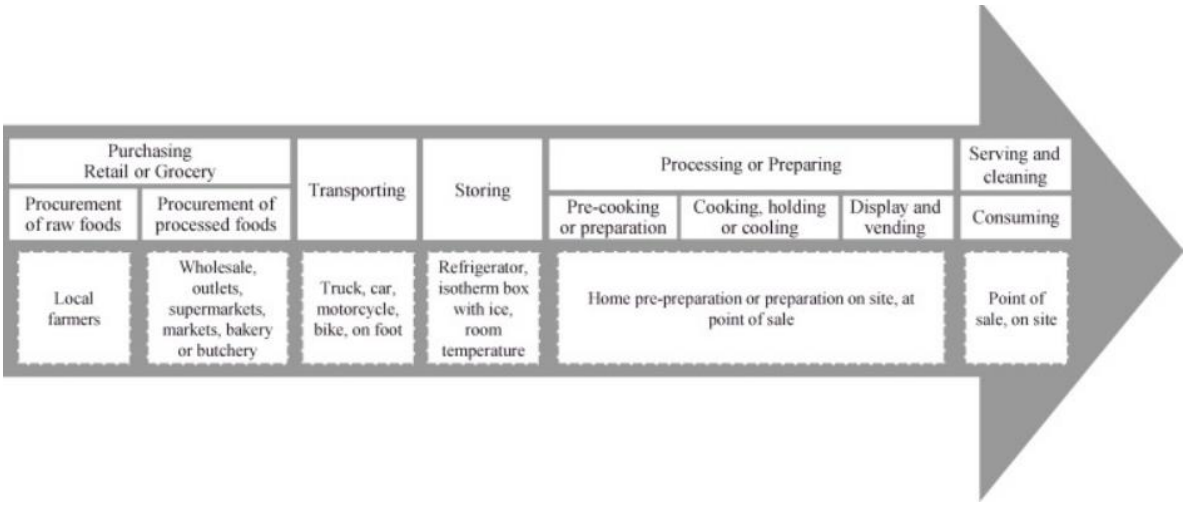


Fig 2.4: Value chain of Street Food System

2.4.6 Risk Factors associated with entire value chain in SF

There are possible risk factors in street food value chain which can be controlled by proper hygiene practices and knowledge and awareness about the health risks related to the

unsafe handling of street vended foods. Mainly three types of risks are associated with street food; environmental, chemical and microbiological (Abdussalam, 1993). However, the risk concerns mostly expressed were majorly health and spoilage/microbial related (Umoh, 1999; Lues, 2006). The possible risks associated within the whole value chain of street food has been demonstrated in table. 2.2

All the mentioned risks are associated with not only the handling, preparation and serving of the food, however, the risks are also associated with the raw materials and agricultural products that are used for the preparation of the foods. Therefore, the risks lies in the entire value chain and contamination can be introduced in any point of the whole value chain.

The major causal reason for increased risks are primarily is the knowledge and attitudes of the street food vendors regarding the street food safety. According to WHO, the majority of the diseases outbreaks are caused by the negligence of food handlers (WHO, 2002).

Table 2.2: Risk factors associated with the street food safety

Source	Hazard	Risk involved	Possible health effects
Agricultural practices	Farmers are using inorganic agrochemicals and organic manure	Residues from excessive chemical applications, (Lead, arsenic, cadmium, copper, mercury)	immune-suppression, hypersensitivity to chemical agents, breast cancer, reduced sperm count and infertility
Vendor environment or location	food handling is not hygienic	Pathogens like Salmonella and E. coli, S. aureus are transferred from human body and environment into foods	Skin infections, diarrhea, fever, abdominal cramp
	Improper waste disposal	Enteric pathogens like Salmonella, Shigella and E. coli are transmitted via vectors	bloody diarrhea, fever, abdominal cramp, traveler's diarrhea

Raw materials	water	Pathogens like E. coli, fecal streptococci, Salmonella and Vibrio cholera are passed	Cholera, dysentery
	Vegetables and spices	Bacilli and Clostridium and pathogens like L. monocytogenes, Shigella, Salmonella, etc. which are spore formers	Nausea, Vomiting, Diarrhea, colitis, food-borne deadly infections
Utensils, equipment	Chemical contaminants	Chemical poisoning	Cancer, infertility, long term impact
	Microbial contamination	Cross contamination of food with Staphylococcus aureus, E. coli and Shigella due to contaminated water, dish cloth, handler	Skin infection, diarrhea, bloody diarrhea
Storage and reheating	Improper storage temperature and reheating of food	Heat stable toxins produced by pathogens like C. perfringens and B. cereus	Stomach cramps and diarrhea
Personal hygiene of vendors	Biological hazards	Staphylococcus, Salmonella and Shigella via carriers	Skin diseases, fever, bloody diarrhea

2.4.7 Street Food Safety Studies in other Developing Countries

Survey of Hygiene and Sanitary Practices in Northern Nigeria

This study is about general hygiene and sanitary practices in Northern Nigeria. About 110 random samples from street food vendors were collected which represented 18% vendors of the study area. From the findings of the study, it has been concluded that, food vendors were only concerned with profit making in the central state of northern Nigeria at the expense of standard food hygiene and sanitary practices. Non-compliance with the Codex Alimentarius Commission guidelines for street food control were suggested in Africa. Since street food has some major benefits for the low-income population in developing countries, it is needed to focus in this sector for maintaining the food safety and therefore, implementation of policies is needed along with proper controlling and maintenance of the

street food sector. Integrated consultation with vendors and consumers in order to meet the needs of government, consumers and vendors is also necessary requirements before developing and implementing the policies. Documentation and licensing of food vendors will help the authorities to identify persons employed in such business and the types of food sold and this will provide an opportunity for food handlers in acquiring advice, service and training in food safety (Nurudeen, 2014).

Hygiene based study of street food vendors in Ghana

This study was conducted in an area of Ghana, where majority of the street food vendors were female. The respondents showed minimal hygiene practices in this study which includes personal hygiene, food hygiene, kitchen hygiene and methods of storing left over foods. This is because the majority of the participants in the study never received any form of training workshop on personal, food and kitchen hygiene. Among many other recommendations, this study depicted three major areas to focus on. Firstly, it recommended about the there is a significant gap among the street food vendors and the policy makers or other stakeholders. The informal nature of the street food vendors cannot ensure whether they are maintaining the rules and regularities of safe food or not. Therefore, a group of street food vendor should be formed in a formalized way to co-create values among different stakeholders for proper monitoring.

Secondly, this study recommended about the sudden monitoring and implementing the proper laws or punishment and also vendors should get regular medical screening by the public health people which needs proper integration among different stakeholders (Noble, 2014).

Consumer based study in developing Countries

There is little researches based on consumers' perception and most of the studies in street food safety are based on the hygiene practice and knowledge of street food vendors. Moreover, there is no evidence of providing street food safety based training for consumers and most interventions have been conducted among the street food vendors.

However, one study was conducted on consumer's risk/benefit perception and their attitude behavioral intension toward street food, Choi, Joowon et al. (2013), identified that perceived risk negatively influenced customer's attitude toward street food. In addition to the finding, they revealed that perceive benefit positively influenced consumer's attitude, whereas, the risk perception negatively impact behavioral intension. Consumer's attitude towards street foods fully mediates the impact of perceive benefit on behavioral intension whereas, attitude partially mediated the impact of risk perception on behavioral intension.

Another study was conducted in India where Sekar and Thamilselvi (2016) tested the buying behavior and consumer awareness toward street foods. They found that consumers are aware of the quality of the street foods and access to the outlet. In another study Sekar and Thamilselvi (2016) examined the consumer's preference of street foods and underlying factors to prefer street vended foods outlets. Taste and aroma factors are given most priority in choosing street vended food outlets in India. Five factor such as, economic, personal, lifestyle changes, Social and cultural factors and other factors influenced consumer's buying decision in street vended food outlet.

In South Africa, Asiegbu, Lebelo, Tabit (2016) conducted a study on 402 consumers to identify the food safety knowledge based on microbial hazard awareness of street food

consumers and found that better taste, affordability and accessibility were the three main reasons for choosing ready-to-eat street vended foods.

In Thailand, Khongtong, Karim, Othman, Bolong (2015) examined the decision making of consumers regarding purchasing safe street food and identified consumers' attitude, motivation, lifestyle, resources, need, pre - purchase evaluation, purchasing, attitude toward food safety certificate as the main factors.

Another study conducted on consumers` eating habit of street food was conducted in Dhaka City, Bangladesh. This study identified six factors that influence the habits of the people eating street foods in Dhaka. The factors are pleasure and soundness, convenience and variety, cost, attractiveness, food value, & taste and image of the food. The study showed that street food eating habits of the people of Dhaka City is significantly influenced by the pleasure and soundness of the eaters, convenience and variety of foods, price and attractiveness to the foods. However, factors like food value and taste and images are found not significant. Therefore, it is necessary to enhance the awareness and quality of street food not only for the health of consumers but also for raising the business level for the vendors. (Islam, 2017)

2.4.8 Street food safety studies in Bangladesh

According to the FAO 2007 study, about 2.5 million people eat street food every day in Bangladesh. It signals that the proportion of business opportunity exists in the street food sectors in Bangladesh. Since Bangladesh is among the developing countries, street food is still a lucrative and better options of food among low and middle income people and also among the young generations.

In 2015, scientists discovered that about half of street food served in Dhaka is contaminated with bacteria that cause diarrhea. The contamination is due to dirty water and air as well as poor hygiene practices. Street food can also carry bacteria that cause dangerous infections, such as cholera, shigellosis, and typhoid (Khan, 2017).

In Dhaka city, the term "street food" is considered as being foods or beverages that are sold basically by the informal sector small entrepreneurs. Street foods are generally sold from stands or stalls (usually not permanent structures) on the footpath of busy streets in Dhaka, usually at a lower cost than fast foods. Therefore, they provide an available source of food to all classes of people.

Street food plays a very important role for fulfilling the nutritional needs of the people living in Dhaka city. In developed countries, street foods are highly attractive as those are very difficult to prepare at home. Due to fast life, these people prefer eating street food more than home - made food. Moreover, the street foods are hygienic in those places and their physical environment is also favorable. But in developing countries like Bangladesh, street foods are not preferred by the mass people as those foods are unhygienic and health hazardous. The environment is also not favorable due to very high dust in the air and at the street as well. The consumers of low income level are majority of the population like rickshaw puller, day laborers, and hawkers etc. who cannot afford to buy expensive foods. In addition, students are also major consumers of street food in Bangladesh.

2.4.9 Policy Guidelines on Healthy Street Food Vending in Bangladesh

National Policy on Urban Street Vendors in 2004 (Government of India, 2004) was developed in India and it is now implemented all over the nation (Bhowmick, 2006). The

Consumers Association of Bangladesh (CAB) has also developed some policy guidelines for street food vending in Bangladesh to assure the safety and quality of street foods to reduce the health issues consumers, and to support, empower and legally protect the street food vendors.

Selected Policy Guidelines on Healthy Street Food Vending in Bangladesh (Haque et.al. 2010). The primary requirements is to register street food vendors with the local government authorities with a provision for every after three year's renewal system. Licensed vendors should not be evicted from the identified vending area unless it is proved to be in the public interest.

- Allocation of vending space at ward level in the cities with legal authority. The police, the public works departments, the city corporations or municipality authorities, local (micro-credit) banks and of the vendors themselves should be members of these committees –at least one third women should be among them.
- The local government authorities should define vending areas, according to urban development policies and the existing formal laws, and allow genuine street food vendors to sell within these areas for a specific licensing fee. Priority should be given to vendors, who already are doing business at these sites.
- Providing legal, financial and socio-economic support to street food vendors to ensure quality, safety and nutrition of the public consumers.
- The local government authority, police, health department and the vendors or their associations need collaboration to implement laws.

- Fees should be charged for allocating the vending areas and issuing the licenses which can keep record of the number of registered vendors, map and identify the vending areas. Complaints should be also registered by the consumers to improve hygiene conditions.

The public analysts of food inspection, National Food Safety Advisory Council members, law enforcers, school authorities and vendors are needed to be trained about the Pure Food Ordinance, the City Corporation and Municipality Ordinances and this guideline on street vending

2.5 Clarification and Relationship of concepts

As mentioned above, several concepts has been discussed in this dissertation to answer the MRQ of the study or in other words, these concepts or viewpoints are applied in this study to develop conceptual framework.

This study follows the steps of the concept to achieve the health intervention successful, such as applying KM concept in managing the intervention better and which needs multi-stakeholder partnership concept and finally community participation and community empowerment by implementing health promotion and literacy concept. Fig 2.5 shows the preliminary application of the concepts in this study.

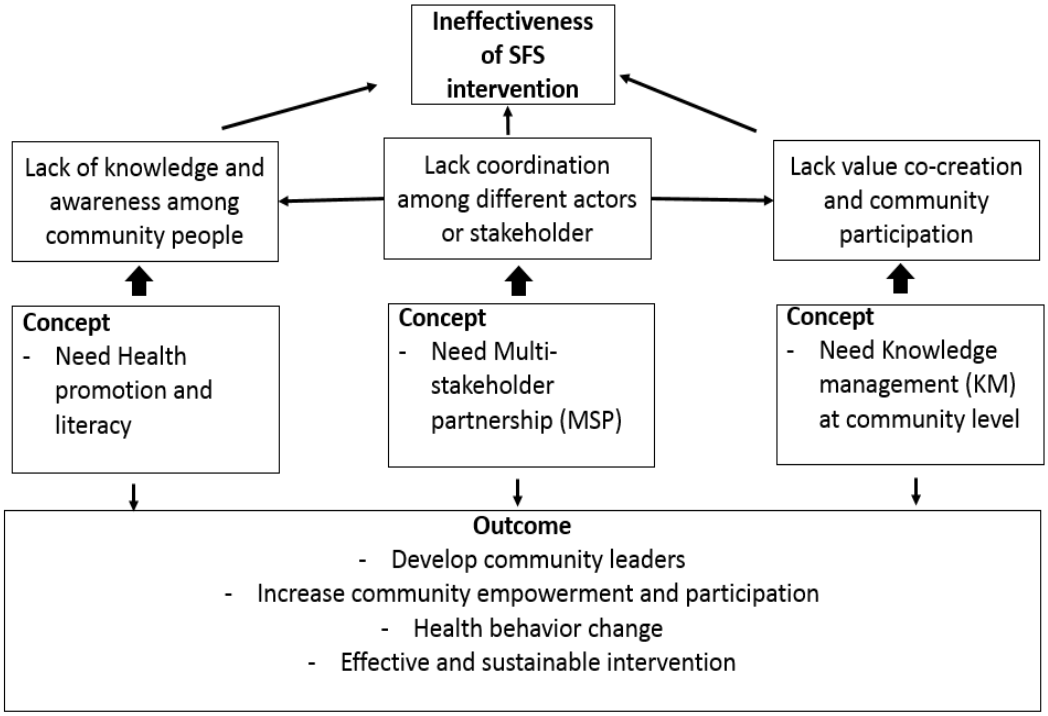


Fig 2.5: Study problem and implemented concepts

Chapter 2 Section B

Features of implemented concepts

2.6 Knowledge Management Viewpoint

Historically, KM has been applied at the organizational level to improve the employee performance and facilitate innovation by creating, sharing, understanding and disseminating knowledge. In health sector where resources are limited, actors are many and work is geographically distributed, it is imperative to apply KM at broader program level. Not only that, but also, along with applying the concept of KM in health programs, it can be applied at community level which will facilitate, motivate the community knowledge resources to act as major stakeholder and empower them to solve local health problems by taking ownership. The KM as a whole can facilitate collaboration, and knowledge sharing at global, regional, national and sub-national levels.

2.6.1 Concept of Knowledge Management

KM is the integration of 3Ps (people, process and platforms). Most knowledge is created, captured, and shared through human interaction— making it essentially a social act. People must, therefore, be at the core of any KM approach, particularly since so much knowledge is in people's head and difficult to transfer to others. Processes, both formal and informal, help us capture and share knowledge, while technological platforms that are appropriate to the context can expedite knowledge storage, retrieval, and exchange. These three components form the foundation of knowledge management.

KM is very well recognized in business and academic areas. KS (Knowledge Sharing) and KT (Knowledge Transfer) is important factors in KM for creating and implementing knowledge that is well understood and acknowledged by all the stakeholders. It provides a framework for analyzing and implementing new information through a mix of values, experience, appropriate context based information, and expert insight (Davenport and Prusak, 1998).

Nonaka suggested two types of knowledge (Nonaka et al., 1994), one is tacit and other is explicit knowledge. Personal knowledge are recognized as tacit knowledge where subjective and experience counts and this knowledge is very difficult to express clearly in words. Cognitive skills like insights, descriptions, or beliefs are needed to express these knowledge. On the other hand, explicit knowledge can be easily expressed in words and it is objective and logical. Theoretical approaches, problem solving and databases can easily express to share this knowledge. KM concept can be denoted as a system or process for improving the organizations (Nonaka and Takeuchi, 1995).

Many researchers have explained the theories of sharing tacit knowledge (e.g. discussions, people interactions, etc.), however it is still difficult for organizations to practice in real situations. E.g. `We can know more than we can tell" (Polanyi, 1969); ` `Tacit knowledge is highly personal, it is hard to formalize and, therefore, difficult to communicate to others` (Nonaka, 1991). The key for a successful KM is to convert or translate one`s tacit knowledge into an usable and understandable explicit knowledge. Polany also emphasized on the importance of dialogues among individual to groups which ultimately move to the

organizational level. Sharing, transferring and translating knowledge from individual level to the broader level is called knowledge dissemination.

According to Nonaka, the process of knowledge creation has been described in Fig 2.6 where he categorized the process into four modes. The figure describes the process on how knowledge is disseminated from individual level to a broader or large collective level. The four modes of socialization (S), externalization (E), combination (C) and internalization (I) are together called SECI model according to Nonaka.

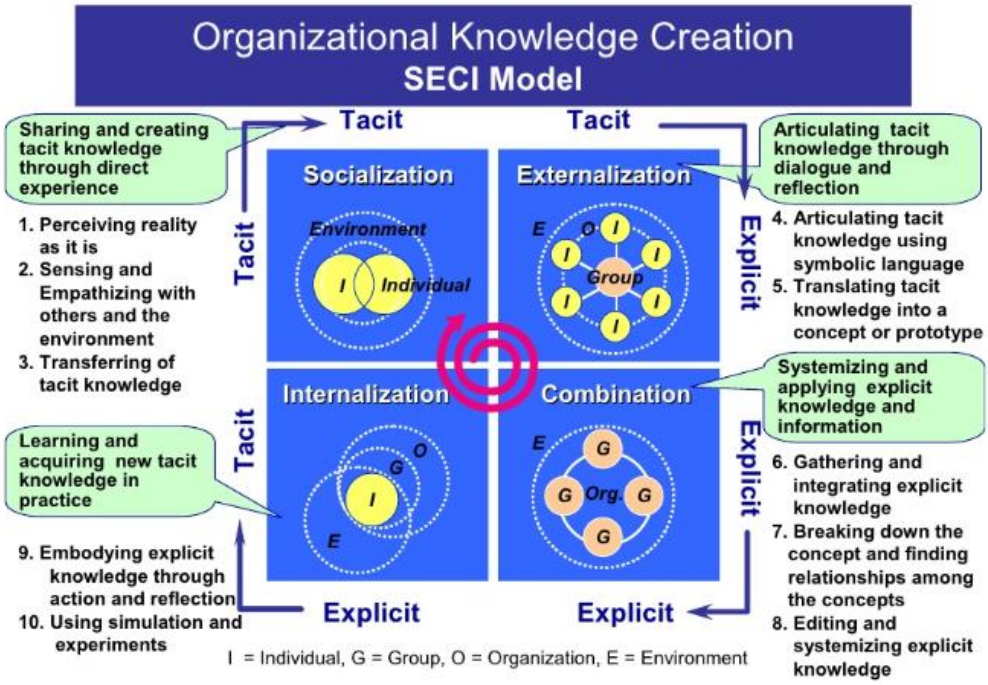


Fig 2.6: Organizational Knowledge Creation (SECI Model)

Applying KM concept in public health issues is new field in research. There are several stakeholders or actors in each public health issues such as, community people, NGOs, government bodies, policy makers etc. Therefore, after knowledge creation process, this knowledge needed to be implemented in action and the model demonstrated by Graham in

Fig 2.7 explains the process about knowledge to action journey happens to implement the acquired knowledge into application (Graham, 2006).

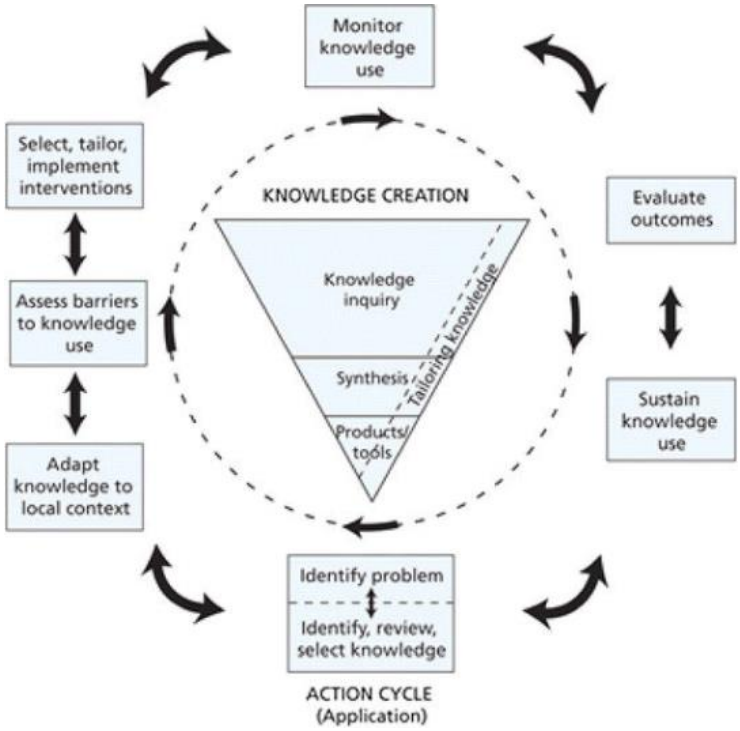


Fig 2.7 Process of Knowledge to Action

2.6.2 Practices of Knowledge Management (KM)

In the above sections, KM has been defined already. However, based on global health related issues, KM can be defined as a systematic process of collecting knowledge and connecting people to it so they can act effectively and efficiently (Salem, 2017). The aim and target of this study explore the gaps or barriers in achieving effective outcome from public health intervention and how this can be improved by some innovative solutions. KM has been used successfully in the business sector for decades and currently, this idea can be implemented in global health and its development by innovative thinking, improved decision making and encourage dynamic learning.

Fig 2.8 shows the KM logic model, developed by global health knowledge collaborative to assist with planning and evaluating the KM interventions in global health program. This logic model provides a visual depiction of the relationships between the resources, processes, outputs, and outcomes of KM interventions in global health programs. This model start with the outcome that we want to achieve and then think backward to identify how efficient and effective knowledge sharing could help to achieve the long term outcome (Salem, 2017).

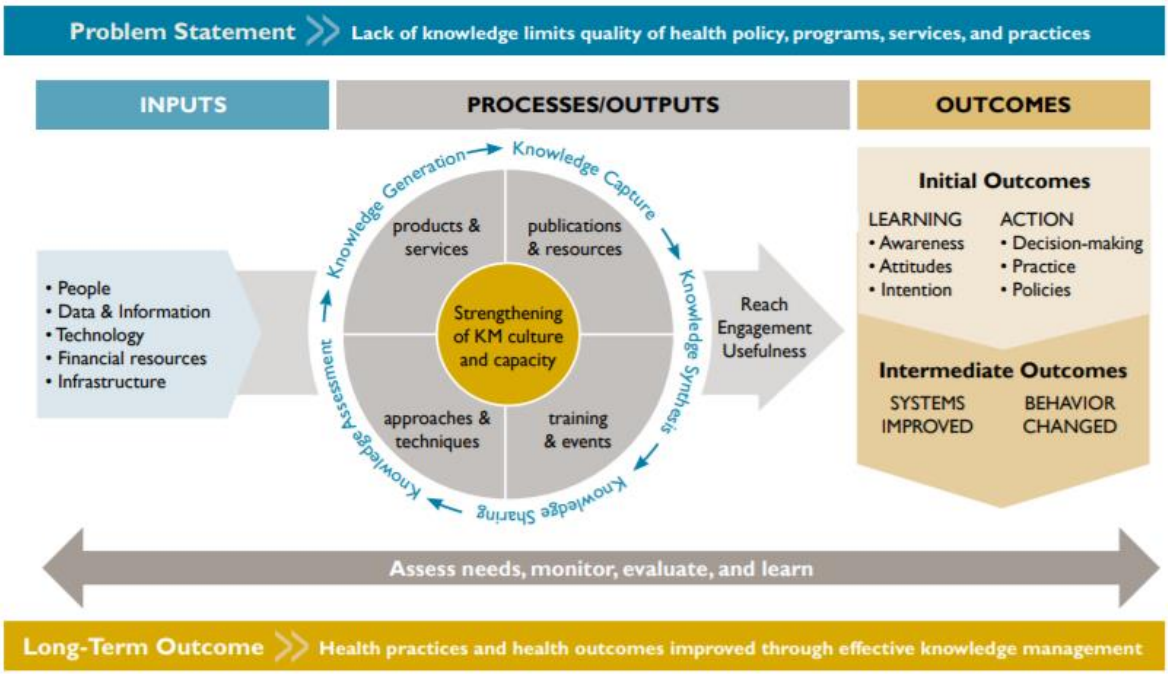


Fig 2.8: Knowledge Management (KM) Logic Model

- The five KM processes - knowledge assessment, generation, capture, synthesis, and sharing which make up the KM cycle together. Several questions being captured from this logic model like who is generating new knowledge? How is that knowledge being captured, and by whom? Is anyone sharing that knowledge? If so, with whom, how, and in what form of outputs?

- Finally, reflect on the needed inputs that make the KM cycle work.

Therefore, it has been found in the logic model that, primary input in knowledge creation is knowledge from people from different level and skills and their engagement in the process actively to get a sustainable outcome (Salem, 2017).

2.6.3 Concept of Community of Practice (CoP)

According to Nonaka and Takeuchi, there are two ways of managing tacit and explicit knowledge, `cognitive approach` and `community approach` (Nonaka and Takeuchi, 1995). According to cognitive approach, knowledge requires to be fitted for objectively defined concepts and focus more on explicit knowledge that can be codified and transferred through texts (Nonaka and Takeuchi, 1995); On the other hand, community model argues that organizational knowledge needs to be rooted in the social context with social interactions and relationships where exploration will be the main process in order to communicate different social groups and communities (Nonaka and Takeuchi, 1995).

Fig 2.9 describes the two approaches demonstrated by Newell, et al. (2002)

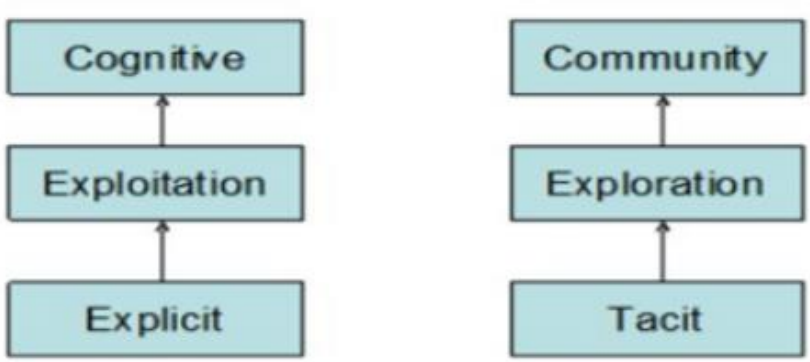


Fig 2.9: Two approaches of managing knowledge (Nonaka and Takeuci, 1995)

However, this study will dedicatedly focus on the community approach through community practice where developing community practice to share his or her experience and ideas with others who are involved in the same pursuit are necessary. Community of practice (CoP) is popularly recognized as KM tool that can be used to implement knowledge sharing, and promoting organization's competitive advantages. According to Wenger and Snyder (2000), CoP provides significant benefits to the organizations which needs three major factors, Domains, Community and Practice. Domain needs to identify the sharing of interests in proper domain, whereas people in this community need to realize that having the same work and goal does not mean community of practice - they need to highly focus on interactions among members; and also, people within this community are required more 'practice' instead of just taking about what they have, i.e. they not only should think about achieving something but also provide their knowledge, experience and even stories as tools to the community to build a resource of knowledge . (Lave and Wenger, 1991). Fig 2.10 shows the three factors related with the CoP.

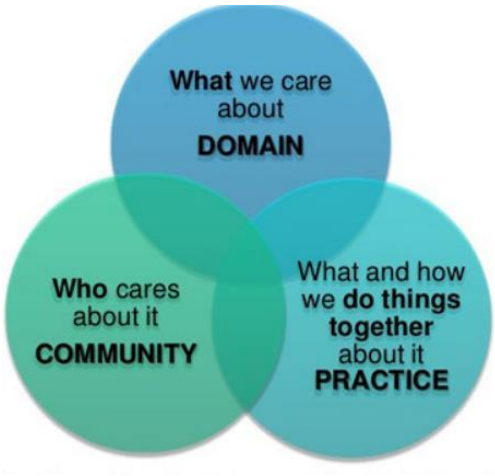


Fig 2.10: Community of Practice Model (adapted from Lave and Wenger, 1991)

Therefore, empowering communities with proper health knowledge is indispensable because, for better participation with understanding and skills, community people should be well informed about the public health issues and health promotional activities and initiatives of health literacy is a must.

2.7 Health Promotion and Health Literacy Viewpoint

Health literacy which has been introduced in 1970s (Simonds, 1974) have created growing importance in public health and healthcare. Capacities of people to meet the complex demands of health in a modern society has been focused (Kickbusch and Maag, 2008). Health literate means engaging one's own health, their family and community into context, understanding the influencing factor of health and related diseases, and knowing how to address them. With an adequate level of health literacy, an individual can be able to take responsibility for one's own health, family health and community health as well (Macqueen et al., 2007).

There are many definitions and dimensions of health literacy. According to Institute of Medicine, health literacy has been defined as the "degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions"(US department of Health, 2000).

2.7.1 Role of Health Promotion and Literacy on Community Participation

The focus of creating values through involving community people is needed for innovating new dimensions for advancement of health services. On the other hand,

community people are the major consumers of health services. Therefore, the concept of consumer value co-creation has been demonstrated in business management literature and practice since the 1970s (Dunston, 2009). Two dimensions of co-creation, namely co-production and co-creation relating to value-in-use has been described by Payne and Frow (Piligimiene, 2015). Co-production is defined as the involvement of consumers in a specific product development; for example; development of health care services for chronic care (Batalden, 2015; Piligrimiene, 2015), which is also a part of preventive strategy. In comparison, collaborative activities that enhance customer lifetime value are defined as value co-creation (Piligrimiene, 2015). In this definition, value is co-created when a consumer is able to contribute their experience in health services or developing products and in undertaking valuable tasks for advancing the health services (Gronroos, 2011) Thus, as end users, consumers determine value based on their individual experiences of health care, and have control over value co-creation in health care. Therefore, to participate as a co-creator in the process of improving health services, health literacy is a must for each and every individual of the community.

2.7.2 Existing theoretical model of health literacy

According to Nutbeam, health literacy has been demonstrated based on two groups, one is for individual benefits and other is for social or community benefits (Nutbeam, 2000).

Functional health literacy leads to an improved knowledge of risks and health services, and compliance with prescribed actions. Interactive health literacy helps to improve capacity

to act independently which also improve motivation and more self-confidence. Critical health literacy is to improve individual resilience to social and economic adversity. Functional health literacy increases the participation in population health interventions which are related to community and social benefits,; interactive health literacy increases the capacity to influence social norms and communicate with social groups; and critical health literacy develops community empowerment and the capacity to act on social and economic determinants of health.

Lee suggested the different dimensions where health literacy means disease and self-care knowledge, health risk behaviors, preventive care and physician visits and compliance with medication. This attributes when people possess can understand their health status, seek emergency care and care hospitalization at the proper time (Lee, 2004).

Institute of Medicine stressed upon communication skills like able to read, write, understand cultural concept and speak about health status which provides satisfactory health outcome in reduced cost (Institute of Medicine, 2004). Speros also supported the same dimensions of health literacy about gaining proper knowledge and understanding to reduce hospital visits and get satisfactory benefit through health services (Speros, 2005).

There are a lot of public health issues where common people and many health service providers do not feel comfortable to discuss about and therefore people cannot be well informed and some of them suffer severely. Therefore, Baker and Manganello explained about the understanding of media literacy about health information which can help the

common people to understand the severity, risk factor and service facilities of those diseases (Baker, 2006; Manganello, 2008).

A lot of conceptual models were found in different literatures; very few models have been empirically validated. One study proposed an integrated model of all the previous concepts outlining the main dimensions of health literacy as well as describing how the factors of health literacy impacting upon health services and health outcomes. Figure 2.11 demonstrates the integrated health literacy model.

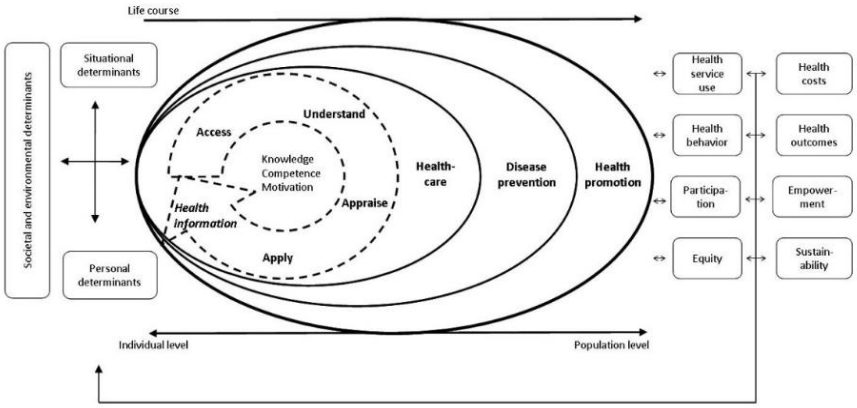


Figure 2.11 Integrated Model of Health Literacy Concepts (Sorensen et al., 2012)

This integrated model describes the main dimensions of health literacy (applying, appraising, understanding, accessing the health information to improve knowledge, competency and motivation) through social, environmental, situational and personal determinants which ultimately help to improve knowledge on how to seek health care, control or prevent diseases and promoting health. The ultimate outcome will be proper use

of health services, improve health behavior and participation, health equity, health cost, empowerment and sustainability from individual level to population level.

2.8 Multi-Stakeholder Partnership (MSP) Viewpoint

For the effective value co creation process, the concept of multi-stakeholder partnership approach is significantly needed. In MSP, the role of facilitation is very important and the facilitator can be both external (NGOs, governments, private sector, academics etc.) and internal (community based like students, teachers, community leaders etc.). The external facilitator can be a wise investment for a particular time but the internal facilitator is usually at the core of any success (Ref MSP). The main principle of this theory is to guide and govern multi actor processes that are intended to change something (ref). Torfing (2012) defines MSP as `the complex process through which a plurality of actors with diverging interests interact in order to formulate, promote and achieve common objectives by means of mobilizing, exchanging and deploying a range of ideas, rules and resources.

There is a strong co-relation between the concept of MSP and KM in the boundaries of organizations. However, public health issues are significantly belongs to the community people where they have little or no partnerships and participations in improving the interventions. Therefore, introducing MSP and KM based on community people as key stakeholder is necessary.

Though MSP has been a broad area to be discussed, however, in this study, the expected outcome using the MSP concept are

- Capacity building of local actors to cooperate, learn and get opportunities to provide innovative ideas.
- Creating strong partnership among all the actors/stakeholders
- Strategic and sustainable decision making or innovations
- Local decision makers and other key partners sharing knowledge and scaling up the efforts through supporting each other
- Local partners empowered to solve further public health issues by taking ownership and create, share and transfer knowledge through learning and practicing

One study findings showed that, the main benefits of MSPs is the possibility of exchanging capacity, knowledge and skills. There are both strengths and weaknesses of the MSPs according to this study that has been explained in table 2.1

Table 2.1: Strengths and Weaknesses of Multi-Stakeholder Partnership (MSP)

Strengths of MSPs	**Weakness of MSPs**
- Collaborative action to reach common goals - Exchange of information and capacity - Pulling together resources - Flexible, informal and decentralized structure - Raising awareness and public opinion - Connecting local practices with the global environmental and development norms.	- Different operational strategies across actors - Different visions, cultures, interests, organizational languages - Difficult to consolidate the conflicting environments - Unbalanced decision making processes - Lack of transparency and legitimacy - Weak monitoring and evaluation mechanisms

(Source: Andersson, 2015)

However, to overcome the weaknesses and to step up for a successful MSP, this study has demonstrated the below points:

- Identification of a common goal or objective
- Inclusiveness and participation
- Alignment of diverse institutional, cultural, and ethnic differences
- Communication and dialogue for trust building
- Maintenance – agreed rules and principles
- Emphasis on good decision-making process and strong governance and implication of public interest
- Well-designed evaluation and monitoring mechanisms (Andersson, 2015)

  The community people who are usually does not concerned about the public health issues, one study was conducted in Japan to establish a system that can approach in raising community awareness for the mass population through cultivating the self-learning ability and empowering oneself for participating. Based on the findings of that study, it has been realized the gaps among the communities and the other macro level stakeholders (governments, NGOs, other private organizations etc.). Therefore, developing community based stakeholders and knowledge sharing through proper collaboration and coordination is the main concept of MSP to achieve sustainable solution for any public health issues.

Chapter 2 Section 3

Relationship of Study Goal with Knowledge management

Like many other public health issues, street food safety is one emerging issue where proper dissemination of knowledge is required. Unfortunately, in developing countries like Bangladesh, the management of knowledge like sharing knowledge from bottom up to top down is less visible. To sustain any healthy behavior, not only intervention but also continuous knowledge sharing is essential with community people. To manage the knowledge properly, strong collaboration and coordination is needed even if in the community level. Fig 2.12 describes in brief that, how this dissertation has been organized in three parts to reach the objective of the study.

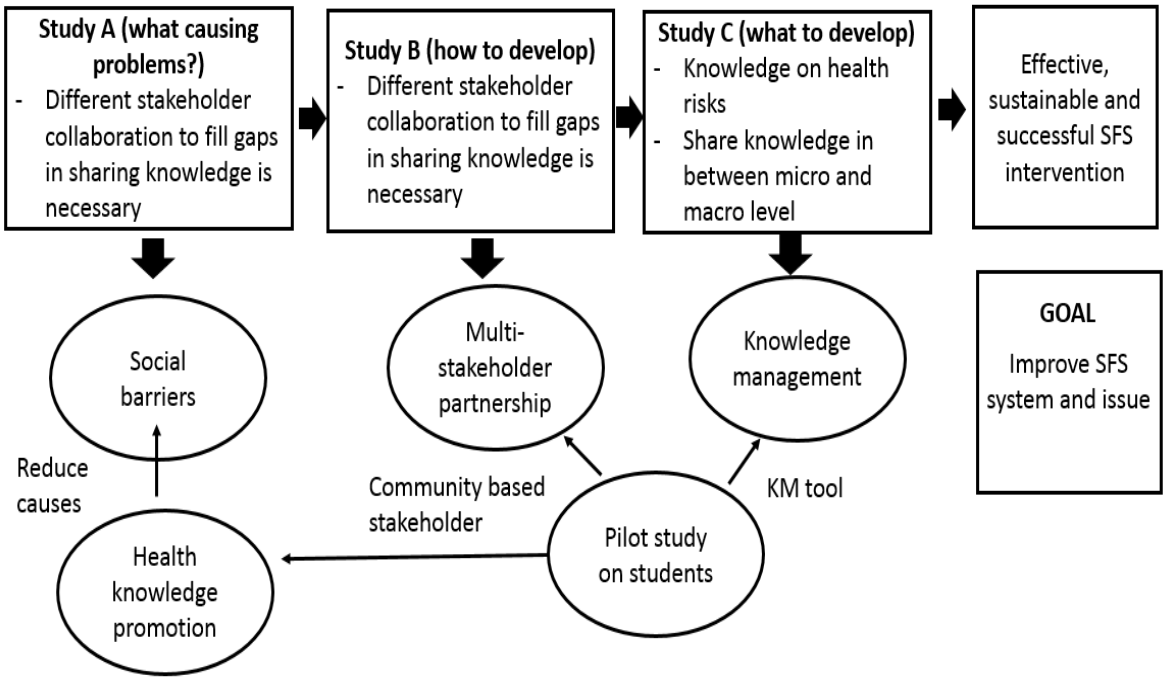


Fig 2.12: Organization of the dissertation and relationship of study issues with the study objective in brief.

Chapter 3

3. Research Methodology

3.1 Methodological Sequences

This study focuses on multidisciplinary approaches to achieve the research questions to obtain the main objective. The study propose a conceptual model to improve SFS system based on knowledge management that helps enhancing the effectiveness of interventions. To answer the three aims, action research strategy has been selected as the major research strategy.

This chapter mainly focuses on the general features of the study methodology like study site, research strategy, research procedure and related stakeholders` introduction etc. However, for the sake of the study, it has been divided into three major parts based on the subsidiary research questions. Therefore, the details of data collection, number of study participants and data analysis has been explained in Chapter 4, 5 and 6 (Study A, B and C) to better understand the methodology and related findings.

3.2 Study Site

The major part of the study was conducted in Khulna district, the third largest city in Bangladesh. Though Dhaka is the capital of Bangladesh, however, for the sake of the study, Dhaka was not selected for the major study area and several interviews and observation were conducted in Dhaka City.

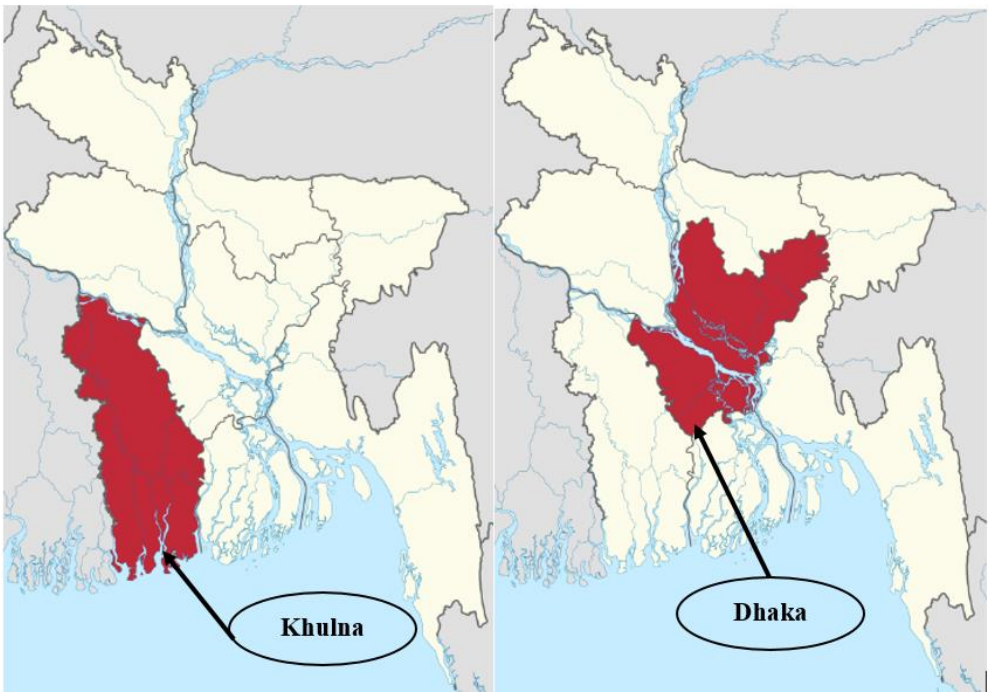


Fig 3.1: Map of Study sites (Dhaka and Khulna, Bangladesh)

Description of Khulna City

Khulna is the 3rd largest city after Dhaka and Chittagong. Khulna is located in south-western Bangladesh at 22°49′0″N 89°33′0″E, on the banks of the Rupsha and Bhairab River. It covers a total area of 59.57 km^2 (BBS, 2001) while the district itself is about 4394.46 km^2. It lies south of Jessore and Narail, East of Satkhira, West of Bagerhat and North of the Bay

of Bengal. It is part of the largest delta in the world. In the southern part of the delta lies the Sundarban, the world's largest mangrove forest.

As of the 2011 census, the population of the city was 663,342 (Population and Housing census, 2011). The city, in combination with localities forming the wider metropolitan area, is home to an estimated 1.022 million as of 2014. (World Urbanization Prospects, 2014) Density of population is about 19,000 per km^2. The literacy rate among the urban people of Khulna is 59.1%, which is higher than the national average of 56.5%.

Description of Dhaka City

Dhaka is the capital and largest city of Bangladesh. It is one of the world's largest cities, with a population of 18.89 million people in the Greater Dhaka Area. It is also the 4th most densely populated city in the world. Dhaka is the chief economic, political and cultural center of Bangladesh. It is one of the major cities of South Asia, the largest city in Eastern South Asia and among the Bay of Bengal countries; and one of the largest cities among OIC countries. According to the Far Eastern Economic Review, Dhaka will be home to 25 million people by the end of 2025.

The literacy rate in Dhaka is also increasing quickly. It was estimated at 69.2% in 2001. The literacy rate had gone up to 74.6% by 2011, which is significantly higher than the national average of 51.77%. (Wikipedia, 2018)

3.3 Research Procedure

Prior to collection of data, researcher contacted with the Food and Agricultural Organization (FAO) for supporting data collection from Dhaka and Khulna city. The approval regarding collecting the data from street food vendors have been taken from the FAO and Khulna City Corporation (KCC).

3.3.1 Details about FAO

FAO means the Food and Agricultural Organization which is specialized agency of United Nations that leads international effort to defeat hunger. The goal of this organization is to achieve food security for all and work for the people to get regular access to enough quality food too lead an active and healthy life. FAO works in 130 countries to work according to the context for reducing the hunger and working for maximum assurance of quality.

In Bangladesh, FAO have four main priority areas to work such as reduce poverty and enhance food security and nutrition; enhance agricultural productivity; improve market linkages and finally improve technology generation and adaptation (FAO, 2018).

3.3.2 Research Strategy

This study is qualitative based and the research strategy that has been used is Action Research. Action research is community-based study where co-operative enquiry, action science and action learning can be possible to improve the conditions and practices in healthcare environments (Lingard et al., 2008; Whitehead et al., 2003).

Parkin (2009) describes that the purpose of conducting action research is to bring change in specific contexts. Healthcare workers can be able to make informal evaluations and judgements through their observations and communications with other people. In an action research project the researchers will need to develop and use a range of skills to

achieve their aims, such as careful planning, sharpened observation and listening, evaluation, and critical reflection.

The purpose of conducting Action Research

- Action research is a method used for improving practice. It involves action, evaluation, and critical reflection based on the evidence gathered and based on that changes in practice are then implemented.
- Action research is collaborative and participative; where a common purpose is embedded.
- It depends on situation and context.
- It develops image based on interpretations made by the participants.
- Knowledge is created through action and at the point of application.
- Action research is also helpful for problem solving.
- In action research findings will support to develop actions, but these are not conclusive or absolute (Koshy, 2010).

3.3.3 Timeline of data collection

Semi-structured guidelines for interviews, focus group discussions (FGD), and participant observations that were based on the literature review and consultation with experts based in FAO Bangladesh. All tools were written primarily in English and then translated Bengali. Although data collected were formally started after receiving the approval from Khulna City Corporation and FAO Bangladesh, where the major data collection timeline were January 2018 to February 2018, the pre data collection that is observational part were started from May 2017 and post follow up part were occurred until May 2018. The

pre data collection observation supported to understand the nature of the participants, especially the vendors of street food.

3.4 Organization of the Methodology and Findings of the dissertation

The rest of the chapters or the main study has been divided into three parts

Chapter 4 or Study A: Exploring the social barriers of street food safety issue based on Bangladesh where the methodology and findings have been described in details.

Chapter 5 or Study B: It is based on the concept of Multi-stakeholder partnerships and knowledge management application

Chapter 6 or Study C: A pilot study based on secondary school students has been explained in details.

Figure 3.2 shows how each study is related to one another to achieve the final outcome.

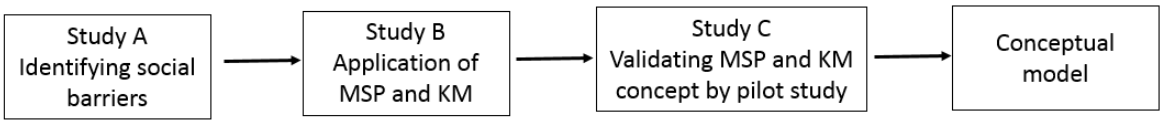


Figure 3.2: step by step approach of study methodology and findings

Chapter 4

Study A

Understanding the Social Determinants and Knowledge based on Street Food Safety (SFS)

This chapter will focus on

SRQ1: What are the social barriers of street food safety issue?

Objectives of this Chapter are:

- To explore the social determinants of health that have some significant impact on street food safety
- To explore the knowledge about the Street Food Safety as public health issue
- To explore the health promotion activities existing and finally conceptual framework based on the respondents.

Significance of this study (A) in relation to major research question

The previous studies based on street food safety are significantly based on the hygiene, behavior and practice of the vendors and little has been investigated about the social barriers or determinants that hinders in acquiring food safety knowledge and achieving the expected food safety situation in street food sector. Fig 4.1 demonstrates what will be discussed in Study A and what output will lead to Study B and Study C

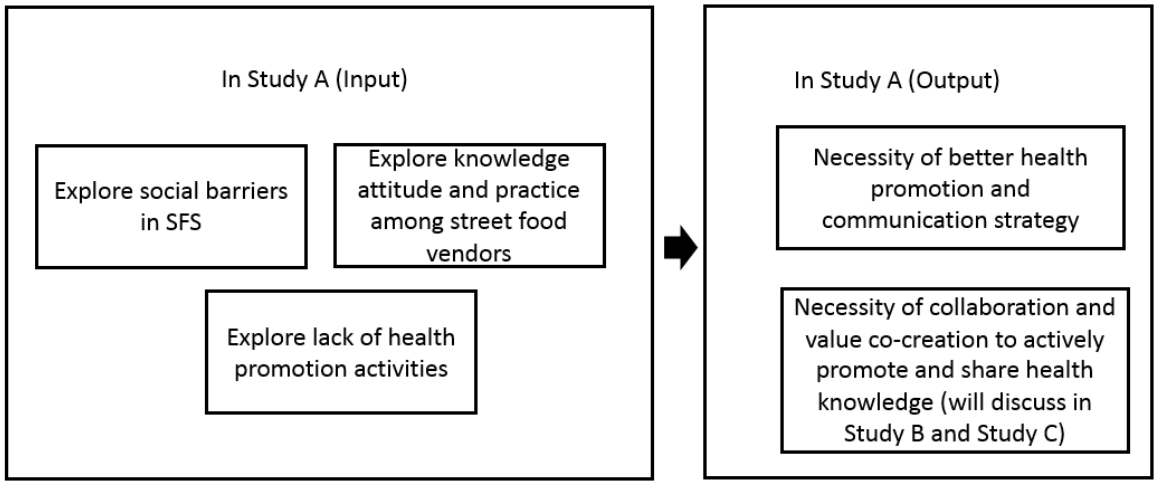


Fig 4.1: Main issues and output discussed in Chapter 4 (Study A)

4.1 Study A1: Exploring the Social Determinants of Health

According to Dahlgren and Whitehead, a model was developed to understand the wider social determinants of health (Dahlgren and Whitehead, 1991). These factors were defined as the `causes of the causes` shown in Fig 4.2. These type of factors although generally beyond outside of individual control, can be improved upon with support from organization like government, policy makers, local authorities etc. These factors concern the environment, the economy, society and health as a whole and are generally interconnected with one another.

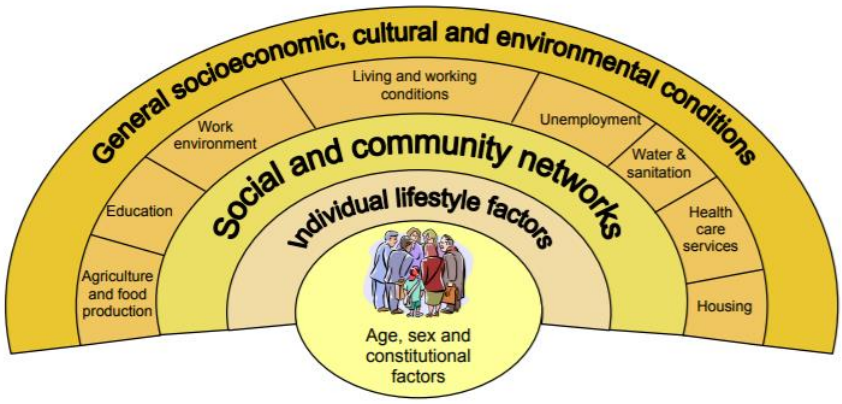


Fig 4.2: Social Determinants Model of Health (Dahlgren and Whitehead, 1991)

To explore the social determinants or in other words, wider social determinants that may have influence on the street food safety problem, data was collected from 20 street food vendors from FAO intervention group and another 20 vendors from non-intervention or control group. Data was also collected from 20 consumers from different age, profession and education.

4.2 Methodology

4.2.1 Study Site and Population

This qualitative research was conducted in two major urban areas of Bangladesh. One of the reasons for choosing Khulna and Dhaka is because in these two cities, an intervention already were conducted by Food and Agricultural Organization (FAO). This allowed the researcher to have a better understanding of how in each cities, street food safety system is working after intervention termination.

4.2.2 FAO previous intervention in Dhaka and Khulna City

FAO proposed and implemented 500 licensed street food carts to street food vendors of Khulna City to reduce the contamination created by uncovering the food when selling

around streets. These carts were mainly covered and the street food vendors were received hygiene based training arranged by FAO and Khulna City Corporation.

On the other hand, the same intervention and initiatives also implemented in Dhaka City and around 600 covered and licensed carts were provided to street food vendors. In both city, the carts were provided to the street food vendors who did not have a good conditioned cart to sell their street food products.

4.2.3 Timeline and Data Sources

For data collection, firstly I contacted with FAO Bangladesh and discussed about the objective of the study. Primarily, they provided some documents about the previous intervention and provided useful suggestions for preparing the questionnaires. The next step was to get official permission to conduct the study with the street food vendors who are listed during the previous intervention. They provided all the technical support like providing staff who can help me in conducting the study with the vendors and conducting the interviews and FGDs. Before staring the data collection, several discussions and corrections were done for preparing the semi-structured questionnaires for the interviews and focus group discussions (FGD). For study A, the data was collected from 40 vendors and 20 consumers whose demographic profile has been described in Table 4.1.

All the vendors were selected randomly both from previous FAO intervention (who received covered cart and training) and non-intervention (who did not receive covered cart and training). On the other hand, customers were selected randomly regardless the age, sex, profession, educations etc.

Each interview were taken for 15-20 minutes from the vendors and consumers and all the interviews were hand written and recorded. On the other hand, 5 FGD were conducted among the consumers who were eating street food. In each FGD, 5-7 people from different age, sex, education and profession were participated and all the FGDs were conducted randomly at the point of eating street food. Each FGD lasted 20 minutes with the help of City Corporation and FAO staff. This person supported in facilitating the topic in front of the participants and also helped in writing the answers as a document.

4.2.4 Data Analysis

The analysis process included the following steps: familiarizing with the data, developing coding schema or framework, coding the data, grouping the data, and interpreting the data. The process is described sequentially in the following paragraphs.

The interviews and FGDs were written by the researcher, one person from City Corporation in Khulna and in case of Dhaka, one person from FAO helped and supported to get maximum output from the respondents. Since all the data collected by the researcher, it was familiar with the researcher and coding was done after reading the data again and again.

4.2.5 Validity of the data

To ensure the validity and reliability of qualitative data, triangulation method has been used. This method is a powerful strategy to ensure or facilitates data validation from two or more sources. Therefore, to understand the social barriers in SFS issue, we collected qualitative data from vendor and consumer perspective to understand the view from two main sources.

4.3 Findings

Table 4.1. Demographics.

Variables	Vendors (intervention+ control)	Consumers
Age range	(25 -65) years	(20 – 55) years
Gender		
Male	33	10
Female	7	10
Education		
Primary (0 to class 5)	27	2
Secondary	10	6
Bachelor	3	8
Masters	0	4
Profession		
Street food vendors	40	
Student		5
Housewife		4
Day labours		7
Working people		4

(Appendix Questionnaire for Study A: Part 1)
(Sample size: 20 street food vendors – intervention)
(20 street food vendors –non-intervention)
(20 customers)
(Tool- Interview, focus group)

4.3.1 Major Social Determinants from respondent's perspectives

Education

- Participants Response 1: `*I did not go school and I did not learn much. I actually do not understand what is the impact of unsafe food on economy, but yes, some problems regarding health may happen*`
- Participant response 2: `*I cannot read the message on posters or leaflets and I do not have time to read those out, I need to work whole day*`.

Most of the street food vendors are less educated and they did not have formal education at

all. Therefore, they usually do not understand the impact of unsafe food consumption on health, the vicious cycle of becoming ill and related economic burden etc. Moreover, some vendors mentioned that, they cannot even have the literacy level to read some safety messages in newspaper, bulletin, poster, billboard, leaflet or any other communication media.

On the other hand, there are two level of customers, one is educated and concerned about the safety behaviour of the vendors. However, the major part of street food customers are less educated, day labourers who are mostly not aware of eating poor quality street food and concern about the lower price mostly.

Lower socio-economic status

-Participant response 1: ` *We are very poor and day labourers, so it is very convenient for us to eat street food from this cart, however, we never check the quality of the food, may be sometimes we felt problem, but that's ok now*`- from consumer`s perspective.

- Participants response 2: ` *We received training on food safety but there are a lot of things we need to buy to maintain the safe food practices, we already are very poor, so how can we buy those if they (macro level stakeholder) do not provide us for free*?`- from vendor`s perspective.

Poor economic condition is most significant social determinants in street food safety. With a very small income, most of the vendors need to survive with poor living environment and in a crowded place where each vendor have more than 5 family members with single income person in a family. Therefore, to bear the expenses for family, they cannot buy the hygienic serving and cleaning materials for the customers.

In addition, due to lower socio-economic status, customers are usually dependable upon poor quality street food which is also cheaper and convenient.

Physical and Working Environment

- Participant response 1: `*They (macro level stakeholder) can evict us anytime, when they see us selling street food here, therefore, we lose our consumers*`. –from vendor`s perspective

- Participants response 2: ` *sometimes some vendors are selling good foods, we are interested to buy from them, however, they do not stay for long*`- consumer`s perspective

As street food is an informal sector, the vendors move different places with their carts and usually sell products in front of busy areas. According to the vendors, due to informal nature of business, they are being evicted by the government people and they cannot be able to select a clean and safe area to formally sell their products.

Social and political environment

- Participant response 1: ` *From the City Corporation people, some have been received the street food covered cart and we did not get, but we do not know why we did not get, we are also poor*`- vendor from non-intervention group
- Participant response 2: `*Vendors who have received the cart are earning more, it is not that their food quality is good but their cart have the certification of city*

corporation, that is why they are not evicted`- vendor`s perspective from non-intervention group.

The vendors in the study area are more or less are from same educational and socio-economic status, therefore, political and social determinants are causing more inequalities among them. From the above qualitative analysis, major significant factors or themes have been explored as the major social determinants of the street food safety problem, which has been demonstrated in fig 4.3.

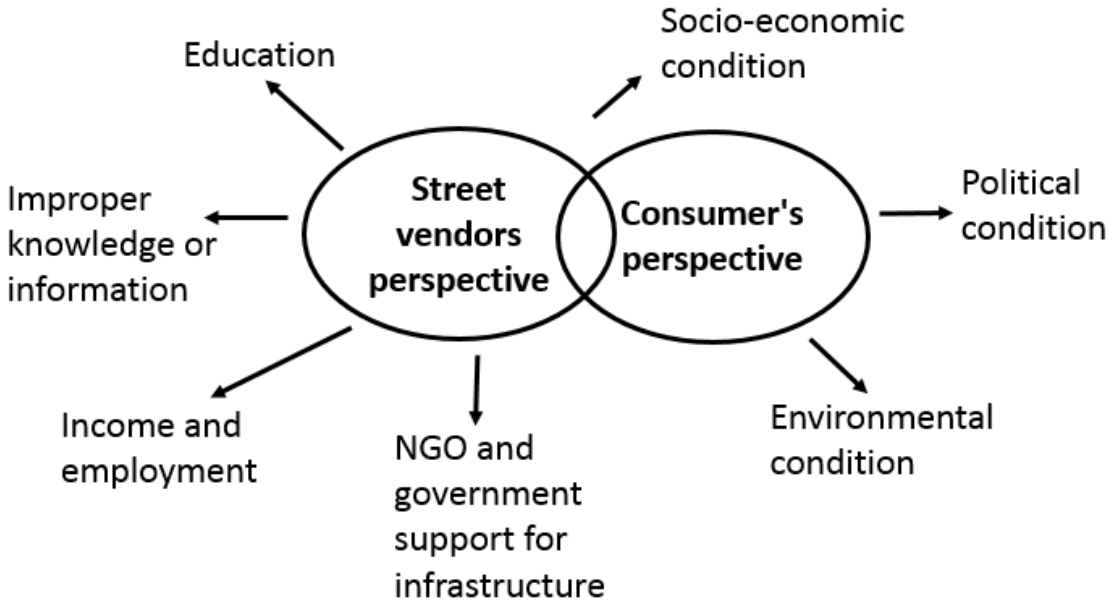


Fig 4.3: Social barriers of SFS based on vendor and consumer interview

4.4 Study A2: Explore Street Food Safety KAP study (Knowledge, Attitude and Practice)

This section discusses about knowledge, attitude and practice (KAP) of the street food

vendors. The main objective of this part of study A is to explore the KAP among street food vendors whether they have some basic knowledge or not and whether practices align with the acquired knowledge or not.

4.4.1 Data collection and study participants

The questionnaire based on KAP was prepared prior discussing with FAO expert and these questionnaires are based on the basic rules of food safety maintenance knowledge that should be possessed by not only the street food vendors but also by the consumers. However, the KAP study was conducted among 90 street food vendors both from Khulna and Dhaka City from previous intervention group. These vendors were interviewed with semi-structured questionnaires to understand their knowledge and observation was also conducted to understand their practice and attitude towards the consumers. Table 4.2 shows the demographics of the study participants in details.

Table 4.2: Demographics of street food vendor

Gender	Male	83.3%
	Female	16.7%
Average Age	26-45 years	74.4%
Major education level	No education Primary secondary	50% 24.4% 21.1%
	Food items	
Average sales/per day	Chotpoti seller Snacks Tea/Bakery	1000-1500 BDT 2000-2500 BDT 2000 -2500 BDT
Location of vendors	Tea/Bakery Chotpoti/fuchka Snacks	Schools/offices Commercial areas/bus/rickshaw stands Commercial areas/bus/rickshaw stands

Average family members		5-7 people

(Appendix Questionnaire for study A: part 2)
(Sample size: 90 street food vendors)

The demographic pattern of the street food vendors shows that, the average age of the vendors are 26-45 years and most of the vendors, almost 50% have no education level. In terms of daily sales, here three major food items has been demonstrated which has the maximum popularity. Among these three, snacks items and tea during office hours get the maximum amount of sales each day. These items are sold mostly in front of schools and commercial areas. In majority, average 5-7 people belongs to one household.

Table 4.3 KAP based themes and findings

Major KAP themes	**Participant practice**
Source of water	Nearby Tube-well
Source of drinking water for customers	Nearby tube well
How hand washed after toilet	Soap and water
How food served	Using spoon (chotpoti, achar, soup, noodles) Using hands (for snacks)
How utensils are washed	Bucket and pot storage water
How vending utensils are wiped?	Only with cloths
Waste/garbage management	Throw at roadside drain
How food are covered	FAO provided cart, which is already covered by glass
How currency is handled	Using hands

How clean are there clothes	Mostly dirty, not wearing aprons
how carts are wiped	With the same clothes using for wiping utensils

(Appendix Questionnaire for study A – part 3)
(Sample size -90 street food vendors)

From the participant's interview and observations, the findings has been extracted and the themes and findings are the statements which is most of the street food vendors mentioned and being observed. Therefore, in Table 4.3, though the participants were from the previous intervention group who received hygiene based training from FAO, however, proper maintenance of hygiene was not found from their practice. Table 4.4 has described the positive and negative attitudes found from the observation.

Table 4.4: Positive and negative observations from KAP findings

Positive attitudes	**Negative attitudes**
- They are using the tube-well water for cleaning the utensils, provide drinking water for consumers from tube-well - They have knowledge about using soap and water for handwashing - Food is served by spoon - Foods are covered by the cart itself, provided by FAO, to save from fly, mosquito, dust etc.	- Both utensils and cart are wiped with same clothes - Currency/money is handled by hand (currency is handled by many people, increase risk of pathogens) - They are throwing wastes at nearby dustbin, which is unhygienic - Many vendors sell their products near dustbins - Vendors are not wearing aprons

4.5 Study on Health promotion based perception

The purpose of this interview was to identify the perception of street food vendors and consumers to understand whether the current health promotional strategies are proper or effective for them to receive necessary health related information or not. Therefore, 30 people both from vendors and consumers were individually interviewed to express their perceptions. The data collected from them were written and then coded manually. Finally, the outcome from the qualitative thematic analysis has been categorized in 4 domains which has been described in table 4.5 and the components under each domain has been extracted which are related to health knowledge, health promotion and health literacy.

Table 4.5: Health promotion domains coded by researcher (from community perception)

Name of domain coded by researcher	Components of the domain (extracted from interviews)
Lifestyle related knowledge	Practice of learning health topics from different digital or print media, practice of handwashing, concerns about smoking and its impact, checking physical fitness (blood pressure or diabetes), observing the food safety before consumption.
Health seeking behavior	Reluctance for visiting doctor and treat by own self, seeking medical advice from family and friends (who is not experienced or not a medical person), hiding symptoms, women seeking medical help very late
Health Service support	Seeking medical emergency to local pharmacy, visiting traditional healers, no knowledge about the proper services or references in case of serious symptoms, cannot understand the prescription or reason for the disease
Health promotion support	Information complexity for less educated person, promotion of health information is insufficient and not reachable to all people, language and promotion of health information are less understandable.

According to the perceptions of community people and from the interview, there are 4 main domains or categories derived where it has been demonstrated that, the level of health promotion regarding the street food safety and overall public health is not so communicative which can be able to develop the community skills and motivation towards healthy practices. The aim of exploring the community perception is to focus on the lack of health promotion and health literacy activities among the community and people actually do not understand how to maintain the preventive health behaviour.

Based on the above domains, table 4.6 explains the actual verbatim or comments about their perception regarding the health promotion.

Table: 4.6: community perception regarding health promotion and knowledge.

Themes	**Comments from the participants**
Lifestyle related knowledge	- *We don't need to watch television, we are very much experienced and we can handle our illness. (female, age -50 yrs., education - S.S.C, housewife)* - *Do not know about washing hands after coming from outside (male, age -32 yrs., education – class 8, day laborer)* - *It is wastage of money to check blood pressure and diabetes, though doctor suggested me to check regular basis (male, age-52 yrs., education – S.S.C, business)* - *We usually eat street food from this vendor and we did not ask about food safety, because the food tastes good (male, age – 20 yrs., university student)*
Health seeking behaviour	- *If any symptom or pain occurs, I usually treat by myself, sometimes I ask my neighbor and there is one friend who is a medical doctor (female, age – 25 yrs., education- MBA student)*
Health Service Support	- *I have serious pain in my abdomen, but I do not know where I seek treatment, there is a local pharmacy, I took medicine from there but did not heal, now I am thinking about going to traditional healer (female, age -21 yrs., education- class 2)*
Health promotion support	- *We cannot get time to watch TV for health messages (male, age-35 yrs., street food vendor, education-class 5)*

	- *I cannot understand what is written in the leaflets or posters, it is difficult to understand, we are not so educated, maybe that's why (female, age-32, housewife, education class 5)* - *I usually try to give whatever knowledge I have gained from different media to others, when I see unhygienic foods are selling, I try to share the knowledge with them. (male, age-14 yrs. Student)* **(Appendix Questionnaire set for Study A-part 4)** **(sample size: 30 community people)**

4. 6 Study A3: Explore Perspectives on Health Promotion

4.6.1 Tackling social determinants by developing conceptual model

Based on the identified social determinants from interviews, 5 different focus group discussions among vendors, adult men, adult women, students and city corporation people were conducted to get their perception about the way of tackling the issues and improving the innovative way of health promotional activities that can reach mass population in a convenient way. Each FGD were lasted 25 minutes and data collected through recordings and written documents. Data analysed manually and from the FGD, several recommendation were explored as described below.

Government and NGO perspectives

Most of the vendors and customers mentioned about the below recommendation

- Formalization of street food cart to avoid illegal usage of area, eviction by police and local authorities. They mentioned that, FAO provided carts are never evicted by the authorities and other vendors require the similar type of formal certification

- By rotation, training through NGO or local health representatives should be incorporated to cover maximum amount of vendors
- Customers mentioned about incorporating street food safety training in educational sector especially in secondary schools.

Health literacy and health promotional activities

- Focus group of vendors: They mentioned about providing pictorial messages about how to maintain street food safety in every vendors cart, tea stall, restaurants, where people can see those and discuss about the issues. In this way, less educated vendors can be able to learn about the safety guidelines, who cannot read the message and cannot get opportunity to watch TV or advertisements.
- Focus group of adult men: They mentioned about providing educational materials in mosques where many people gather during daily prayers. They also suggested about educating students in schools who can be able to disseminate food safety knowledge and other health messages and health service related information to families and surrounding community people.
- Focus group of women: They mentioned about weekly gathering in a specific meeting and they are interested in getting knowledge on how to seek proper health services and required food safety and health related messages through local health representatives.

- Focus Group of students and others: They mentioned about utilizing the mass media, educational institutions and popular gathering places to promote food safety messages and health information.

Figure 4.4 shows the model that has been developed from the identified social determinants or social barriers and some recommendations from the community level population to tackle in a collaborative way.

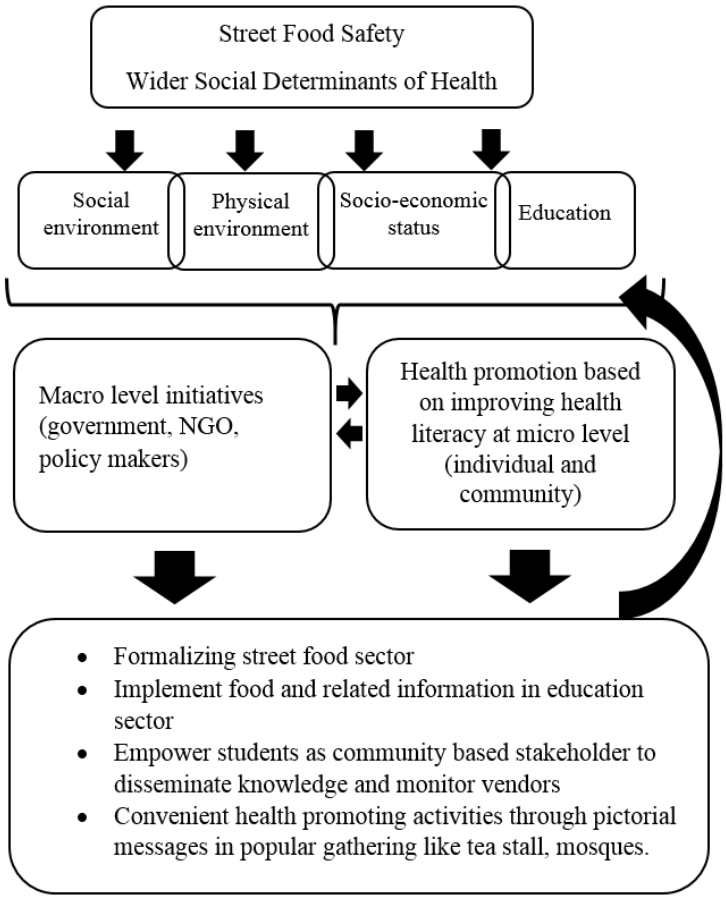


Fig 4.4: Development of a model based on Social determinants of Health and Health promotion and literacy

4.7: Summary

This section illustrates about the wider social determinants which is difficult to solve, however, it has been recommended to become health literate to tackle those social barriers. The KAP study based on the street food vendors provide an idea that, most of the positive behaviours can be achieved when NGO or government are providing proper facilities and services. However, the absence of these facilities, the attitudes or behaviour are not so significantly changed. One of the reason might be the social determinants like lack of education and proper health based information through which, community people can be able to understand the health and economic impact of consuming unsafe street food.

It has also been found that, the health promotional activities that has been distributed by the macro-level stakeholders are very limited and it is not so easily understandable for less educated population. Therefore, it is important to translate the health messages in simple local language from the academic language.

Based on the community perspective, several useful health promotion ideas has been developed mentioned below

- Community people mentioned about sharing knowledge through representative like students, mosque Imams (in Islamic country, the leader who delivers useful messages before prayer in the mosques), community medical representatives etc.
- For street food vendors, they suggested about putting useful messages through useful pictures which is further discussed when consumers come to their cart, discuss together about any topic together.

Therefore, to monitor the street food activities, whether they are maintaining hygiene condition or not can be observed by some guidelines or rules which will be displayed in front of the cart and consumers can easily be aware before consuming food from the street food cart. This guideline will also be beneficial for vendors to maintain the food safety during selling the food products.

Fig 4.5 explains the guideline, which has been also provided among the street food vendors by the researcher during data collection phase.

Fig 4.5: Hygiene rule provided to the street food vendors during the study (Food safety and standard authority of India, Ministry of Health and Family Welfare, Government of India)

Chapter 5

Study B: Improving Street Food Safety (SFS) system through Multi-Stakeholder Partnership (MSP) Approaches

This Chapter will focus on

SRQ 2: **What is the role of developing community based stakeholders in confronting social barriers in SFS issue?**

When the partnership is mandated to address a social problem, multiple partners from each of the private, public, and civil society sectors are involved. In most of the MSP studies, it explain that, partners participate in mutual problem-solving, decision making, knowledge-sharing, and resource distribution (Koschmann et al., 2012; Provan et al., 2007). However, little has been focused on how to empower community people to actively involved in MSP approach for decision making.

More recently, this type of partnership has been emerging in response to the prevalence of complex social challenges unsolvable by a single organization, such as issues related to poverty, public health, economic development, the environment, and education (Bond et al., 1998; Clarke, 2014; Geddes, 2008; van Tulder & Pfisterer, 2014). The challenges embodied by the term sustainable development, require the participation, cooperation, resources, and knowledge of all three sectors where institutional shortcomings prevent progress (Bäckstrand, 2006; van Tulder & Pfisterer, 2014). A concern with addressing sustainable development challenges through multi-stakeholder partnerships is in its early stages, and so the links between actions and outcomes at the partnership level remain unclear (Branzei & Le Ber, 2014).

In this chapter, we have focused on developing community based stakeholder through empowering secondary school students in food safety based literacy. It is believed that, the health literacy skill and food safety knowledge not only help them to participate in monitoring the street food safety but also empower them to gain communicative and interactive skills to coordinate, share and transfer knowledge with other macro level stakeholders. Fig 5.1 describes the main points to discuss in this chapter Study B and what is the major output of this chapter.

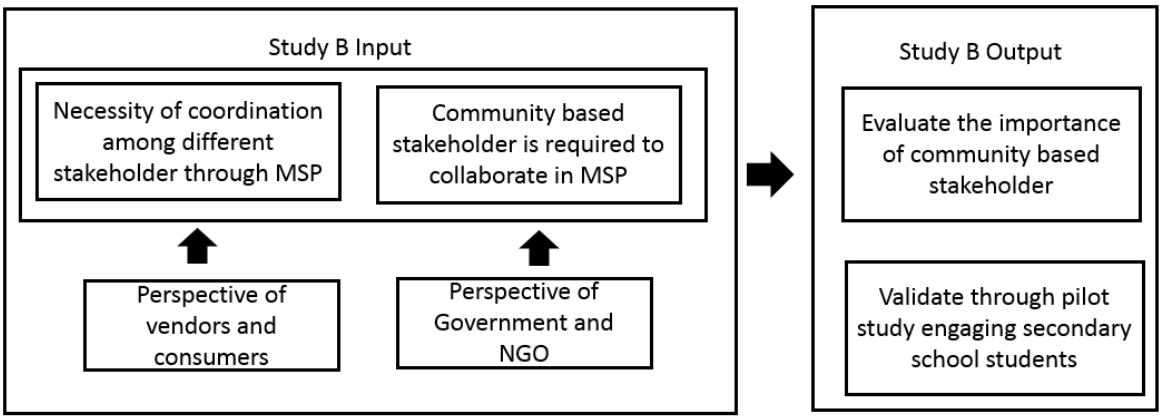


Figure 5.1: Main issues discussed in Chapter 5 (Study B)

5.1 Methodology

This phase of study was conducted in two parts. The first part of the study was conducted in in January 2018 to administer interviews and FGD among all stakeholders or actors in SFS system. The major stakeholders in SFS system are street food vendors, consumers, NGO people, and Government people. The interviews were done by semi-structured questionnaire to explore the perception regarding the role of multi-stakeholder

partnership or collaboration and how to facilitate the collaboration or coordination. The data collection of the first part was conducted in both Dhaka and Khulna city participants who were participated in Study A. However, different sample size has been taken which is described under each table of the findings.

In the second part, pilot study in small scale was conducted with the help of Khulna City Corporation and NGO people in February 2018. Around 30 secondary school students were participated in the study.

Therefore, the first part was conducted among all stakeholders and second part of data collection was among the students.

5.1.1 The Pilot Phase

The pilot phase was conducted in Khulna city and it could not be conducted in Dhaka city due to lack of technical support. The first phase of pilot study was conducted by NGO people who provided training to secondary school students and from them, randomly 30 students were selected for the data collection process.

Data were collected in two parts. First part were secondary data collection where Khulna City Corporation and NGO provided a checklist to monitor the street food vendor and their practices. Those monitoring forms were collected and analyzed as document analysis.

In the second part, participant observation by researcher was conducted to understand the students' facilitation to promote the healthy and hygienic behavior for the consumers and further, students were interviewed to provide their perception to the researcher.

5.2 Study B1: Understanding Role of all Stakeholders

Regarding the perspective of multi-stakeholder partnerships (MSP), majority of the respondents from the interview and focus group discussion (FGD) thought that, there is significant necessity for collaboration among the government, NGOs, community people, educational institutions and academic researchers for effective service provision, effective outcome generation from intervention, sustainable solution from the outcome of intervention and behavioral change among the community people in SFS system through proper MSP concept. Based on collaborative manner, it is possible to achieve sustainable solution in SFS system, get formalization of street food and proper awareness can be established according to the perspective of the participants. Therefore, MSP can be an option for any public health issue along with SFS to be implemented in the management system. However, community based stakeholders or leaders is needed to develop for effective collaboration.

Table 5.1 demonstrates the necessary role needed to be conduct by each stakeholder and the findings is based on the interview results from the street food vendors. In this study, only street food vendor's perspectives was taken and about 90 vendors participated in answering the questionnaire.

From the findings, vendors think that, maintaining hygiene is the first priority among other roles. On the other hand, consumers need to raise awareness and consume safe food. Vendors also think that, there are two significant role for NGO, share the knowledge about food safety with community and include food safety education in schools through collaborating with them. Lastly, from vendor`s perspective, it has been found that, each of

the role is important for government, however, among them formalization of street food sector is the most necessary role among all.

Table 5.1: Role of each stakeholder based on street food vendors

Role of vendors	Receive training and maintain hygiene	WHO guideline	Handwashing properly	Learn health messages	
	83.3%	12.2%	72.2%	27.7%	
Role of consumers	Consume safe food	Monitor vendors	Help to enforce safety behavior	Quit buying unsafe food from vendors	Support NGO and Govt. by raising awareness
	78.9%	44.4%	46.6%	54.4%	75.5%
Role of NGOs	Promote food safety information	Act as intermediary between community and government	Share the knowledge about food safety	Do community based need assessment	Include schools in health promotion
	62%	66.6%	69%	65%	74.4%
Role of Government	Reduce political restlessness	Formalization of street food sector	Implement food safety in education system	Provide all support to NGO	Monitoring and enforce law and policies
	86.6%	98%	72.2%	85.5%	75.9%

(Appendix Questionnaire set for study B-part 1)
(Sample size: 90 street food vendor)

5.2.1 Perceptions of communities in SFS system

For reducing or eliminating any public health issue, interference of government and NGOs along with other health service partners are needed. However, there is less or no opportunities for community people to participate in decision making, or not even share the final outcome and participate in way forward planning with community people. Fig 5.2 shows how other stakeholders lack community participation in an SFS intervention planning to decision making management system.

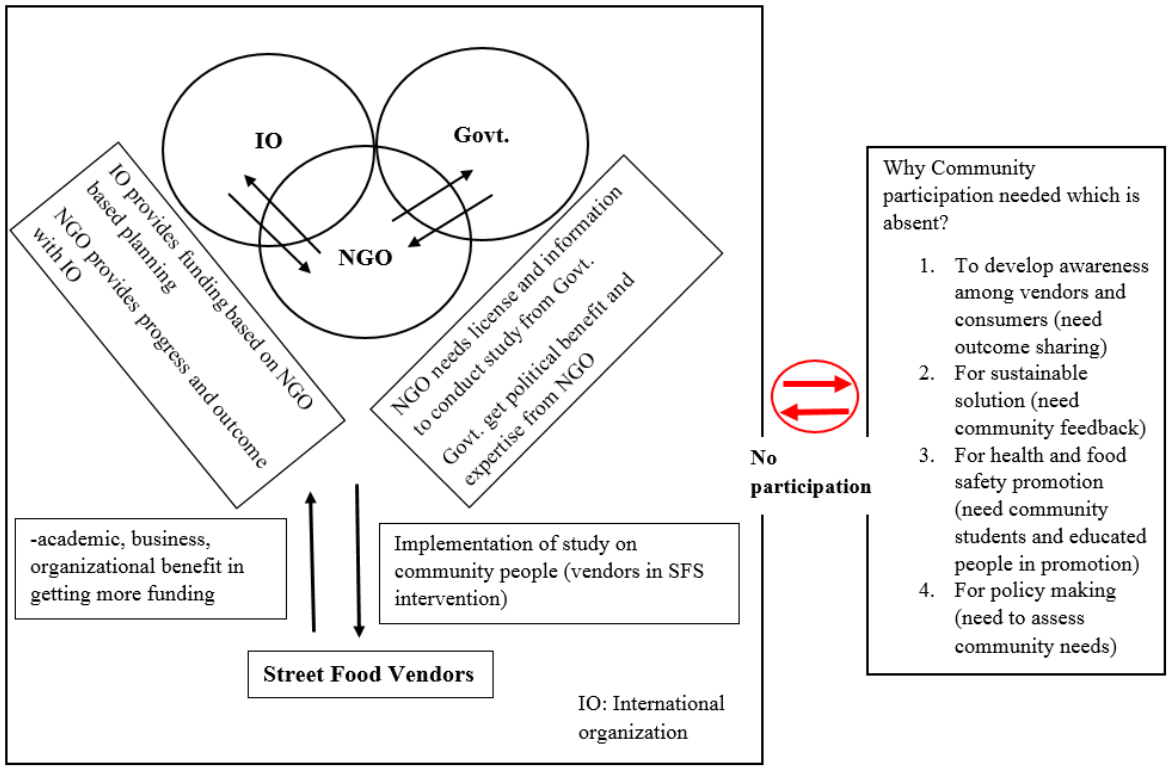


Fig 5.2: No participatory activities by communities in the intervention process

In Fig 5.1, it is seen that, in SFS intervention process, street food vendors only participated in the implementation phase as samples, however, real participation is not only engaging as samples, but also need to have ownership and decision making ability or

opportunities through community perception as well. As in Bangladesh, most of the low-income level people who are the major consumers of the street food are less educated, therefore, we need to develop community based stakeholders who can take that ownership and coordinate with other stakeholders.

5.2.2 Perceptions from Vendors and Consumers in Dhaka City

Table 5.2 has been demonstrated some domains for which, the previous intervention by FAO was relatively unsuccessful compared with Khulna city street food intervention. The domains has been explored from the street food vendors and consumers through interviewing and collected their perceptions as qualitative data. Based on their perceptions, the domains has been explored and necessary collaboration points that needed to be focused were also explored.

Table 5.2: Causes of ineffectiveness of no coordination in Dhaka city SFS intervention

Domains	**Street Food Vendors**	**Consumers**
Social determinants and need assessment	- No prior need based study was conducted with vendors before intervention	-there is no proper information about safe food vendor -most of them responses about the cheaper and available food rather than safety. -no consumer based study was done before intervention
Street food cart service	-They do not know about why some vendors received cart and some do not received (biased selection process)	-usually covered cart they prefer, however, they also have no idea about the selection process
Water supply service	-Vendors in Dhaka city have less potable water services	-usually poor consumers drink whatever water is available
Training about hygiene	-only intervention group received, however, majority did not receive and training was ad-hoc based	-there is no street food safety based information or message easily available, some are on websites only

		-for consumers, there is no training materials
Health promotional materials	-street food safety based messages need to be provide in popular places which is absent	-same as vendors, need messages in popular and convenient places
Political and governmental issues	-street food carts are not formalized by government/city corporation -this develops sudden eviction, develops economic insecurity	-street food vendors are not always in the same place -if someone sells unsafe food, there is no system to complain against them
After intervention outcome sharing and monitoring	-no monitoring -vendors cannot provide any feedback, perception or needs to the stakeholder	-the results was not shared with them after intervention -no monitoring

(Appendix Questionnaire set for study B)
(Sample size: 20 street food vendors and 20 consumers)

In table 5.3, the idea or perception of having community leader or representative who can be able to act as a health communicator in successful collaboration between other macro-level stakeholders.

Table 5.3: Requirement of community leader or representative in SFS system improvement

Themes/questions	Community perceptions
As information communicator	- `I need to ask something, regarding my license, I cannot get access to the office`
As knowledge resource	- ` I did not understand many things in training, need to understand more, as I am not educated that much`
As health communicator	- ` as we do not get much time to attend training or to watch TV to know about food safety information, it will be good if someone comes to give me some suggestions
Students as representative	- ` it is great if students can be the representatives, because, they learn good things about health from schools and it will benefit us` - ` we believe and follow more students more than anyone else` - `Any local people can represent our issues and collaborate, however, students will be more beneficial, for them and for us too`

Engaging in policy making	- ` we only give our views t help in policy making, otherwise, we are less educated and do not understand about policies` - ` We are interested in helping NGO and government, but policies should be helpful for both vendors (like us) and consumers`.

(Appendix Questionnaire set Study B – Part 2)

(Sample size: 30 vendor, 30 consumers)

The above results demonstrates the need and understanding the community representative to promote, share, disseminate and collaborate knowledge to help achieve MSP approach in improving SFS system.

5.3 Study B2: A Pilot Study

5.3.1 Objectives

The objective of this pilot study is to gain understanding of

- Whether street food vendors are willing to cooperate and learn from secondary school students as community based stakeholders
- Whether consumers and other community people will be helpful through sharing knowledge with school students
- Whether government and NGO people are willing to coordinate and collaborate with school students for gaining knowledge about community people through school students.

Table 5.3 demonstrates the predicted value or role of students as community based stakeholders according to the all the stakeholders (street food vendor, consumer, NGO and government people).

Table 5.3: perceptions of all stakeholders regarding the advantage of students as community based stakeholders.

Domains	**Comments on involving students as community based stakeholder**
Health promotion	Strong tool as health promoter Lessen knowledge gaps between different stakeholders Improve health service information sharing
Raising Awareness	Increase food safety awareness both in vendors and consumers Can aware new issues in public health and food safety
Monitoring and management	Strong enforcement tool in monitoring the vendors n regular basis Improve vendors performance Lessen managerial complexity
Sustainability	Cost effective solution for long term Can be implement anywhere Lead the system towards sustainability
Collaboration	Trust worthy solution Increase communication and collaboration Student knowledge help to make policies
Participatory	Make community livable, active and more participatory Source of contact for community people.
Beneficial	Beneficial to make a knowledge society

(Questionnaire set for study B part 3)

According to the complexity of the issue of street food safety and from previous section, it has been found that, coordination or collaboration to and from the micro-level stakeholders (community people) to macro-level stakeholders (Government, NGO, civil society, policy makers, and researchers) is necessary from all stakeholder perspective. Unfortunately, in public health issues, interventions fail due to community participation.

Therefore, this study conducted a small pilot study based on secondary school students and other stakeholder in street food safety problem to develop a conceptual model.

Based on first part of data collection through document analysis, monitoring of street food vendors can be successfully implemented and step by step approach of the first part of data collection has been demonstrated in Fig 5.3.

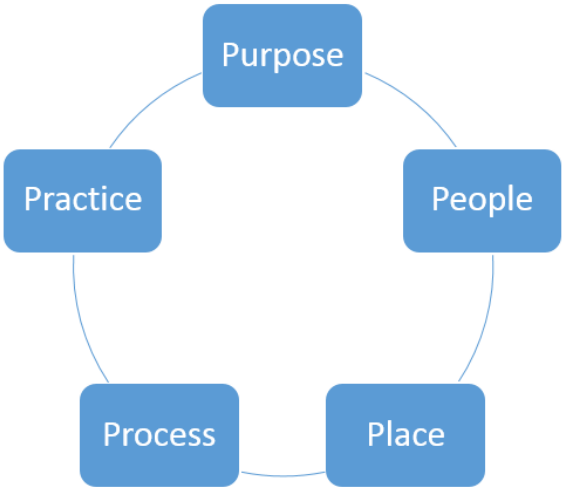


Fig 5.3: Step by step approach of MSP

A. Purpose: Why the street food problem is an important issue?

Micro-level stakeholder's perspective:

- ` Due to the social barriers and lower education and economic status, vendors and consumers (community people) cannot access the food safety related health promotion materials`
- `There is no regular monitoring system for vendors, to check their knowledge and practice during street food handling`

- ` Vendors and consumers cannot provide their necessary service requirements to the macro level stakeholders like they face some environmental or social issues which needs macro level support, face political issues etc.`

Macro-level stakeholder perspective

- ` Need city corporation cooperation to provide license, certification to vendors` (by NGO)
- `Need support from city corporation to tackle the political issues (by NGO)
- `Need Government monitoring system to maintain the intervention outcome` (by NGO)
- ` Need training and intervention to the other vendors from NGO` (by city corporation)

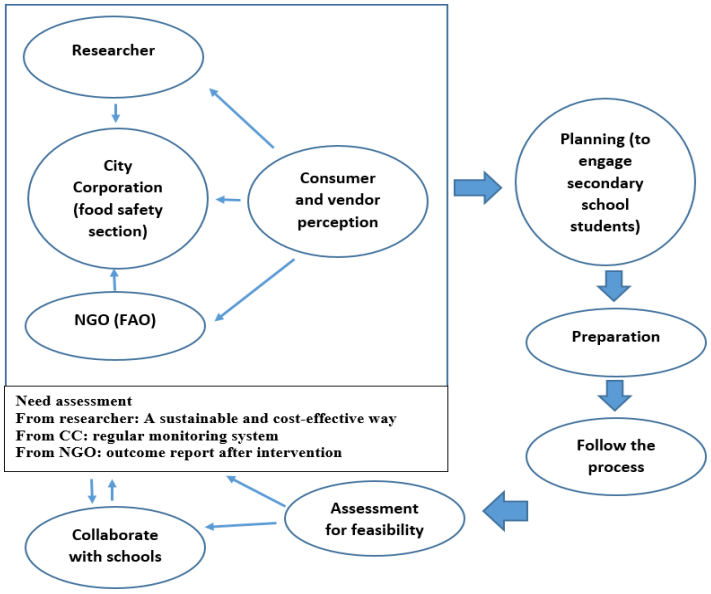
Therefore, from the above perspectives from micro and macro level stakeholder, it has been found that, street food safety is complex systematic issue and need further initiatives.

B. People: Who are the people or stakeholders?

Due to researcher study limitation, in this study 5 stakeholders were engaged; these are

- Government (Khulna City Corporation)
- Non-Government Organization (Food and Agricultural Organization)
- Facilitator (Secondary school students)
- Street Food Vendors
- Researcher

C. Process: What are the process and responsibilities of each stakeholder and what are the steps of the process phase?



There are four steps in the process step

- Planning
- Preparation
- Follow
- Assessment for feasibility

Fig 5.4: Planning and preparation step of MSP process

D. Place: Where and what types of logistic and technical support?

- The NGO (Food and Agricultural Organization) provided Street food safety training to the secondary school students collaborated with Researcher and City Corporation of Khulna. The training materials and presentation was prepared by the expert group of food safety sector. The below schools were participated in the training.

B.K Union
Nunagar sconadary
Rupsha higher Secondary School
Khulna collegiate girls
Khulna Public high school

Doulatpur girls high school
B.L Public College
Pollimangal high school
Bangbashi High School

E. Practice: How to developing self-awareness, interpersonal development and environmental response through student engagement among all stakeholders?

- With the help of questionnaire set B3, 30 students from 9 schools observed 256 street food vendors for one month (participated in intervention group) primarily shown in table 5.4.

Table 5.4: Students evaluation on street food vendors

Students number	Observed street food vendor	Very good	good	average	Bad	Unacceptable
30	256	83 (32.42%)	126 (49.2%)	32 (12.5%)	10 (3.9%)	5 (1.9%)

(Appendix Questionnaire set for study B-part 4)

5.4 Student Perception about acting as Community based Stakeholder

The second part of data collection was conducted among the 30 students through the observation and interviews. The purpose of exploring student perception regarding their role as community based stakeholder will help to understand their motivation in facilitating and promoting safe street handling behavior not only among the vendors but also the

consumers as well. Table 5.5 shows the comments and recommendations about students' role and their motivation.

Table 5.5: student perception regarding facilitating as health promoter

- *I always busy with study during the other 6 days but on weekend, I feel really happy doing this monitoring,*
- *It not only help us but we can increase the awareness among others through some education and knowledge.*
- *I have monitored 10 carts and I found they do not wear the uniform. Moreover, there is no opportunity to hand wash with soap for the consumers.*
- *I found some vendor of the cart are smoking and no opportunity to hand wash for consumers.*
  consumers face difficulties for smoking behavior of the vendor
- *Vendors who received intervention are trying to follow the training instructions of the city corporation and hope they can improve in future if we can regular monitor and advise them.*
- *Vendors should be more aware and concerned. They are not maintaining all the rules according to the training.*
- *Vendors do not wear the uniform and they are selling the food products with open hands.*
- *Some carts need more training or retraining as their condition is not so good for food safety.*

There key success factors that was found as the differentiating factor from Dhaka based street food interventions are shown in table 5.6

Table 5.6: Key success factors from Khulna based SFS intervention
1. Carts that was provided by FAO were maintained under the monitoring of city corporation people and students.

2. They have incorporated license system for selling food and provide certification after training
3. Strong enforcement of monitoring
4. Services like potable water source provided
5. Enforcement and monitoring of street food location (based on hygiene)
6. Provide services according to the feedback of the vendors and consumers (community participation)
7. Monitoring by school students provided community support and advocacy.
8. Maintained collaborative approach, regular reporting to and from different stakeholders and share the outcome, retraining facilities for vendors and adding new vendors in training sessions etc.
9. Less political issues and biasness due to involvement of city corporation actively.

5.5 The conceptual model based on students as community based stakeholder

Based on the above findings and concepts of implementing students to actively participate in promoting street food safety knowledge among vendors and community people, a conceptual model has been developed to show how they can work with the help and collaboration of NGO and local Government which has been described in figure 5.4

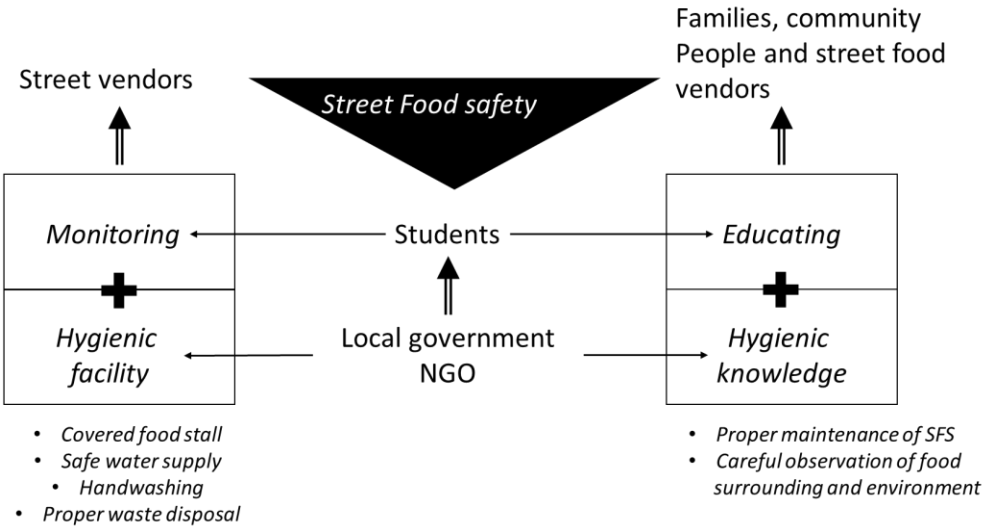


Figure 5.4: Students as KM tools to implement the SFS system in developing countries

5.5 Summary

Fig 5.5 is the explanation of the flow of this dissertation how Study B depends on the outcome of study A.

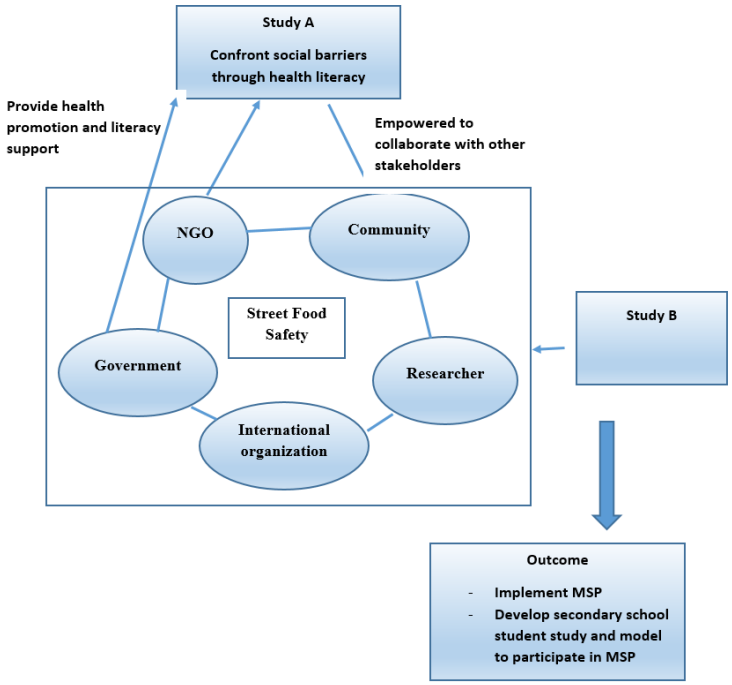


Fig 5.5: flow diagram of study A to study B (outcome)

This section describes about the current practice of each stakeholder in SFS system where lack of coordination and lack of knowledge sharing among micro level stakeholders and macro level stakeholders exist. However, MSP and voluntary commitment can be the key aspect in implementing any collaborative decisions for sustainable SFS system development. It was also recognized that there might be some difficulties in achieving the overall community participation and building MSP. These barriers include motivation, unwillingness to take the initiatives, conflicts and feeling of negativity among the community.

Therefore, from Study B, it is clear that there is need for a group of community based people who can act like stakeholder for facilitating and coordinating role to promote community development and building MSP. This study explains that students from

secondary level can play this facilitating role for sustainable SFS activities, monitoring the safety environment and act as a coordinator between communities and macro level stakeholders.

Moreover, to coordinate various stakeholder, it is very important to share the knowledge, disseminates the perception, achievements, issues etc. among different stakeholders which has been discussed in Study C as well.

Chapter 6

Study C: Value co-creation through Knowledge Management based Approach

This chapter will focus on:

SRQ3: **How an innovative model can be developed based on knowledge management to reduce SFS problem?**

To achieve the third objective of this study, 'Study C' has been targeted to identify and explain co-created values through knowledge management concept to develop the effectiveness and sustainability from health based interventions.

6.1 Knowledge management for Improving Street Food Safety

The need of knowledge on how to improve the health issues in sustainable way is not only the concerns of stakeholders and researchers, but also community people need to acquire knowledge and share their perception. According to Wong (2010), KM provides a good foundation for sustainable development where knowledge sharing (KS) is the central idea of KM. In terms of KM, respondents of this study thought that knowledge not only on street food safety but also on other public health issues should be consistently promoted to the public, to schools (lessons for students in curriculum) through training, health promotion in popular areas, through the City Corporation or government and NGO people. This mainly aims to ensure that in case of street food safety problem both vendors and consumers needed to be aware of risks, and impacts that would be generated by unsafe food consumption and

its health, economic, and social impact on the individuals and community. Fig 6.1 describes the major issues discussed in this chapter.

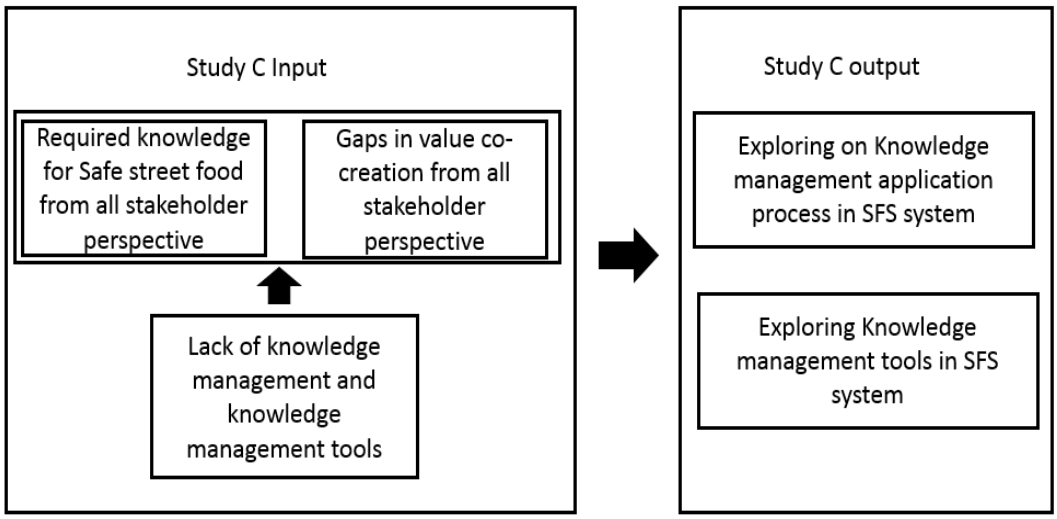


Fig 6.1: Major issues discussed in Chapter 6 (Study C)

6.2 Methodology

In this part of the study, qualitative data was collected through interview from around 20 street food vendors, 15 consumers, 5 local government people and 3 NGO people. The interview was in-depth regarding the value co-creation concept between different actors or stakeholders and how it can be possible to achieve. Each interview lasted 20 -25 minutes and data analysis was manually coding. Reading the data again and again, main themes or codes were explored from the qualitative data.

The data regarding the concept of value co-creation through knowledge management has been validated through data triangulation by exploring the data from 4 different sources or actors' perspective.

6.3 Study C1: Required knowledge needed for all the stakeholders

15 types of knowledge has been shown in table 6.1, which is needed for a sustainable street food safety system. Not only that, but these knowledge are required to co-ordinate among all the stakeholders mentioned in the table. The involvement of all the stakeholders collaborate with each other to create, share, translate, and disseminate or transfer these 15 basic knowledge required for smooth and effective outcome and management of street food safety system.

In this table it is highlighted that, street food safety and hygiene related knowledge such as food storage, food handling, World Health Organization guidelines (WHO) and handwashing knowledge should be needed to know by all the stakeholders and this knowledge should be shared (KS), especially from NGO people to vendors and consumers. The acquired knowledge is then transferred (KT) internally among the community people (vendors to consumers and vice-versa). The above set of knowledge are based on the behavioural practice of street food safety.

On the other hand, there is a significant gaps among less educated community people regarding the impact of unsafe food on health and economy. This knowledge not only based on street food safety but also risk factors associated knowledge should be shared and promoted based on every public health issues.

Moreover, the regulations and policies related knowledge also needed to be shared both from NGOs to communities and within the communities as well. The above knowledge discussed is based on explicit knowledge categories. However, the tacit knowledge is a matter of understanding based on the personal experience sharing and community learning.

Therefore, not only KS but also ability to understand others experience can create knowledge from individual level to other individual or group. As for example, if one consumer become sick by consuming the unsafe street food, he/she can share experience. On the other hand, vendors who does not follow the basic hygiene rules and safe practices, and does not follows the food safety regulations, he/she become economically less benefitted or get punished and this is a knowledge of gaining experience from others.

Table 6.1: Needed knowledge for SFS improvement from all stakeholder viewpoint

Needed knowledge	Community people		Intervention based people	
	vendors	consumers	Government, policy makers	NGO, researchers
1. Hygiene rules	✔	✔	✔	✔
2. Food storage	✔	✔		✔
3. Food handling or serving	✔	✔		✔
4. WHO guidelines	✔	✔	✔	✔
5. Risk factors of unsafe street food consumption	✔	✔	✔	✔
6. Handwashing rules	✔	✔	✔	✔
7. Impact of unsafe food consumption on health and economy	✔	✔	✔	✔
8. Regulations, laws and policies of unsafe food handling	✔	✔	✔	✔
9. Health promotional activities	✔	✔	✔	✔
10. Emerging food safety related risks	✔	✔	✔	✔
11. Education in schools			✔	✔
12. Initiatives on training and monitoring on street food safety			✔	✔
13. Co-ordination among stakeholders	✔	✔	✔	✔
14. Knowledge translation (from academic to practice)			✔	✔
15. Health services	✔	✔	✔	✔

(Appendix Questionnaire set for study C: part 1)
(Sample size: 20 vendors, 15 consumers, 5 persons from City Corporation and 3 person from NGO)

To make the whole system effective, collaboration of all related stakeholders is needed. In the collaboration, external stakeholders (Government, NGOs) need to integrate their different knowledge and expertise to enhance the Knowledge Translation from academic perspective to practical use in a simplest communication for less educated community people which improve the knowledge about risk factors and health services. For this, innovative health promotional activities, school based education and co-ordination with community people is necessary to get overall health intervention capacity building.

6.4: Study C2: Co-Created Values

6.4.1: Co-Created Values on the Perspective of Knowledge Management

Food and Agricultural Organization (FAO) has tried to reduce the street food safety problem and provides supports and funding to make a systematic street food safety chain. It also has been trying to change the behavioural practices both in vendors and consumers and bring the street food vendors under a formal umbrella. However, attempts has not been effective entirely due to several barriers. After analysing the management system of the street food safety intervention, it has been found that, lack of value co-creation is one of the major barriers where knowledge management approach with a particular focus on values contributed by community participation is needed. The following fig 6.2 demonstrated that, how no value co-creation exists in the total system of street food management between the intervention implementers and intervention participants or in other words service providers and service recipients.

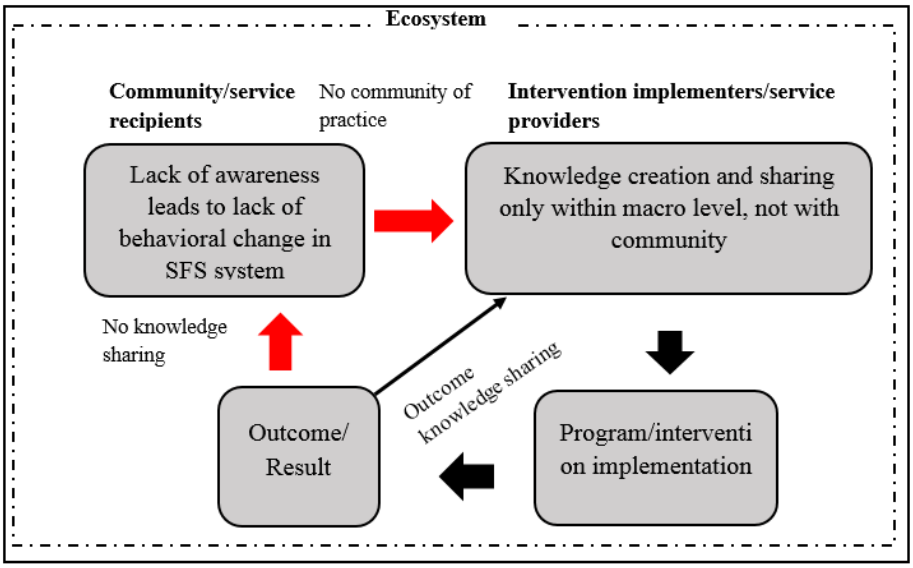


Fig 6.2: No co-created activities

The application of KM is an alternative solution to achieve the overall effectiveness in an intervention. The major concern or focus of successful KM system is to achieve effective KS and KT among all the stakeholders. For an appropriate value co-creation, the tacit knowledge or experience based knowledge, the practice and perceptions in maintaining the proper street food safety can be learnt from the feedback of service recipients especially the perspectives of vendors and consumers. According to Polany, dialogues among individuals or groups lead to transferring and sharing of knowledge (Polanyi, 1964).

To achieve the sustainable street food safety environment, intervention is not enough to cover all the population in terms of awareness building, regular monitoring and maintenance of the system. Therefore, concept of KM is needed to implement in management system where adopting the participation of community as a stakeholder is a priority. Based on Polany`s study, sharing knowledge not only in between the organization but also sharing knowledge with community people (vendors and consumers) before and after the

intervention can retrieve many hidden knowledge to support policy making for sustainable solution.

Effective use of KS and KT can lead to successful KM. However, in street food safety system, major gaps exists not only from health educational and awareness perspectives, but also from infrastructural, political and technical perspectives as well. Since street food safety is an informal sector and most of the people selling and buying street food are less educated and not economically very strong, KM approach should significantly needed in developing this informal sector a formalized one. Therefore, participants from the community (vendor and consumers) and participants from other Government and NGOs have responded and agreed upon the similar types of KM gaps found in the street food safety system. On the other hand, they also agreed upon the limited effectiveness of ad-hoc based intervention activities and rather supported for innovating long term strategies like KM to formalize the system.

Applying the KM concept to street food safety service system aimed for sustainable solution in the street food safety system in Bangladesh. If KM was successfully applied, participants thought that collaboration among all the key stakeholders was formed to create mutual benefits, which resulted in reduction of health risks from unsafe street food consumption, better economic benefit for both vendors and consumers, transparent and effective street food safety system as a whole, and less health, socio-economic and environmental risks and impacts. In terms of value co-creation, there would be better understanding of maintaining the food safety in street food for the consumers health benefit. Consequently, awareness of impacts caused by would increase, which is important for the street food safety ecosystem.

After combining the responses from the vendors of street food (both intervention and non-intervention), consumers and other stakeholders, several common obstacles or gaps which has been demonstrated in table 6.2 in a combined approach and the responses derived from the community people along from health service sector.

Table 6.2: Participants viewpoint on the co-created value absent in SFS system

Domains	**Needed knowledge/ types of knowledge**	**Gaps in value co-creation**
Social determinants	- Understand the social determinants (poverty, education level, need assessment etc.)	- Less community feedback before intervention plan
Health promotional activities	- Adequate level of available, understandable, updated and local language based health messages needed	- Less knowledge sharing and transfer, especially for less educated people - Lack or no knowledge translation
Educational activities	- Community based health education (in schools, in mosques, work places)	- No such initiatives - Significant amount of people are lagging behind the health information
Health service	- Regular and proper information/ messages regarding the availability of proper health services	- No knowledge sharing, knowledge transfer
Research outcome	- Updated and new research outcome needed to be informed	- No collaboration among the stakeholders in sharing and translating research knowledge into practice

(Appendix Questionnaire set study C: part 2)

6.5. Study C3: Incorporating KM concept for developing sustainable SFS intervention

As mentioned previously in this dissertation that, interventions can be less effective or less sustainable due to improper management system before and after the intervention. This study also demonstrated in study B that, in two major cities in Bangladesh, similar intervention was conducted, however, the outcome of Khulna city was better than Dhaka city and exploring the major root causes is actually a part of a successful and organized knowledge management approach to find out what, why and how questions.

On the other hand, for successful collaboration with different stakeholder, proper knowledge management is necessary.

- **There are three cross cutting concepts in KM**

Collaborating involves engaging with key stakeholders to understand the local context, design health interventions appropriately, and keep abreast of changes. It also involves coordinating efforts within an organization and among partners and other stakeholders to increase productivity and extend the organization's influence and impact beyond its intervention funding.

Learning occurs before, during, and after intervention implementation. When health professionals learn, they generate, capture, analyse, share, and apply information and knowledge to improve interventions. Interventions should pause periodically to reflect on and synthesize new learning, and then intentionally share and validate that learning with other partners, donors, and implementers.

Adapting within a health intervention requires application of the learning that occurs and making iterative course corrections during implementation to respond to changing needs, priorities, and realities. Such adaptations are crucial to increasing the impact of interventions. The above three concepts are very much important actions for a sustainable intervention. Table 6.3 will describe practical case study of SFS intervention, and explore how KM application can improve the intervention in Bangladesh context.

Table 6.3: KM application in street food safety problem situation

Assess Needs	
Tasks	Steps in action
1. Identify problem than KM can solve	Street food safety that cause health and economic impact mostly in low and middle income people
2. Define audience/collaborators	Government, civil society, community leaders, community people (vendors, consumers)
3. Key questions for need assessment?	- What are social barriers? - What facilitating factor can do knowledge sharing? - How information can be disseminated?
4. Select appropriate method to answer key questions?	Action research Knowledge, Attitude and Practice study
5. Analyse the need assessment findings	-lack community level knowledge sharing -social barriers like lack of education to access information and awareness -facilitating factor can be community level stakeholder or leader or representative or facilitator - Overall finding is, enhance community based knowledge sharing, health promotion, awareness and collaboration for raising knowledge sharing.
Design Strategy	
1.Decide on KM objective	Monthly meeting to share knowledge, share reports or results, develop promotional activities
2.Define audience or collaborators	Government, civil society, community leaders, community people (vendors, consumers)
3.Theoretical framework	Stages of change (Prochaska, 1997) explains Individual motivation or readiness to change behaviour

4.KM tools	Regular meeting to share knowledge, enforce or implement health literacy in school to educate students, develop proper understanding about the street food safety among communities.
5.Monitoring and evaluation	Performance monitoring and share results for expert views
6.Bring relevant stakeholders together	All the stakeholders including community representatives to understand the intervention properly.
Create and Iterate	
1.Identify KM team	Researchers, NGO people, students, vendors, community people as consumers
2.KM tools and techniques	Tools: NGO people directly or by secondary school students communicate with individual, family or community people Techniques: interviews, focus group,
3.Test and gather feedback about KM tools and techniques	Whether the knowledge of street food safety can be explored properly or need some modification
4.Finalize the tools	Case studies, interviews , focus group and observation are the most preferable one to get the street food safety actual situation
Mobilize and Monitor	
1.Implement KM intervention and keep stakeholders updated	Share monthly data or outcome with all the stakeholders including the community people (vendors and consumers) as well through KM tools or community based stakeholders (students in this study)
2.Review progress	How many vendors adopted the knowledge and how many do not, the actual situation needed to be reviewed regularly
3.Adapt as necessary	When it was found that, only NGO cannot cover the base level knowledge sharing, improve the ability of the community students more to disseminate knowledge to of street food safety (through personal communication, at gathering, through increasing the health promotion activities at popular places)
Evaluate and Evolve	
1.Choose intervention and evaluation design 2.Collect data and analyse	For street food safety, KAP study, testing the food samples randomly, observation on knowledge level and practice level
3.Share evaluation findings to all stakeholders	Through presentation and journal articles for academics, presentations, reports, meetings with NGO and government, meeting and translate the knowledge to community based stakeholders/representatives
4.Promote use of evaluation findings in policy and practice	Promote the findings and get feedback from all stakeholder from the micro level to macro level for developing sustainable and community friendly policies.

From the above description of the KM implementation phases in SFS study problem, the importance of sharing knowledge before, during and after the intervention has been significantly depicted.

6.5.1 Perception of developing knowledge management tools (KM tools)

From Study A, we have been found that, social and behavioural determinants are major barriers in achieving the safe food safety situation. Not only that, lack of collaboration was found in Study B which is essential for coordination between macro and micro level stakeholder and also community based leader or stakeholder is also needed. From Study C, it has been found that, lack of proper knowledge management culture among community level develop gaps in co-creating values between community people and other macro level stakeholders. Therefore, based on community and macro level perception, implementing or developing proper KM tools is necessary strategy to reduce the social and behavioural barriers.

Table 6.4 shows role of KM tools explored from the study participants and its impact related with the different social and behavioural barriers in SFS system.

Table 6.4: Possible strategies based on KM for social and behavioural determinants

What?	**Why?**	**KM strategy (facilitating factor)**	**How/ Possible response strategy**
Socio-economic condition	Cannot buy safe materials, lack infrastructure	- Need collaboration from government and NGO - Need to communicate with community people - Need to create and share knowledge	NGO and private sector provide subsidies, training certificate may increase sales in higher income level, regular monitoring for maintaining hygienic condition

Education	- Both vendors and consumers are less educated - cannot understand the current food safety promotional messages/ sometimes not motivated to learn	- health literacy and awareness needed in all levels - Collaborative effort or facilitate knowledge through community representative like students. -Face to face discussion, students to families, students to communities	- require early link to educational sector like schools - motivations needed from young generation - easy, understandable food safety messages
Environmental conditions	-most cases, no potable water supply and no toilet facilities -poor drainage and waste management facilities	-collaborative -community feedback - Need knowledge from vendors or representatives	Interventions have to consider local possibilities and limitations and aim at step-wise improvements.
Political and institutional barriers	-political and local influence -sudden eviction by local authority	-need collaborative effort to formalize the street food sector and develop local society of street food vendor -value co-creation needed through community feedback	-Institutional capacity building required -formalization of street food sector develop legal business and can be monitored.
Vendor/ consumer interaction	Consumers are more concerned about price and quantity of the food, rather than food safety	- Customers have much influence over the vendor. Vendors are willing to learn to please customers. -need collaboration, value co-creation among all.	- Customers' awareness about food-safety issues need to be increased.
Quality and culture relation	-vendors believe in religion but do not maintain the trust and quality in food	-maintaining quality of food a part of religious norms and both vendors and consumers should maintain the trust.	-positive link to culture and religion and develop awareness

Risk factors in street food value chain	-less knowledge due to low education level	-knowledge should be translated through collaborative effort - need knowledge sharing through opinion leader among community regularly.	-Risks should be explained in local language, visible promotional messages with pictures -explains health and economic loss related to each other
Scientific knowledge	-less or no knowledge about invisible risks (bacterial, fungal infections)	-collaborative effort needed to translate the knowledge through NGO or school students	-knowledge should be communicated very clearly and with understandable format
Practical knowledge	-do not know how and when to hand wash properly -Do not know hygiene rules	-collaborative effort, training for vendors -for consumers, knowledge sharing through representatives or students.	- Health promotion and Health literacy in every popular places, gathering, schools, street food vendor stalls are required in pictorial format
Practical experience	-no data or knowledge about the serious health outcome after consuming unsafe food, no reporting system	-collaborative effort to gather more information on practical impacts	-Institutionalized reporting system and gather case experiences on the impact (both health and economic condition based)
Business or economic benefit	-vendors cannot connect the relationship of quality and safe food with more sales	-information and knowledge on profit making related to high standard quality street food to be shared.	-Collaborative effort needed to identify the business persons maintaining safety in street food and arrange incentives for them to motivate others.
Laws and policies	-since informal sector, policies have not been implemented yet -vendors and consumers are unaware about the laws and policies	-need collaborative effort of public and NGO sector -knowledge sharing is necessary	-prior formalization of the street food sector -develop street food vendor society -implementation of policies

6.5.2 Community based KM verses Organizational KM

Based on the above framework and from the previous discussions in the dissertation, it has been clear in three points below

- Knowledge sharing with community is the key for collaboration, value co-creation and better and sustainable outcome generation.
- Community based representatives is also necessary.
- Knowledge creation or valuable experiences from the community is also an important facilitating factor

However, for the competitive advantages for any organization, the above point is important not only in global health issues but also for the business organization (both goods dominant and service dominant). The traditional and organizational knowledge sharing system is demonstrated in fig 6.3

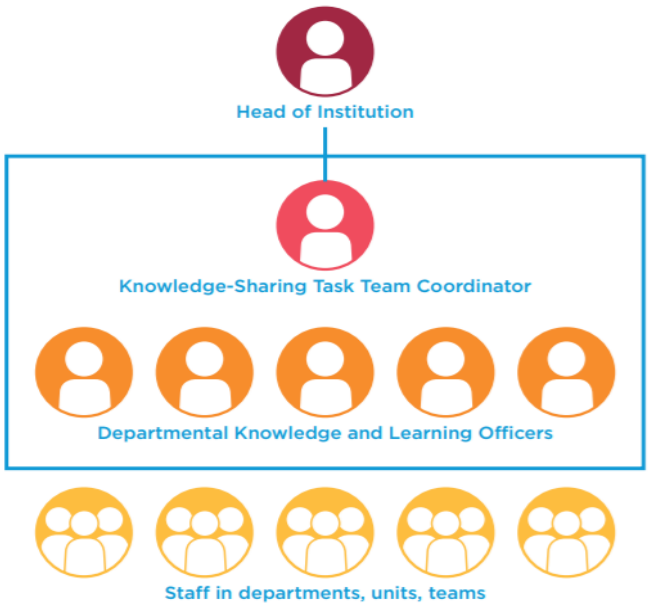


Fig 6.3: Organizational knowledge sharing and management process (Janus, 2015)

6.6 Summary with Case study

6.6.1 Why community example applicable for organizations? A case study

An internationally reputed food and nutrition company produces different types of baby foods and other food items based on milk. There is a consumer complaint service where consumers can complain about the discomfort, diarrhea, indigestion, abdominal cramp etc. and every month, more than 1000 complaints with samples is lodged. The complaints mostly about the discomfort, indigestion, diarrhea in children.

According to the organizational knowledge sharing method, these complaints received in every month are shared only in between the organizational staffs and discussed internally, however, the possibility of improving the complaints not in decreasing trend. However, the real picture among the consumers are still not clear on the root causes of the problem.

Possible initiatives: This is the situation, where, community based representative is needed to implement or communicate the consumers and explore the need assessment, root cause of the problem and share with the organization. In an organization, there are many experts from different fields, however, understanding the community based issues is really difficult from the organizational viewpoint. The community of practice (CoP) is the key concept to engage with community or consumers, share knowledge with them and co-create values to enhance the product or service related competitive advantages.

From the above case, we can draw the summary that, the study C demonstrates the concepts of implementing community based model not only in community setting but also it will be an innovative solution for the organizations as well.

Chapter 7: Implication

This section describes about the significance of developing the change in street food safety system that will be also applicable and generalizable to other public health issues based on developing countries, however, the concepts and viewpoints of solving the social and health issues in a community will pose similar impact in developed countries as well.

This study specifically has been interested in enhancing the effectiveness of health interventions through the concepts of health promotion, Multi-stakeholder partnership or collaboration and knowledge management approach which have been discussed through the social, economic, legislative viewpoints.

The significance of secondary school students as community based stakeholders has also been discussed and finally, using the concepts, the conceptual framework have been modelled.

7.1 Social Viewpoint

Street food vending is an integrative element of urban food systems and contributes crucially to food security of low-income people, day laborers and students. The majority of the vendors are also from the poor economic and social situation that has been already discussed in study A. Due to urbanization and population density, this informal sector has becoming demandable, however, on the other hand, the quality and safety of the street food has become an emerging public health issue. It is therefore, very much difficult for one single organization to develop proper and sustainable system if there is no coordination exists among different stakeholders.

From the action research and also from the literatures, it has been found that, as street food safety is an informal sector and most of the vendors are less educated, therefore, combination of health promotion activities, strengthening the awareness by incorporating the health literacy initiatives and collaborative approach to make it a formal sector is urgently needed.

Moreover, the social barriers which is difficult to control, need responsible collaboration between different stakeholders. The enhanced system will eventually reduce health impacts and unsafe street food handling practices, when most of the people in the society work together, bring awareness and enforce proper policies.

7.2 Economic viewpoint

Street food is not only a convenient food and nutritional source for the low-income people, it is also an emerging source of business for the urban businessman. This is also a potential source of income for the women entrepreneurs. Therefore, strengthening and improving the street food sector will create more income options. Moreover, due to urbanization and changing environment, people need to work outside and they need a safer source of food and nutrition in a cheaper price.

It is very important for the government to focus on this informal sector and provide license, certification and provide fix place for vendor's cart. Active collaboration and enhancing the community people`s participation will also motivate the community people, especially consumer to support government and NGO with proper system development.

On the other hand, it is also important to provide health literacy on the economic impact of consuming the unsafe street food from the unhygienic food carts. Therefore,

brining awareness will not improve the health situation but also create competitive advantage among the street food vendors to be clean and handle food safely.

7.3 Health Promotion and Health Literacy Viewpoint

Health literacy is one of the major solutions to reduce street food safety problems by acquiring the knowledge and understanding on how food can be contaminated and how it can be controlled. There are a lot of raw materials and agricultural products that becomes intentionally or unintentionally contaminated with chemicals, which is also harmful for health. These raw materials are used to prepare street food and it is also unsafe for the consumption. Therefore, proper health messages and promotional materials are necessary to aware people about the risks associated with food items.

In this study, secondary school students have been focused to play as facilitator for disseminating the food safety and health related information. According to Nutbeam, functional, interactive and critical health literacy among the students not only develop skills to gain knowledge in food safety, but also, these students simultaneously improve their ability to gain knowledge in other public health issue. This knowledge acquisition is necessary for rural or less educated community people to access to health services. Therefore, collaborative and motivated approach from all stakeholders to empower the community people with health literacy is necessary.

7.4 Legislative and Policy related Viewpoint

Street food is also an attractive, cheaper and business based platform in developed countries like developing countries. However, many developed countries like Canada, United States etc. have implemented strict quality standards that needed to be maintained to run a street food vending and also have focused on using proper location to sell their products.

On the other hand, in developing countries like Bangladesh, where street food sector is a very important source of income generation and food security, the policies or legislation is not present properly and government is not concerned about the formalization of the system of street food. However, based on the policy of India, "Policy Guidelines on Healthy Street Food Vending in Bangladesh" were proposed by the Consumers Association of Bangladesh. It includes nine practices of fair street food governance, among them licensing systems, securing their access to public space, services for vendors, business support, food safety training, political empowerment and practices of identification. The key, however, lies in the social recognition of this trade and the urban poor's legitimate claims for their "rights to the city." The proposed ideas might be of relevance for urban planning, city governance, poverty alleviation, food security programs, and development cooperation (Etzold, n.d).

Therefore, to take initiatives for any action plan, continuous support from the community people, civil society, educational institution and NGO supports will be primarily needed for the government to make the sustainable legislative policies and planning.

7.5 Secondary school students as community based stakeholders

McLaughlin describes that it is schools themselves rather than government policy and priorities that matter (McLaughlin, 1990). She claimed that the nature, amount and pace of change at the local level were a product of local factors that were largely beyond the control of higher-level policy makers. (McLaughlin, 1990).

This study aims to improve the students` health literacy level and develop them as community based stakeholders or facilitator for the reasons below:

1. Sustainable solution for practicing health literacy

Not always the government and non-profit organization can support the community development regarding health literacy. There should be a sustainable solution that can move forward the process of disseminating knowledge in every generation.

2. Proper communication tool

Improving students' health literacy rate not only stored as knowledge among them but also can be used as the tool to serve less educated people in the community by delivering proper information especially in resource poor countries. In developing countries in rural areas, majority of the people possess unhealthy lifestyle and unaware about the existing health services when needed. Most of the community people have less opportunities and capacities to develop themselves through knowledge and information. Students can be resource point and community people also trust them many times more than the other people.

3. Cost-effective

It is very difficult and expensive for the non-profit organization to cover the whole population in educating health literacy rather developing student literacy can support educating their surrounding community in a cost-effective way.

4. Developing healthy future generation

Students are the backbone of the nation and it is high time to educate the students about the emerging diseases, their risk factors, their impact on health and economy and regarding the facilities and services available for the people. They are the people who can follow up the health related intervention program outcome in the long run.

5. Contributing in advancing the services through knowledgeable future

Students` through empowering themselves in health literacy will be well-informed about what emerging public health issues globally affecting and what are the risk factors through their knowledge acquisition process. Therefore, they can contribute in innovating and modifying the policies that is appropriate for their economy and context.

The study aims to describe the need of an educated and motivated community based facilitator to participate in collaborative activities and take the ownership to co-create values.

However, based on different context and need, community based facilitator needed to be selected very sensibly.

7.6 Knowledge Dissemination and Co-Created Values

Based on study analyses, this section delivers essential themes that lead to practical implications of applying KM tools on sustainable SFS and other public health service in Bangladesh. Integrating analysed results from Studies A, B, and C, there are three groups of themes that participants and other stakeholders focused in order to have the effective SFS intervention and sustainable system. Those three factors are considered as the readiness of community (vendors and consumers) to become empowered by proper food safety information, readiness to participate in collaborative decision and policy development and readiness of participate in maintaining the system through changing behaviour.

In this study, value co-creation is defined as collaborative activities that enhance community lifetime value (Piligrimiene, 2015) and focus on preventive and service based approach. Value is co-created if and when a community people are able to contribute his or her experience in undertaking valuable tasks like knowledge creation, knowledge sharing and dissemination for communicating and improving intervention services. Thus, communities determine value based on their individual experiences as an integral part of the community and have control over value co-creation in solving problems. All the stakeholders participate in this process as co-creators.

According to the theory of stages of change, individual motivation or readiness to change behaviour is very important. Based on the theory, People move through five stages when adopting new behaviours: • Precontemplation (unaware of the problem) • Contemplation (aware) • Decision (intends to take action) • Action (practices the desired behaviour) • Maintenance (works to sustain the behaviour change). People can benefit from different interventions, matched to their stage of change, to make the desired behaviour change.

Therefore, to change the behaviour, community people need to acquire proper knowledge about the consumption of unsafe street food, its impact on health and economy. A lot of pathogenic and chemical risks are associated in the total value chain of the food process. If communities are not concerned about the deadly causal reasons of food associated diseases, they cannot be aware and cannot change the behaviour.

However, there are many academic and scientific evidences that describes about the cause and effect of street food safety, it has been translated in local and easily understandable languages, targeting the less educated population.

Therefore, knowledge that is created, shared, disseminated and translated within the the organizational boundaries does not actually provide real support in accomplishing the actual objective of any study, research or intervention.

Finally, the approach of multi-stakeholder partnership can provide the support of raising awareness through health literacy, create community based stakeholders like student to co-create values by community of practice concept and overall knowledge management

process needed to be shifted from organizational level to community level to get the actual knowledge (both tacit and explicit) for further sustainable improvement.

Fig 7.1 shows the conceptual framework with the concepts of developing community based stakeholders through Health literacy (HL), disseminate, create and share knowledge with families and communities, develop effective communications among with NGO and government and this collaborative approach in making KM process will lead this society in enhancing learning and changing behaviour, build capacities, increase more knowledge skills outside and inside the organizations and finally improve service of intervention and develop effective evidence based policies for sustainable Street Food safety system development.

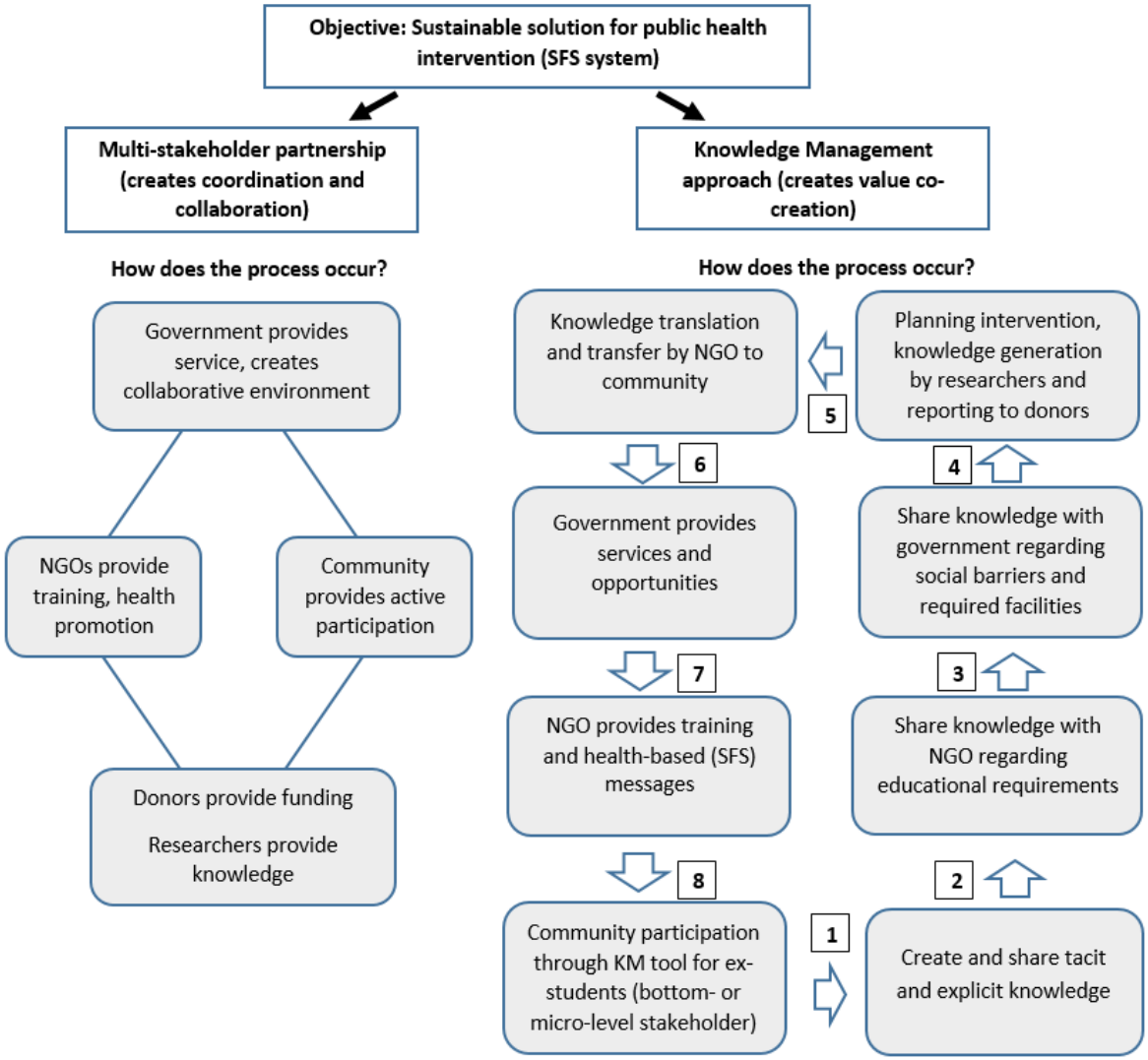


Fig 7.1: Conceptual Framework towards sustainable SFS system development

7.7 Improvement of SFS intervention after Collaboration and Value co-creation

By observing the findings from the study A, B and C, , it has been found that, the macro level stakeholder (Government, policy makers, NGOs and researchers) and micro

level or community based participants who receive the service from intervention follow the current attitudes in street food safety program shown in table 7.2.

The results showed that major problems of current SFS system are no collaboration among sectors, lack of involvement, and policies that is not practical and not maintained properly; whereas effective SFS system can be achieved by having practical policy, providing proper health promotional activities to gain knowledge, involvement and collaboration within different sectors.

However, MSP is such a concept where all these stakeholders mentioned in table 7.2 should work together with strong collaboration and co-ordinate with each other for improving and sharing knowledge. Therefore, table 7.2 also describes the future activities needed to be conducted by each and every stakeholder in a coordinated manner to implement the concept of MSP in a successful way.

On the other hand, table 7.3 also describes how value co0creative activities can reduce the main social barriers and can impact on major domains in SFS system through sharing knowledge. The two tables are described in the following pages respectively.

Table 7.2: Future activities of each stakeholder after collaboration

	Service Provider/ intervention implementer		**Service recipient**
	Public (Government)	**Private (NGOs)**	**Community people (vendors, consumers)**
Current	- old system and policies - less or no co-ordination among other stakeholders	- less co-ordination - traditional system (managed by government) - no practical knowledge translation from research to implementation (in an understandable format for common people) - profit, funding and duration oriented in major cases	-lack of motivation for safe food handling practice and behavioral change (both vendor and consumer) - lack of awareness on health and economic loss (vendors and consumers) -less participatory behavior with other stakeholders -less motivation to acquire health knowledge
Future	-more strong co-ordination through knowledge sharing - implement policies strictly Provide more educational opportunities and empower community people -provide opportunities for community participation - sustainable system, policies and transparent management process - reduce or eliminate political interference in health related issues	- Work together by proper coordination. - involve community people throughout the intervention and share results and get feedback from them - Proper planning not only to complete the project but intend to aware community people and empower them. - provide health educational and promotional activities to educate each and every community people about the health risks and its impact on economic situation - engage more expertise in each field and extract long term solution	-understand on benefit of acquiring health education, training - share and transfer knowledge among the communities Attend health promotion based information sharing platform -gain knowledge from others experience (both health and financial) -change behavior and implement hygienic approach for business benefit (for vendors)

Table 7.3: Impact of acquiring knowledge to improve the value co-creation

Street food safety system	Required knowledge/practice	Co-created values
Hygiene rules	Training on WHO 5 key rules for vendors All the other storage/ handling/ serving related knowledge (both for vendors and consumers) Proper handwashing	If consumers are aware, then more monitoring and better safety will be assured More economic benefit for vendors
Health and Economic Impact	Basic information on unsafe food consumption on health and economy Basic knowledge on poor health on economic loss	Develop awareness among consumers which leads the better hygienic practice in vendors
Health promotion activities	Trained stuff Easy and available promotional materials Develop popularity and motivate community people to understand the messages	Develop more educated people rather than ad-hoc based or limited intervention activities
Provide Infrastructure	Develop potable water supply/ safe water for the vendors and consumers Develop proper waste bins for the food wastes	Less health risks Proper collecting of waste Less production of odors of leftover waste
Develop monitoring system	Train community based people in monitoring system Application of proper legal enforcement Train vendors and consumers about laws, regulation and policies	Reduce the overload of stuff in monitoring system Increase trust and collaboration between community and other stakeholders Reduce health risks and improve the business More vendors will be motivated to sell street food safely.

Chapter 8

8. Conclusion and Recommendations

Concluding Remarks

This chapter summarizes the details of all analyses that answers each of the research questions. Academic and practical perspectives are also explained in this section. Limitations of the study are also mentioned in this chapter.

Explanation of each Research Questions

The findings and interpretation from the study A, B and C demonstrate all the concepts that has been described already in the background part of this dissertation. Details of achieved results that meet each research question are explained as follows.

SRQ1: What are the social barriers of street food safety issue and what is the impact of health promotion on these barriers?

As explained in `Chapter 4` this part focused on the social determinants of street food safety problem especially in the developing county perspective, the knowledge and attitude of street food vendors and their perception about the health promotion and finally posing the health promotion initiatives and developing health literacy skills among the community population to overcome the SFS related social barriers which will also empower them to acquire knowledge about preventive strategies of health system.

In the first part, the major area of focus was to find out the other social determinants

hidden under the unsafe street food practices and which needed to be solved in a collaborative manner among the macro level stakeholders (government, policy makers and NGOs) and micro level stakeholders that is community people. A lot of interventions have been conducted not only on street food safety but also on many other public health issues. These interventions are very much fund based, on some areas or groups where the opportunity of tackling the hidden or wider social determinants of health like poverty, education, political issues, environments, accessibility in decision making etc. are overlooked or less prioritized. To get a sustainable reduction of street food safety issue, health literacy and the recommended health promotional activities can be a key social determinant to tackle the other barriers. However, macro level cooperation is strongly required to make them a success.

In Bangladesh, still now, there are less or no promotional or educational activities in mass media level about the safe handling and consumption of street food. Not only that, but also, educational institutions and health service sectors are also not focusing this issues at their end. Though there are several social determinants play significant impact on street food sector, health literacy through empowering community people and innovating convenient health promotional activities can be the key factors in gathering, assessing and using information for health, and factors that influence the initiation and maintenance of behaviour change to achieve health and well-being.

SRQ 2: What is the role of developing community based stakeholders in achieving effective Multi-stakeholder Partnership (MSP) model?

Various organizations like NGOs and government bodies are working for the betterment of street food safety issues, but their efforts are inadequate. The present study was

a very small pilot study to explore the viewpoint of engaging community representatives in street food safety and other public health issues and work for the improvement of the hygiene and sanitation condition as well as share proper health based information. Therefore, secondary school students can be a significant facilitator in communicating both the vendors and consumers as well as with the macro-level stakeholders. Sometimes, the NGOs work collaboratively between themselves and even with government.

Since street food safety is a complex issue and it is more complex in densely populated city like Dhaka, where the population is increasing rapidly due to urbanization, the low-middle population will suffer more from unsafe street food consumption. In addition, everyday people migrate from other parts of the country to seek employment and most migrants are from lower-income groups. As a result of this over population, the interventions undertaken by NGOs and other government bodies are seen as inadequate. Although different NGOs have come forward to fill the gaps, most of their work is project based and they terminate their intervention after completion of a project.

One major way to improve these situations is to take action involving all stakeholders in a sustained collaborative process. At present, the NGOs maintain project-based partnerships with government. It is very rare to engage community people, research institution or the media in these collaborations. To develop sustainable street food safety environment for low-income groups, keeping in mind the future impacts of unsafe food on health of consumers and especially the young adults, it is necessary to have multi-stakeholder collaborations. In these types of collaboration, the government needs to play a key role by formulating policies, guidelines and taking strategic action to bring resilience. Research

organizations should identify the needs and actions to prioritize. The media and advocacy groups should translate scientific information for local communities and the government. The major part of local community people is to participate through sharing knowledge and NGO also need to promote with proper food safety information with the help of students and media, as a communicator. The combined effort of MSP approach can derive sustainable, cost effective solution and policies.

SRQ 3: How an innovative model can be developed based on knowledge management to reduce SFS problem?

Study C explains about the necessary knowledge that needed to be co-created among the different stakeholders. The first part of the section describes about the 15 necessary knowledge mentioned by all stakeholders, which needed to be acquired or understand for the sustainable system development. These knowledge also should be shared and transferred in different stakeholders as well for creating values.

The second part describes about the viewpoint of participants regarding the co-created activities that is needed to develop proper knowledge management. However, gaps also have been shown in the second part of this section and according to the community participants, they have the little or no opportunity to provide any feedback or values in developing macro level decision making.

In the third part of this section, the street food knowledge management activities has been demonstrated through the knowledge management road map and aims to suggest the significance of community participation in knowledge management process. At the end of this part, the comparison of the knowledge management approach in community based

intervention and organizational KM system has been demonstrated, where, it has been targeted that, community of practice or sharing knowledge before and after any intervention or project is the key to get proper and sustainable outcome, which is currently absent in organizational KM system.

Applying KM can be an innovative solution to increase the effectiveness of the SFS intervention. If vendors and consumers who are the main actors in SFS system are well informed, educated, or learn how to maintain proper hygiene during handling and consumption of street food, the health issues will be reduces. In addition, all stakeholders mentioned about the importance of understanding the risks associated with improper handling of the street food and what is economic impact along with health problems, the awareness will be increased and there will be sustainable change in behavior

Based on successful application and implementation of KM and KM tools, participants mentioned that collaboration among key related stakeholders can create mutual advantages, which results in lessening the unsafe street food selling and consumption, better system and effective intervention and outcome will be generated with less socio-economic impacts.

The implementation community participation through community based stakeholders such as students allow a number of opportunities, like regular monitoring of the street food vendors, provide health based necessary information, receive community based issues, share knowledge and outcome, share community issues with macro level stakeholders, empower the community people with health literacy that they have achieved from school education etc.

The study also suggests a conceptual framework for SFS system, which offers a better understanding of how KM works in developing sustainable approaches in SFS system and how KM can be implemented at community level.

MRQ: ` How to enhance the effectiveness of health based interventions to achieve long term sustainability`?

By combining all results based on SRQs, the study explains important themes that can enhance the effectiveness of SFS system. To achieve the main objective of this study, the following results has been highlighted:

- Wider social determinants and barriers have been explored which hinder in maintaining the proper street food safety attitude for low-income and less educated population
- The wider social determinants can be minimized by developing collaborative approaches.
- The co-created values derived from the KM concept provides valuable knowledge for SFS system and also suggest strategic management options.

8.1 Academic Implication

It has been revealed that knowledge management is the concept viewed only in organizational boundaries and there is a vital need of knowledge management transformation in a new paradigm from community based perspectives and bottom up perspectives. In any interventions, multi-stakeholders that have dynamic resources and expertise can contribute

in the process. This opportunity can provide better setting up the right people in the right time and managing the scarce resources can lead towards specific targets of increasing the level of effectiveness and competitiveness. Therefore, if we consider the health based intervention to be effective and sustainable, community based participatory knowledge management needed to be incorporated

In the context of providing effective and reliable SFS system, the public health problem of SFS is a very complex issue that needs cost-effective but sustainable solutions. Therefore, long term, top down and single organization based intervention not only derive ineffectiveness after the completion of the tenure, but also it costs high and the objective of the behavior change among the community does not be accomplished.

Knowledge is required to be created, translated, transferred and shared to all sectors as both tacit and explicit knowledge are the valuable resources. Community knowledge should also be well managed and shared to understand their perception and most importantly before planning and implementation of any health intervention successfully which is also contribute in the wellbeing of the society. MSP and KM concepts in improving the SFS system can be an innovative approach that improves the performance of community participation, increase awareness and eventually tend to change behaviors.

The conceptions of Health literacy, multi-stakeholder partnership and knowledge management research have been realized significantly and the blended approach of these three concepts can be a sustainable solution for any public health and social issues. Not only that, but also this new paradigm will also open the new insights in organizational learning process and this application is significantly important addition in academic arena, providing

sustainable solution is complex public health research arena. Previous studies have tried to develop solutions that can reduce the complexity of health problems and overcome the difficulty among public health sectors which can increase the sustainability of the health intervention.

Though this study relates to Street food safety system, it can be used as an applicable example for any other public health issues. It can be also useful for other studies in terms of reducing the research gaps to broaden the scope of knowledge that is helpful for the contributions of other studies.

8.2 Practical Implication

The level of education and awareness among street food vendors, the increased population density in urban areas and the informal nature of the street food sector have increased the complexity of the street food safety problems. Though international level NGOs are trying to mitigate or reduce the issue, the different political, and socio-economic situation based on different context have significant impact on the outcome and sustainability of the intervention and develop barriers in changing community behaviour.

In this study, it has been found that, the organization that is Food and Agricultural Organization (FAO), conducted the same intervention on both Dhaka city and Khulna city.

There are a several political issues found in Dhaka city mentioned by the respondents, which has not been included in the study. However, other than the political issues, the level of awareness and knowledge is also poor among the vendors compared to Khulna city vendors and consumers.

The study aims to focus on prioritizing towards the sustainable solution where community itself take the ownership of their own health and economic value should be realized by themselves.

Therefore, to achieve the improvement in this public health issue, supports and coordinating activities is needed as the community people are less educated and from lower socio-economic status. The necessary knowledge for developing awareness and building capacity needed to be contributed by the collaborative effort of government, NGO and other community and civil society. Moreover, this knowledge based and community based study help to increase the knowledge and skills among the community people, which is not only beneficial for street food safety problem but also other public health issues. Discussing about the practical benefit, this study provides

- Collaborative approach for all stakeholder and develop cost effective solution
- Capacity building among all stakeholders
- Increase knowledge and skills
- Community based knowledge creation not only explore the social barriers for this study but also these social barriers are hindering to achieve successful outcome in other health based intervention.
- Develop students as community based stakeholder who can be a resource for next generation and can store the community tacit and explicit knowledge for the next generation.
- Can develop community based policies

- Overall awareness and health literacy level can be improved through extensive health promotion activities and people will be motivated to change their behaviour gradually.
- The street food business will be trustable, and well accepted not only in low-middle income people but also, it can be a source of food and nutrition for high income level and higher socio-economic status.
- Business will be expanded in large scale and low socio-economic people (both street food vendors and consumers) will be benefitted.
- Final outcome will be a healthy society with formalized street food sector and well managed policies

8.3 Limitations and Recommendations

The study aims to develop a model through integrating the concepts related to act on social barriers and have tried to get the perceptions of street food vendors, consumers and macro level stakeholders on which, the model will be established.

Since it was challenging to communicate and collect knowledge based data from the vendors and consumers, the city corporation of Khulna provided immense support which was not achieved from Dhaka city for political conflicts. Depending on the support from NGO, data was collected from Dhaka city.

On the other hand, it would more beneficial if another city where intervention conducted by FAO could be collected and could add more values in this study. Therefore, success factors and other social determinants could be verified from this two cities.

However, further study can touch upon identifying key success factors from another city and add values in this research.

The study have proposed a conceptual framework which is applicable to any other public health and social issues and it will be beneficial for the policy makers and other macro-level stakeholders in sharing knowledge.

Moreover, the primary objective of this study is to enhance the activities of health promotion in a more effective and convenient for the less educated population. Therefore, this idea can be implemented in the education system to increase the knowledge regarding the risk factors or health and available health services. The idea has been shifted from the street food safety to overall public health issues because once the education system can be reformed, the burden of diseases and related costs will be minimized in developing countries, which is an urgency. On the other hand, to reduce the complexity of public health problems and to build trust on health system, strong collaborative and co-creative activities needed to be implemented urgently.

Moreover, technical and operational infrastructure and services needed to be strengthen like providing license and certification, training, creating street vendors group to monitor regularly, setting up or arranging hygienic toilets and potable water for food preparation, etc. are also needed to be provided by macro level population, along with health education.

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Appendix

Questionnaire Set for Study A:

Part 1:

Topics for Interview and focus group among vendors and customers

- What is the most preferred source of information among the following? (Magazine, leaflet, TV, Radio, friends and families, videos, talk by health representatives, billboards or displays, pictorial material etc.) and how well you understand those messages?
- How much important a food safety for you and for your families and customers?
- What are the major barriers in achieving safe handling of food?
- What is the best possible way to get the food safety related information in an easiest way for you?
- How long in a week you have to work and how many people helping you?
- Does anything else affect your health or the way you live your life? If so what?
- How much you are concerned about your health?
- What are the possible suggestions to improve food safety related promotional activities?

Demographics of respondents

Part 2: General information of respondents

1. Sex □ Male □ Female

2. Age

□ 16 – 20 years old □ 21 – 25 years old □ 26 – 30 years old

□ 31 – 35 years old □ 36 – 40 years old □ 41 – 45 years old

□ 46 – 50 years old □ 51 – 60 years old □ > 60 years old

3. Education

□ Primary school □ Secondary school □ High school

□ Vocational school □ Bachelor's degree □ Master's degree

□ Doctoral degree

4. Occupation (in case of consumers)

□ Student □ Business owner □ day laborer

□ Housewife □ service holder

□ Retired □ Unemployed □ other working people

5. Average sales per day

□ < 500 BDT □ 501 – 1000 BDT □ 1001 – 1500 BDT

□ 1501 – 2000 BDT □ 2000 > BDT

6. Types of Location

□School/College □Bus/Rickshaw Stand □ Commercial Area □ Residential Area

□Market □Others

6. How many people live in your house? _____ persons

Type of Street Food Vending (Tick(√))

□	Chotpoti/	□	Singara/	□	Puri/ Kima puri	□	Alur Chop/
□	Patties	□	Roti/Prata	□	Piaju/Beguni	□	Cholabut
□	Jhalmuri/	□	Popcorn	□	Vapa/Chitoy/	□	Rice and curry
□	Tehari	□	Chicken/French	□	Noodles	□	Soup
□	Burger/Sandwich	□	Pen cake	□	Sharma	□	Sharbat
□	Tea/ Bakery item	□	Pre-cut food	□	Achar	□	**If others then above, please**

Part 3: Questionnaire for KAP study

1. **Source of water using for street food preparation (Tick(√))**

□	Tube well water	□	Tap water of WASA
□	Hotel/Restaurant tap water	□	Public toilet water
□	Brought jar water from the market	□	Halo tab mixed safe water

2. **Source of drinking water served to the customers (Tick(√))**

□	Tube well water	□	Filter water
□	Tap/Supply water	□	Bottled water(Mineral water)
□	Halo tab mixed water	□	Not Applicable

3. **How hands be cleaned after urination/after Toilet? Tick(√))**

□	Only water	□	Soap and water
□	Only Safe Water	□	Safe Water and soap
□	Hand Washing gel	□	

4. **How food serve to the customers?(Tick(√))**

□	Using Hand	□	Spoon	□	Tweezers
□	Plate	□	Glass/mug	□	Paper
□	Tissue paper	□		□	

5. **How vending utensils can be washed? (Tick(√))**

□	Bucket and Pot storage water	□	Only with Flow tap water
□	Flow tap water with detergent	□	Wash in safe flow tap water with

6. **How vending utensils can be wiped? (Tick(√))**

□	Only towel or	□	Paper/News paper	□	Tissue paper	□	Don't

7. **Waste/garbage management by vendor (Tick(√))**

□	Throw in the roadside or drain
□	Keep in the bag/polythene bag and at the end of the day throw in the specific dustbin
□	Collect in a covered pot and keep away from the shop and at the end of the day throw

8. **How foods are cover to save from the fly, mosquito, animal or dust? (Tick(√)**

□	Using Polythene paper cover	□	Newspaper/paper cover
□	Covered by Towel/Cloth	□	Using cork to cover mouth of the pot
□	Plastic/Silver cover	□	No cover

Part 4: Health Promotion questionnaire

1. Select top three methods by which you prefer to get information?
2. What type of topics in heath you are interested to learn?
3. Are you ready to do healthy eating habits?
4. Are you interested in getting information from secondary schools students?
5. How well can you understand the leaflet or messages written in posters, or any bulletins?
6. Regarding food safety or handwashing, did you find any information about those, which you understand easily?
7. Do you know about the health impact caused by unsafe food products?
8. Do you know about the economic impact by eating unsafe food?
9. What happens if you seriously get sick after unsafe food consumption?
10. Do you ever check the expiry date or do you observe how street food vendors are serving foods?
11. When you get sick, where you usually go for health service?
12. From where you usually get advice regarding health service and health-related information?
13. Do you think, learning about health related information would be beneficial for you?
14. Are you interested to provide your feedback to the community based representative, such as secondary school students?

Questionnaire set for Study B

Part 1: What are the role of each stakeholder in street food safety according to your perception?

Vendors	Consumers	NGOs	Government
□ Receive training and maintain hygiene	□ Consume safe food	□ Promote food safety information	□ Reduce political restlessness
□ Maintain WHO guideline	□ Monitor vendors	□ Act as intermediary between community and government	□ Formalization of street food vendors
□ Handwashing properly	□ Help to enforce safety behaviour	□ Share the knowledge about food safety	□ Implement education
□ Learn health messages	□ Quit buying food from vendor who sell unsafe products	□ Do community based need assessment	□ Provide all support to NGO
	□ Support NGO and government by raising awareness	□ Include schools in health promotion	□ Motivated on innovating the SFS monitoring and implementation of laws and policies with proper enforcement

Part 2: Questionnaire (open ended) to understand the community based stakeholder`s role in improving SFS system?

a. What you do when you need some support from the government people?
b. Do you think, you can understand the important information regarding street food safety, when you participated in training?
c. What do you think, what can be the effective way for you to get maximum information?

d. What do you think if someone like school students support you in understanding the street food safety related information?
e. Do you think, you agree and believe what the school students or the student in your family explains some health related message to you?
f. What do you think, who can be the other community people, with whom you can share your perception?
g. If you involve in SFS improvement or policy system, would you like to participate?
h. How do you want to get involved in policy making?
i. Do you think, your opinion will be accepted?
j. Do you think, your opinion will be effective?

Part 3: questionnaire (open ended) to all stakeholders for exploring the students as communicator for collaboration.

Question: please share your opinion if secondary school students will be engaged as health communicator, share knowledge and collaborate with other stakeholder, please mention some advantages based on

- Promotion of health information
- Social impact
- Managerial impact
- Participatory impact
- Economic impact
- Service and others.. if any

Questionnaire Set for Study B

Part 4

Questionnaire for Pilot Study

Food Cart Monitoring Form
Co-supervised by City Corporation and NGO

SL No	Monitoring questions	Yes	No
1.	Location of food cart: (15 km far from dustbin or toilet or other garbage area)		
2.	Using clean equipment for food serving		
3.	Storage or serving food away from dust or car smoke		
4.	Personal cleanliness: wearing apron or clean dress or not?		
5.	Clean hand, cut nails, cut hair or not?		
6.	Smoking, sneezing, coughing, spitting or not?		
7.	Vendor is suffering from any disease or skin infection?		
8.	Source of cleaning and using potable water or not?		
9.	For consumers, providing potable water for drink or not?		
10.	Handwashing before food preparation and serving or not?		
11.	Can consumer get soap for handwashing or not?		
12.	Water and cleansers for washing equipment or not?		
13.	Cleaning with clean clothes?		
14.	Raw materials are fresh or not?		
15.	Using separate equipment for each serving or not?		
16.	Separate cooked and raw foods or not?		
17.	Serving food hot or not?		
18.	Covering the food or not?		
19.	Serving food with bare hand?		
20.	Waste management after the leftover food and raw materials properly or not?		

Vendor`s performance

1. A (80-100%) 2. B (60-79%) 3. C (50-59%) 4. D (40-50%) 5. E under 40%

Other comments from investigator:

Vendor cart number:
Student Name:
School Name:

Part 5: Please mention your opinion about why in Dhaka city, street food intervention has been less effective?

Questionnaire for Study C

Part 1: Questionnaire on needed knowledge and perception about SFS improvement system, development from different stakeholders.

1. Knowledge about hygiene rules	yes/no
2. Knowledge on Food storage	yes/no
3. Food handling or serving	yes/no
4. WHO guidelines	yes/no
5. Risk factors of unsafe street food consumption	yes/no
6. Handwashing rules	yes/no
7. Impact of unsafe food consumption on health and economy	yes/no
8. Regulations, laws and policies of unsafe food handling	yes/no
9. Health promotional activities	yes/no
10. Emerging food safety related risks	yes/no
11. Education in schools	yes/no
12. Initiatives on training and monitoring on street food safety	yes/no
13. Co-ordination among stakeholders	yes/no
14. Knowledge translation (from academic to practice)	yes/no
15. Health services	yes/no

Questionnaire for Study C

Part 2: What do you think about the statements?

1. Did you or any other vendors were asked about their requirements before intervention implementation?
2. Do you understand what the broader purpose of the SFS intervention is?
3. Is there any food safety related education going on the schools?

4. Do you always get proper health services when you or your family member get sick?
5. Did the city corporation people or NGO people shared the knowledge on what is the causes of food safety risks factors with you?