

**THE IMPACT AND MONITORING OF SANITATION AND HYGIENE INTERVENTIONS IN
CHILD SURVIVAL AND DEVELOPMENT
IN SUB SAHARAN AFRICA**

by

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Abbreviations and Acronyms

ACSD	Accelerated Child Survival and Development
CATS	Community Approaches to Sanitation
CLTS	Community Led Total Sanitation
DALY	Disability-Adjusted Life Year
MBB	Marginal budgeting for bottlenecks
MDGs	Millennium Development Goals
MEME model	The Multiple Exposures Multiple Effects model
MINITER	Ministry of Lands, Environment, Forests, Water and Mines
MOEVT	Ministry of Education and Vocational Training
MOH	Ministry of Health
MOSHW	Ministry of Social and Health Welfare
MOWI	Ministry of Water and Integration
PMO-RALG	Prime Minister's Office-Regional Administration and Local Government
S&H	Sanitation and Hygiene
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation and Hygiene
WEDC	Water, Engineering and Development Centre
WHO	World Health Organization
WSS	Water Supply and Sanitation
WSSCC	Water Supply and Sanitation Collaborative Council
YLL	Years of Life Lost due to premature death
YLD	Years Lost due to Disability

Chapter 1 Introduction

Globally, nearly 9 million children die before year of five yearly due to pneumonia, diarrhoea malaria and other diseases according to the latest estimates in 2008 (WHO/UNICEF, 2010a, p.11). This represents a tremendous improvement in contrast to child mortality in 1970 (17 million), however much remains to be done, since children and infants are a vulnerable group whose voice is hardly heard. It is estimated that globally over 4,100 children under-five die each day due to diarrhoea alone, with 46% of all child diarrhoea death occurring in Sub-Saharan Africa where 10 out of 15 countries globally with the highest rates are located (UNICEF/WHO, 2009, p.7). Diarrhoea therefore becomes the biggest killer for death of children under-five in Sub-Saharan African countries (Velleman and Slaymaker, 2011, p.5).

1.1 Justifications for the research

Child survival and development are influenced by a number of factors including the presence and use of adequate sanitation and household hygiene practices (UNICEF, 2009, p.5; UNICEF/WHO, 2009, p.9). While many of the outcomes of sanitation and hygiene impact on child survival and development, child survival is primarily with the Health Sector and sanitation and hygiene are elsewhere. Sanitation and hygiene are rarely the responsibility of the Ministry of Health and so the interventions are not given the same priority as other health interventions (for example immunization, breastfeeding) (Word Bank, 2008, p.31).

Consequently the impact of improved sanitation and hygiene upon child survival and development is not adequately taken into account during health sector planning or measured as a health outcome. This may be a significant reason why child survival related MDGs in a large number of countries, especially in Sub-Saharan Africa are off track. It is, therefore worthwhile exploring how to scale up the impact of sanitation and hygiene interventions in child survival and development by some innovations to create better enabling environment, including policy and institutional reform and change in implementation models.

1.2 Research aims

The aim of this research is to look at the viability of the health sector integrating certain sanitation and hygiene interventions along with associated impact indicators. The specific research aims are

To determine:

- a. Which sanitation and hygiene interventions are critical to child survival and development
- b. Which are the most appropriate policy and institutional responses to make sure these interventions reach children
- c. What the indicators are for these interventions and how they can best be integrated into child survival and development programmes
- d. To make recommendations about post 2015 in respect of the above

The aims will be achieved by

- Identifying which sanitation and hygiene interventions are critical to child survival and development
- Looking at what has happened during the period of the MDGs and the trends that have resulted in some child survival and development initiatives taking on sanitation and hygiene
- Looking at the situation in different countries to understand which policy and institutional models assist the aims to find out who was, are or will be responsible for doing the interventions and monitoring the corresponding indicators; what kinds of interventions are made at different levels; and when the actions are intervened and monitored.

1.3 Defined research questions

Defining questions plays a critical role in the research design. Defining the problem is also a first and important step, because it can bring benefits in various important aspects. Specifically, defining the problem correctly could make a difference in giving focus, setting boundaries and providing directions (O'Leary, 2004, p.29). Therefore, the defined questions based on the research aims and objectives for this research are presented below. The aims and defined questions are also demonstrated in Annex A, as well as the associated methodology examined

in chapter 3.

Research Aim A - Possible Interventions

- Which sanitation intervention is critical to child survival and development?
- Which hygiene intervention is critical to child survival and development?
- What kinds of interventions are made at different levels?
- Is there any the present health initiatives that have considered sanitation and hygiene interventions? Is so, what are they and what are problems?
- Which improved latrine option is the most suitable for children under-five?

Research Aim B - Policy and Models

- What are the evidence base for sanitation and hygiene in child survival and development?
- What are the most significant sanitation and hygiene factors and people to impacting child survival and development?
- What are the constraints to hinder progress on scaling up impact of sanitation and hygiene interventions in child survival and development?
- Is there any significant factor or bottleneck related to policy and institutional arrangement?
- In terms of policy, what is the most appropriate policy to make sure the effective interventions to reach children in Sub-Saharan Africa?
- As for the institutional arrangements, what is the most appropriate response to make sure the interventions to reach children in Sub-Saharan Africa?

Research Aim C - Indicators

- What are the indicators for measuring the interventions in sanitation and hygiene for child survival and development?
- How to set the indicators mentioned above?
- When the actions are intervened and monitored?

Research Aim D – Recommendations

- What is the most appropriate policy to ensure the impact of sanitation and hygiene on child survival and development in future, particularly for post 2015?
- What is the most appropriate institutional model to follow to ensure the impact of sanitation and hygiene on child survival and development in future, particularly for post 2015?

- What are the appropriate indicators for monitoring sanitation and hygiene interventions to impact upon child survival and development in future, particularly for post 2015?
- What are the other commendations for sanitation and hygiene interventions to impact upon child survival and development in future, particularly for post 2015?

1.4 Hypothesis

Hypothesis is a statement of an informed guess, which may then provide certain direction to further study (Hart, 2005, p. 90). Thus, hypothesis can be used in this research to give the baseline of study. To be exact, the primary (alternative) hypothesis H_1 can be depicted as follows.

- Sanitation and hygiene interventions would have a greater impact on child survival and development if the health sector took an overall responsibility both in provision of sanitation service (mainly advocating sanitation interventions) and hygiene promotion at both national and community levels, because both sanitation and hygiene interventions are associated with behaviour change to reduce incidence of diseases. Health sector can integrate the interventions with data of child mortality and morbidity and monitor the progress on interventions.

In contrast, the null hypothesis H_0 may have the opposite words below.

- Sanitation and hygiene interventions would make less impact on child survival and development or make no change in impact if the health sector took an overall responsibility both in provision of sanitation service (mainly advocating sanitation interventions) and hygiene promotion at both national and community levels.

To better understand the hypothesis, outlines illustrated in table 1.1 attempt to breakdown the hypothesis. The major concept is child survival and development, while regarding the responsibilities as the variables. More details can be found in table 1.1.

Table 1.1 Operationalizing the hypothesis

Main concept cannot be directly measured	→	Child survival and development	
The key things which indicates the existence of the main concept	→	Indicators	→ The mortality and morbidity of children under-five
Categories of activities which may affect the main concept	→	Variables	→ <ul style="list-style-type: none"> - The health sector takes an overall responsibility for sanitation and hygiene interventions; - The health sector takes a responsibility for hygiene promotion alone while water sector has a responsibility for sanitation interventions.
The actual output can be measured	→	Value	→ Equity, effectiveness, efficiency or sustainability

Source: Hart, 2005, p. 93

1.5 Structure of the research

This research report will first explain the project definition in this chapter 1, including justification, research aims, defined questions and hypothesis. And then in chapter 2, literature review will be undertaken to identify the gaps filled in the research. Chapter 3 presents the methodology employed for the search. The following chapter 4, chapter 5 and chapter 6 will demonstrate findings from the data collection, analysis and discussion respectively. Finally, the conclusions and recommendations will be suggested in chapter 7.

Chapter 2 Literature Review

This chapter aims to investigate the published and grey literature in the domain about how sanitation and hygiene make a difference to the United Nations Millennium Development Goals (MDGs) for child survival and development in undeveloped countries. Through the review, the gaps between the past researches and status quo will then be identified and filled in further study.

2.1 Literature search and limits

Literature search is fulfilled in various ways. To start with the university library and WEDC resource centre, the key words is input in the catalogues and metabases: such as "metalib", "GSA illumine", "WEDC conference paper". The following search words are used, including 'WASH and health', 'sanitation and child survival', 'Africa accelerated child survival', 'WASH accelerated child survival', 'marginal budgeting for bottlenecks WASH', 'WASH indicators for child survival' and 'diarrhoeal disease prevention'. Apart from the key words above, the author 'Jennifer Bryce' as an important contributor is recommended by the supervisor, whose article is also searched by various metabases. In addition, the website of UNICEF, WHO, the World Bank, WaterAid, WSSCC, USAID and Google scholar are employed as search engines, because more recent article provided in these databases. Moreover, a snowball system is also applied by looking at the references in the documents obtained, in an attempt to collect the relevant old articles. Finally, a variety of critical documents are also sent by the supervisor.

The literature in water sector and health sector relevant to child survival and development is selected by searching methodology above. However, the literature in Sub-Saharan Africa is relatively limited in comparison with the global and whole Africa regions, despite the fact that the information for individual country is available. In addition, some documents are not accessed free of charge and cannot be provided through the library metabases, they thus cannot be used during the research.

2.2 Definitions

Child survival and development

Child survival and development as the basic right of the child can be traced in early 20th century. The first international standard on child rights, the Geneva Declaration on the Rights of the Child, was adopted by the League of Nations in 1924. Since then, child rights have been developed considerably, particularly after the Convention on the Rights of the Child deployed by the UN in 1989, which was a comprehensive and powerful treaty to protect child rights globally (UNICEF, 2009,p.2).Under the convention, child survival and development was one of the three major basic rights for children. Of which some critical rights will be call for protection, such as basic health and health care, disease prevention and control, education, water supply, sanitation and environmental health, and so on (UNICEF, 2009,p.15). It should be mentioned that children under-five are the major focus of concern in the research. In this case, some rights, such as primary education, will not be studied in the research.

Sanitation and hygiene

Improved sanitation and hygiene practices, along with safe water make a significant difference to child survival and development, but sanitation and hygiene seem to be neglected due to various rationales. It was surveyed by GLAAS (2010, p.28) that sanitation funding only represented 37% of total aid by donors, compared with a 67% of water funding. Therefore, the focus in this research will be emphasized on sanitation and hygiene. Admittedly, water quality will be taken into account for the presence of diseases, as it also plays a pivotal role for the health of children under-five but omitting the infrastructure for water facilities or accessing to water.

To distinguish from the concepts of sanitation and hygiene, two different components will be introduced in the research. Of which sanitation will be defined as *“the means of collecting and disposing of excreta and community liquid wastes in a hygienic way so as not to endanger the health of individuals and community as a whole”*(WHO, 1987, p.12), including *safe collection, storage, treatment and disposal/re-use/recycling of human excreta (faeces and urine)*”(Evans,

2005, p8). Hygiene will be stated as *“the planned and systematic attempt to enable people to take action to prevent water and sanitation related illness, and to maximize the benefits of water and sanitation facilities”* (Ferron, Morgan and O’Reilley, 2000, p.12), therefore focusing on hygiene behaviours. Obviously, the word sanitation used in this research does not include the scope of hygiene.

MDGs

The United Nations Millennium Development Goals (MDGs) are the goals that 187 member states agreed in 2000, aiming to provide the basic needs for all the people and end global poverty (UN, 2008). Eight goals with 21 targets and 60 indicators are suggested and tracked, varying from health, gender, poverty to environment issues. To better identify the impact of sanitation and hygiene in child survival and development in the MDGs, all the MDGs referred to child survival and development will be presented in Annex B. It covers poverty, child mortality, HIV/AIDS, malaria and other diseases and environmental sustainability. Of which MDG4 aims that the death rate of under-five child will be reduced by two thirds by 2015, but it is seriously off-track in Sub Saharan Africa where the highest rates of child mortality were found in 2009, equivalently one in eight children dead before the 5th birthday (UN, 2011a, p24) . It is predicted that the target will not be met until 2064 if current trends cannot be accelerated (WaterAid, 2009, p.1). Figure 2.1 shows under-five mortality rate during 1990 and 2008 in the region.

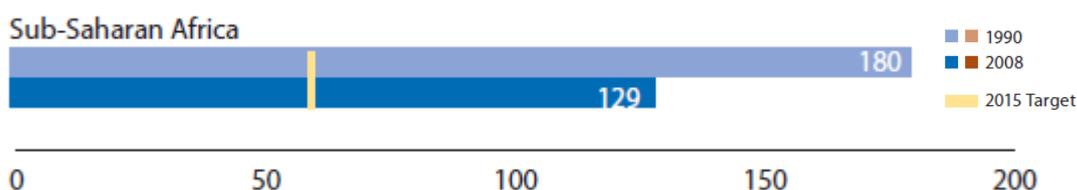


Figure2.1 Under-five mortality rate per 1,000 live births in Sub-Saharan Africa 1990 and 2008

Source: UN, 2011a, p.24

2.3 Sanitation and hygiene in the MDGs

Sanitation is reflected on MDGs directly, which is target c in goal 7, to ensure environmental sustainability’. Specifically, it is to *„Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation’* (UN, 2008). In terms of basic sanitation or

improved sanitation, it is defined in Box 2.1. As for the status quo of sanitation, it was revealed by WHO/UNICEF (2010b update, p.6) that over 2.6 billion people globally cannot access the improved sanitation in the year 2008, among which people in Sub-Saharan Africa contributed to 565 million(WHO/ UNICEF, 2010b update, p.6). Figure 2.2 presents that the majority of Sub-Saharan African countries are off track for the sanitation MDG target. In addition, 1.1 billion people (equivalently 2 in 10 person) still practices open defecation globally whereas 27% of Sub-Saharan Africa people defecate openly (equivalently 2.7 in 10 person) (WHO/ UNICEF, 2010b update, p. 22) .

Unfortunately, there is no specific target in the MDGs for hygiene promotion or water quality. It is believed that three hygiene behaviours are critical to reduce the diarrhoea including handwashing, safe disposal of faeces and safe water storage (World Bank, 2005, p.8). Indicators set for monitoring their progress at global level will thus accelerate the behaviour change. Measuring handwashing with soap is normally carried out from the perspective of programme whose initiatives are to develop individuals' habits of handwashing with soap at critical times, such as the Global Public–Private Partnership for Handwashing with Soap (PPP-HW) (World Bank, 2005, p.42; Curtis et al, 2011, p.317). By contrast, water quality surveillance varies from countries. At the national level, it is suggested to be the mandate of Ministry of Health (Howard, 2002, p.24).

Box2.1 Definition of improved sanitation

- Flush toilet
- Piped sewer system
- Septic tank
- Flush/pour flush to pit latrine
- Ventilated improved pit latrine (VIP)
- Pit latrine with slab
- Composting toilet

Source: WHO/UNICEF (JMP), 2008.

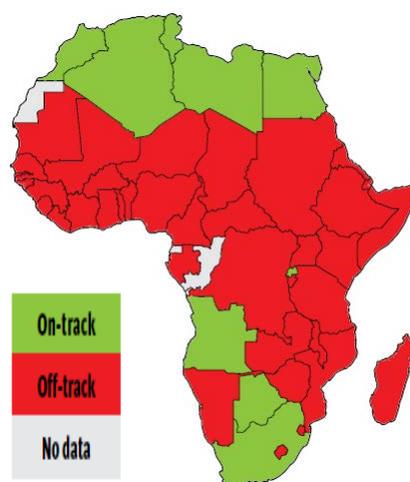


Figure2.2 80% of Africa countries are off track for the sanitation MDG target in Sub Saharan Africa

Source: WaterAid, 2010, p.2

2.4 The evidence-based impact of sanitation and hygiene in child survival and development

Sanitation and hygiene can affect child survival and development in various ways other than accessing improved sanitation as the basic rights of child. Unimproved sanitation and poor sanitation and hygiene practices can result in a large number of diseases for children, which would in turn have an adverse effect on child mortality and morbidity, poverty and development.

2.4.1 Sanitation and hygiene-related diseases in child mortality

Sanitation and hygiene-related diseases contribute to child mortality. Globally 8.8 million children died before the age of five in 2008, where pneumonia (18%) and diarrhoea (15%) contributed 33% of total deaths (WHO/UNICEF, 2010a, p.11), as illustrated in figure 2.4. In contrast, the data in 2000-2003 showed that the pneumonia (19%) and diarrhea (19%) ranked the top killers for children under five, representing 38% of total global deaths of 10.6 million (Bryce et al, 2005, p.1150). Although the death rates in under-fives relating to these two diseases appear to decline over the past a few years, the marginal progress seems to be achieved. Meanwhile, diarrhoea replacing pneumonia became the first killer for under-five children in Africa in 2008 (see figure 2.3). It is because of the high death rate that diarrhoea together with acute respiratory infections is regarded as the leading cause of child mortality due to the environmental health (World Bank, 2008, p.3).

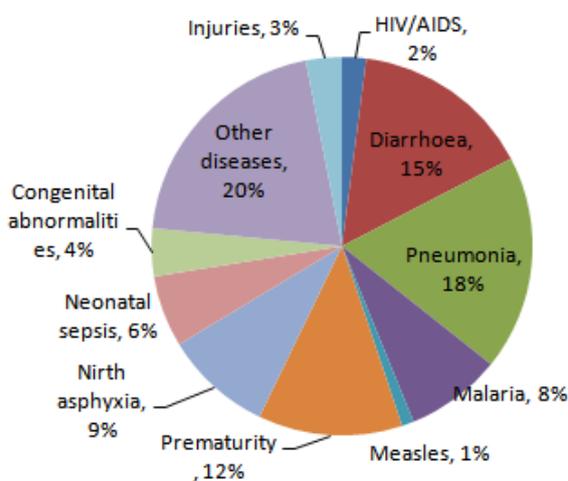


Figure 2.4 Global causes of death among children under-five in 2008

Source: WHO, 2010c, p.71

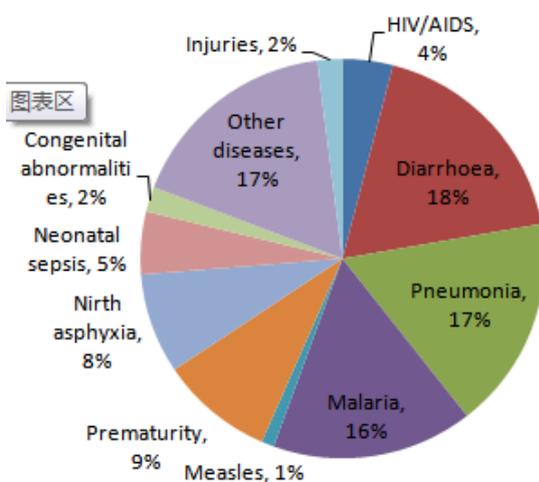


Figure 2.3 Africa causes of death among children under-five in 2008

Source: WHO, 2010c, p.71

Diarrhoea

Diarrhoea is the second killer for child under-five, representing 15% of annual deaths globally in 2008, whilst ranking the biggest killer for under-five child in Sub-Saharan Africa at the rate of 19% (UNICEF/WHO, 2010a, p.11).

Poor water, sanitation and hygiene (WASH) is regarded as the root reason for diarrhoea (UNICEF, 2011, p.1). It was proved by Pruss-Ustun and Corvalanin (2006, p.9) that approximately 94% of diarrhoea attributed to unsafe drinking water and unimproved sanitation and poor hygiene practice while WHO (2011d) suggested the figure of 88%. Essentially, the majority of diarrhoeal diseases are caused by various pathogens which can be transmitted through the fecal-oral routes (UNICEF/WHO, 2009, p.9; Pruss-Ustun and Corvalan, 2006, p.34). In other words, the pathogens may be transferred from the faeces of one person to a new host through the mouth due to the unsafe water, poor sanitation and hygiene practice, as illustrated in Figure 2.5. Specifically, pathogens in the faeces can result in contamination of fluids, fingers, fields and even flies, which will finally be transferred to a new host via a wide range of routes via the contaminated foods directly or indirectly (World Bank, 2008, p.18).

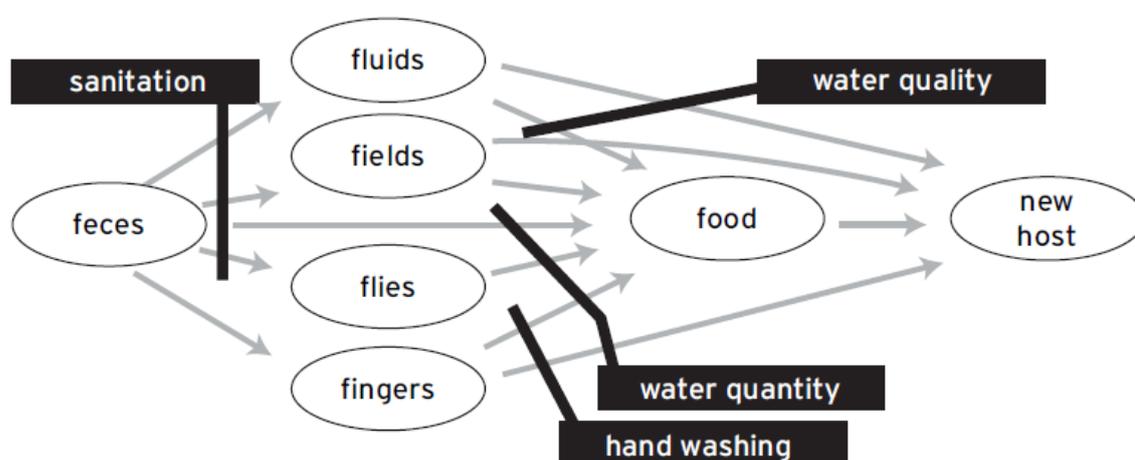


Figure 2.5 The F-Diagram: Transmission Routes for Infection

Source: World Bank, 2008, p.19

Meanwhile, children under-five as a vulnerable group tend to have more risks when exposed to an unhealthy environment. Approximately, one in five people worldwide practice open defecation (WHO/UNICEF, 2010b update, p.22), which increases the risks for children playing

on the ground where faeces can be found. In addition, children's faeces are discovered to take more pathogen load compared with that of adults (UNICEF/WHO, 2009, p.19). The safe disposal of stools therefore appears to be critical.

It is believed that diarrhoea can be prevented effectively by good environment conditions, such as safe water supply, improved sanitation, and good hygiene practice (UNICEF/WHO, 2009, p.11). Specifically, the proper disposal of faeces and handwashing with soap were recommended by WHO (2010a, p.11) as some of preventive interventions to diarrhoeal disease, especially including for children infected by HIV/AIDS, since they can break the transmission route of diarrhoea effectively. Similarly, handwashing with soap and community-wide sanitation were also regarded as two approaches in prevention package by UNICEF/WHO (2009, p.31). As for the promotion of community sanitation particularly, this new strategy is proved to be more effective than previous measures, which can help stop people practicing open defecation.

As for impacts of improved sanitation and hygiene promotion, Esrey et al (1991, p.612) reviewed 67 cases on diarrhoeal morbidity, nutritional status and mortality. It is discovered that improved sanitation alone and improved hygiene promotion can reduce by 22% and 33% of diarrhoeal morbidity, respectively. In addition, this study identified that improved sanitation was proved to be a most effective approach to decline mortality of infants, especially for those non breast-fed infants (Esrey et al., 1991, p.613). Later on, Fewtrell et al (2005, p.46) reviewed more update studies on the basis of peer research results and revealed the similar findings. To be more exact, sanitation and hygiene (S&H) interventions can reduce the risk significantly by 32% and 37% respectively, corresponding risk factors of 0.68 and 0.63. Unfortunately, there seemed to be just two eligible studies on sanitation while 11 studies on hygiene intervention. In contrast, Waddington et al (2009, p.27) discovered the effectiveness of S&H interventions by investigating more and update samples of 71. Of which 6 samples of sanitation interventions reached the risk factor with 0.63 (equivalently 37% of reduction), whereas 17 out of 71 hygiene interventions samples hit 0.69 (equivalently 31% of reduction) of the risk factor. However, the latest review research contributed by Clasen et al (2010, p.5) attempted to focus on excreta disposal interventions by using the vigorous methodology. 11 out of 13 studies were shown

interventions to be effective where improved sanitation available.

Pneumonia --- acute respiratory infections

Pneumonia is one of acute respiratory infections which include acute upper and lower respiratory infection. To be more specific, pneumonia affects the lungs, classified as acute lower respiratory infections (UNICEF/WHO, 2006, p7). It is caused by various infected agents, such as bacteria, viruses and fungi. Although the specific routes of transmission may not be proved, noses and mouths of children are believed to be the main paths for infected agents (UNICEF/WHO, 2006, p9). Therefore, poor hygiene practice is regarded as a major risk factor for respiratory infections (Velleman and Slaymaker, 2011, p.5).

The evidence indicates that good hygiene practices can help prevent incidence of pneumonia in children. Rabies and Curtis (2006, p. 264) revealed that 6-44% of respiratory infections can be reduced by handwashing with soap after studying eight cases in developed countries.

Furthermore, Figure2.6 presents the effective package for control pneumonia. Handwashing as one intervention in protective measures can reduce by 3% of child mortality when safe water and improved sanitation were accessible (Jones et al, 2003, P. 67).

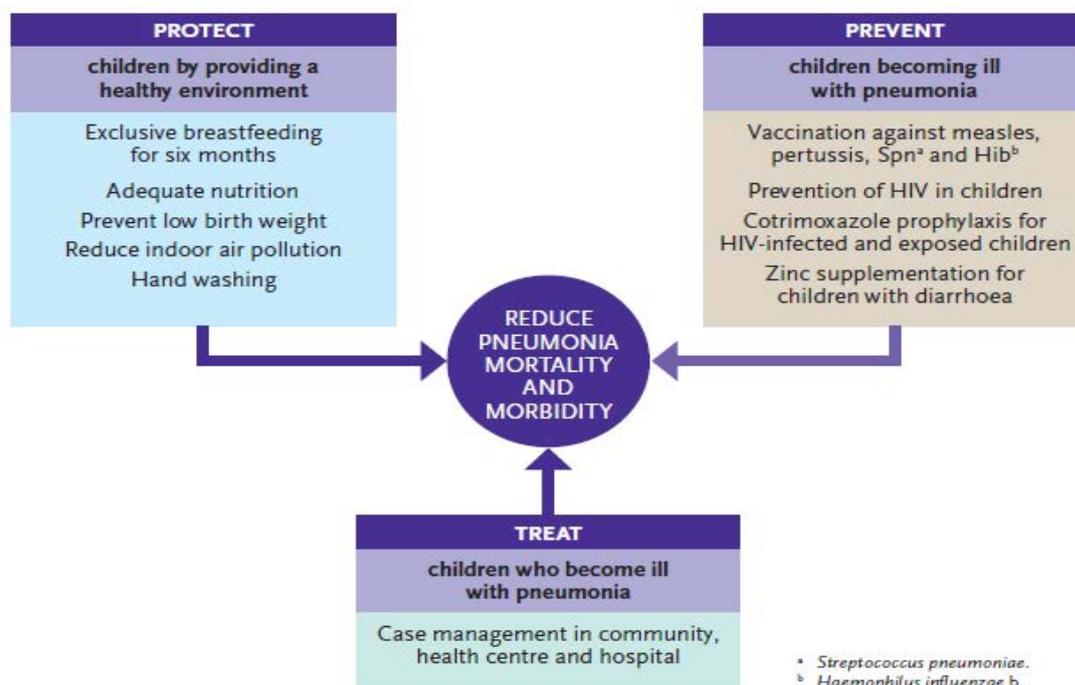


Figure2.6 Framework for pneumonia control

Source: WHO/UNICEF, 2009, p.4

2.4.2 Sanitation and hygiene-related tropical diseases in child survival and development

Some sanitation and hygiene-related tropical diseases following a faeco-oral pathway as illustrated in figure 2.5, will contribute to under-five children morbidity in the region (Mara et al, 2010, p.2).

Trachoma

Trachoma is contagious eye disease, which may lead to blindness but is not fatal. The disease is caused by unsafe water, unimproved sanitation and poor hygiene practices (Pruss-Ustun et al, 2008, P.8; Fewtrell et al, 2007, p. 2). It is estimated that 5 million people could had been prevented by progress on WASH sector (Pruss-Ustun et al, 2008, P.8).

Other sanitation and hygiene-related tropical diseases

Apart from trachoma, the other sanitation and hygiene-related tropical diseases (table2.1) may relate to poor hygiene promotion and unsafe sanitation, along with unimproved water supply, because they are transmitted by faecal-oral pathways (WaterAid, 2009, p.6).

Table2.1 Other main WASH-related diseases in child mortality

Diseases	Percentage of relationship with WASH
Intestinal nematode infections (ascariasis, trichuriasis, hookworm disease, other)	Considered to be 100% related to unsafe WASH
Schistosomiasis	Considered to be 100% related to WASH risks
Lymphatic filariasis	Globally estimated that 66% is attributable to WASH

Source: Fewtrell et al, 2007, pp.2-3

2.4.3 Malnutrition

Malnutrition contributed to one-third of child death worldwide by the estimate of 2008 (WHO/UNICEF, 2010a, p.11). Similarly, it was revealed by Caulfield et al (2004, p.195) that undernutrition may have high association with the death rate of some leading diseases, including pneumonia, diarrhoea, malaria. Essentially, underweight tends to be the primary cause of diseases, which in turn will result in undernutrition and the high child mortality (Ezzati et al, 2002, p.1356; WHO, 2011a).

Irrespective of the effect on child mortality, malnutrition may in part affect child growth, as nutrition plays a pivotal role in the growth and development of the fetus and child under the age of five. In other words, reduction in undernutrition can have a considerable beneficial impact not only on child mortality but also on their growth.

Undernutrition is supposed to impair the child survival and development in a wide range of approaches. On the one hand, children undernutrition may be easily infected by various diseases than the healthy children, as they tended to have weaker immune systems and cannot defend the invasion of infected agents (UNICEF, 2005, p.22; Fewtrell et al, 2007, p.22; WHO/UNICEF, 2010a, p.13). On the other hand, it is well known that pregnant women may be affected by malaria and helminthes due to exposing the bad sanitation and poor environmental management, which in turn can result in undernutrition of the fetus and the neonatal (World Bank, 2008, p.3, p.112). Therefore, the progress on WASH tends to be increasingly focused on even in the health sector.

It is estimated that 50% of childhood malnutrition attributed to diarrhoea and other WASH-related diseases (Velleman and Slaymaker, 2011, p.5), although it is known that the causes of malnutrition should owe to three major factors, such as lack of food; poor unsafe water, sanitation and health services; as well as bad care and feeding practices (Pruss-Ustun and Corvalan, 2006, p.44, WHO, 2011a). As an increasing study revealed, the unhygienic environment should be a critical and priority determinant for the prevalence of malnutrition in all three aspects (World Bank, 2007, p.6; WHO, 2011a), WASH as the key component of the environment should thus be paid more attention. The main pathways between WASH and malnutrition are illustrated in figure 2.7. Particularly, diarrhoeal disease may contribute to child malnutrition considerably, which is largely neglected (World Bank, 2008, p.151, Brown, 2003, p.331S).

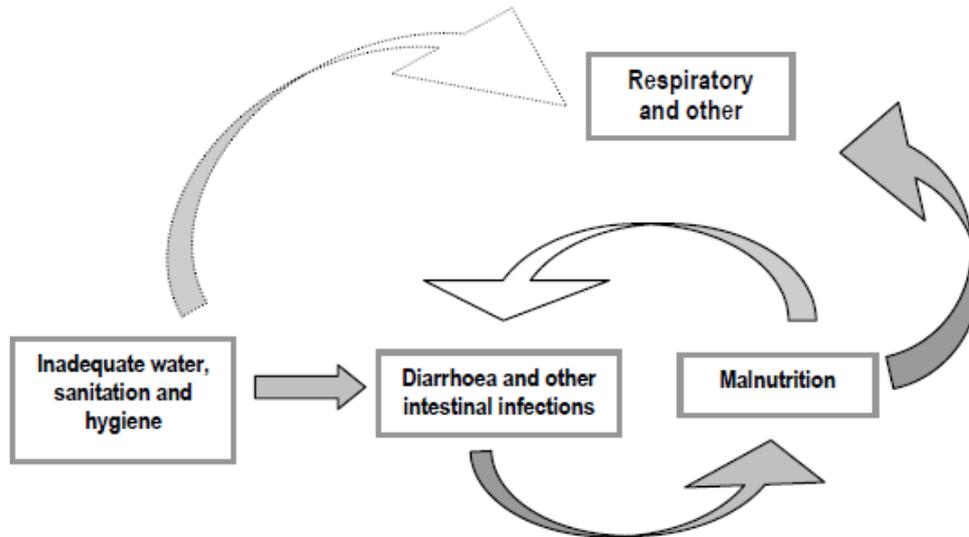


Figure2. 7 Main pathways link WASH to malnutrition

Source: Fewtrell et al, 2007, p.21

As the necessary provision, safe water and efficient sanitation are provided as the part of the nutrition programs implemented in developing countries. Those successful experiences imply that environment element also can make a big difference other than actions in the health sector. Take Central America for an example. Both education on hygiene practice to mothers and access to safe water and sanitation are taken as the preventive measures to address malnutrition (World Bank, 2008, pp.91-3).

2.4.4 Sanitation and poverty in child survival and development

Although malnutrition is the primary cause of diseases for child mortality under five ages, the root reason for malnutrition tended to be the poverty (UNICEF, 2005, p22; WHO/UNICEF, 2010a, p.13). Poorer children tended to have reduced access to food, safe water and sanitation and health services, which may lead to child malnutrition and even ultimately mortality. In other words, the poor tend to be exposed to the environment of poor sanitation and to be vulnerable to infectious diseases (Peña and Bacallao, 2002, p.242). It was indicated by UNEP (1994 cited in Peña and Bacallao, 2002, p.242) that the mortality of children younger 5 years in extreme poverty was five times than others. On the other hand, the malnutrition and diseases would result in the further poverty, because curing disease can be expensive when the treatment cost, transport cost and parents' loss of income when looking after sick children is included (Rottier

and Ince, 2003, p50). Consequently, diseases make the poor less wealthy. This may become a vicious circle for sanitation, malnutrition, poverty, and child survival and development.

2.4.5 Sanitation, hygiene and burden of diseases for under-fives

A considerable burden of diseases for under-fives links to poor sanitation and hygiene. Table 2.2 presents sanitation and hygiene-related diseases and their DALYs in under-five children in the region in the year 2004. The disability-adjusted life year (DALY) can be used to measure and compare burden of disease, because it quantifies the burden of disease from both mortality and morbidity. It is the standard unit on the basis of time, including the Years of Life Lost (YLL) due to premature death and the Years Lost due to Disability (YLD) (WHO, 2011c). In addition, figure 2.8 shows DALYs of S&H-related diseases contributed nearly 40% of total DALYs for under-five child in Sub Saharan Africa in the year 2004.

Table 2.2 S&H related diseases attributable-DALYs in 2004

S&H-related diseases	Diseases attributable- DALYs in under-five children in Sub Saharan Africa (million)	Percentage of regional/global diseases attributable- DALYs in under-five children
Diarrhoea	28	45%
Lower Respiratory infections	34	54%
Malnutrition	9	42%
Neglected tropical disease	0.6	51%

Source: WHO, 2011e

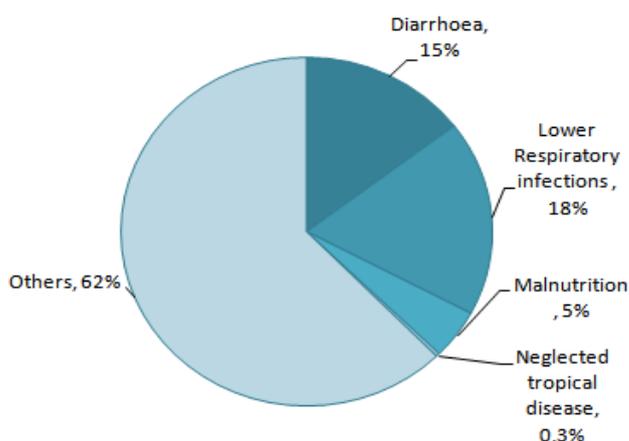


Figure 2.8 Contributions in DALYs of S&H-related diseases to the total burden of disease for under-fives in Sub Saharan Africa (2004)

Source: WHO, 2011e

2.4.6 Sanitation and economic development

Not only does adequate sanitation impact upon health of child under-five, but also it will be beneficial to economic development. These economic benefits include reduction in health system costs, fewer days lost at nursery for children and more days at work for mothers, etc.(Mara et al, 2010, p. 3). It is estimated that 12% of the total health cost in sub-Saharan Africa is spent in treating diarrhoea and similar water-borne diseases (PATH, 2009, p.4). Conversely, a reduction in incidence of diarrhoea can save limited health budget. Meanwhile, studies showed that improved environmental conditions could save annual GDP at the rate of 8% in Ghana (World Bank, 2008, p.135). In addition, Mara et al (2010, p.3) noted that economic benefits of approximate 10 dollars could be created by spending only one dollar in sanitation at global average level. Specifically in Africa, Hutton, Haller & Bartram(2007, p.494) found that the cost benefits of achieving water and sanitation MDG are slightly lower than the average value, between 5.5 and 6. Yet the economic benefits on child under-fives seem difficult to be calculated clearly.

2.5 Roles and responsibilities for interventions

To understand the roles and responsibilities in sanitation and hygiene for both WASH sector and health sector, it is necessary to be aware of sanitation and hygiene interventions in child survival and development. It needs to be noted that WASH sector in the research refers to water sector where water and sanitation are its mandates, or water and sanitation sector where water and sanitation are their mandates. The phrase of WASH sector thus has a different meaning from the word of WASH in the report.

2.5.1 Sanitation and hygiene interventions in child survival and development

A variety of interventions in adequate sanitation and hygiene, together with safe water have been employed, in order to combat against the water-related diseases. In essence, the approach of S&H interventions attempts to block the various transmission passages of infected agents (see Figure 2. 5), thereby reducing child mortality and morbidity (Billig, Bendahmane, and Swindale, 1999, p.6). The mechanism is presented in Figure 2.9.

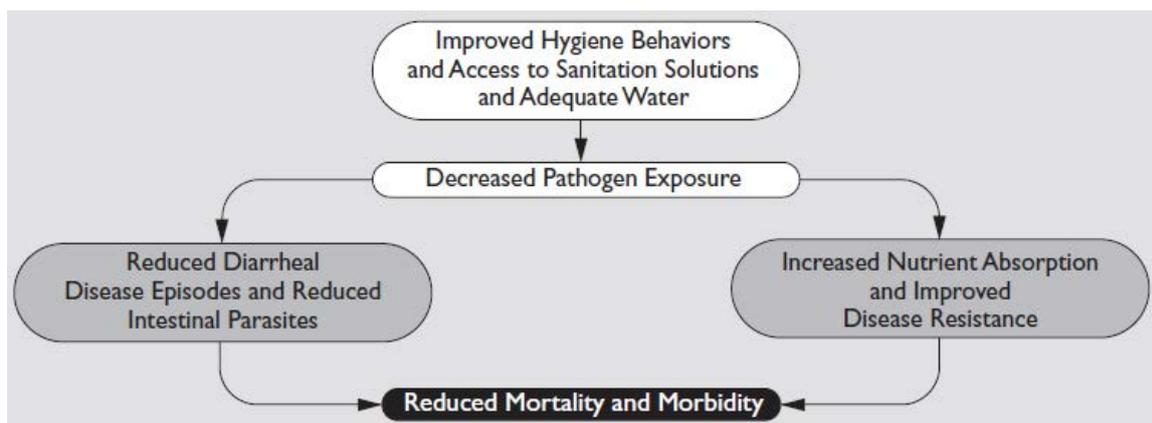


Figure 2.9 Mechanism of S&H to reduce child mortality

Source: Billig, Bendahmane, and Swindale, 1999, p.7

Therefore, various S&H interventions in child mortality and morbidity reduction can be developed on the basis of F-diagram (Figure 2.5) and mechanism above. All WASH interventions can be classified into five areas as shown in figure 2.10 (Fewtrell et al, 2005, p.44). In terms of interventions on sanitation, it aims to provide and promote the improved sanitation (defined in Box 2.1). In contrast, hygiene promotion refers to hand washing with soap and measures on raising public awareness on hygiene education (See figure 2.10).

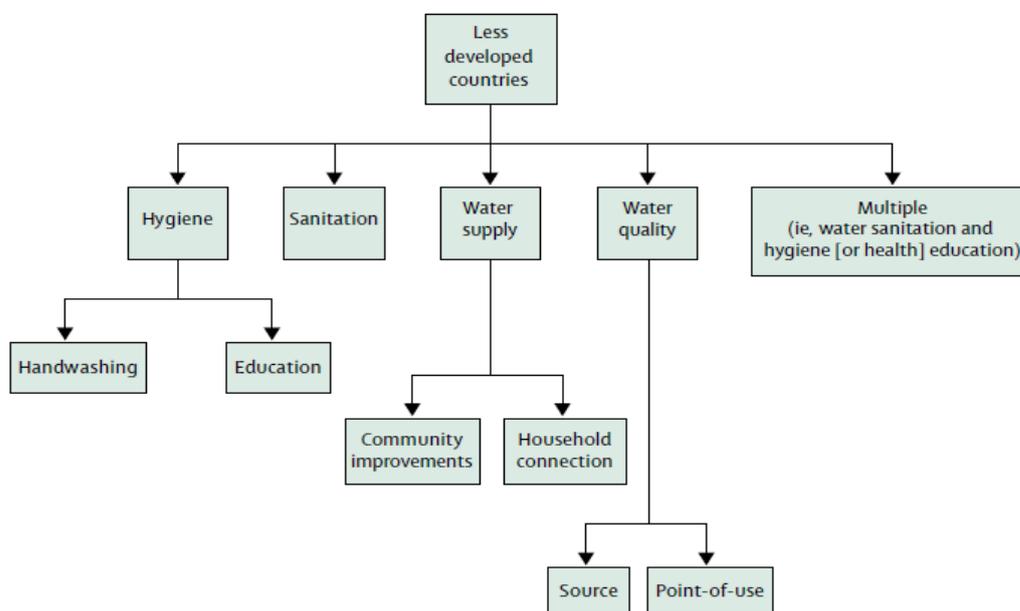


Figure 2.10 WASH interventions classification

Source: Fewtrell et al, 2005, p.44

However, ODI(2006,p2) argued that safe water storage as well as safe hand washing practices are two critical hygiene practices for reducing child mortality under-fives, which should be also

taken into account as hygiene promotion, particularly in rural Sub-Saharan Africa countries. Obviously, Fewtrell et al (2005, p.44) tended to regard safe water storage as point-of-use in intervention of water quality rather than good hygiene practice.

Generally speaking, effective interventions should include access to hardware of sanitation facilities, as well as good hygiene practice (software). WSSCC and WHO (2005, pp.2-3) supposed that it would make a difference only when both sanitation as a hardware and hygiene promotion as a software were improved simultaneously. It is believed that the sanitation hardware alone may not be invalid if behavior was not changed by good practice of hygiene promotion.

2.5.2 Institutional management for interventions

The roles and responsibilities of the WASH sector and the health sector in sanitation and hygiene varies from countries due to different institutional arrangement. In practice, the management model for the interventions in Sub Saharan Africa can be thus identified as follows.

Sanitation and hygiene led by WASH sector

Sanitation and water traditionally have been regarded as a single sector (Cairncross et al, 2010, p.1). Hence, Sanitation and hygiene was often managed by the ministry of water in some countries as the sanitation seemed to be associated with engineering in this view while hygiene promotion is conveniently undertaken by the same sector (Cronin and Pond, 2008, p40).

However, some challenges emerge for this kind of institutional arrangement in practice. When the responsibilities for the water sector in local governments were delegated, they may often construct the facilities whilst transferring the hygiene promotion to the other department (Newborne, 2010, p.3). In this case, hygiene promotion cannot make a big difference. It can be further proved by the fact that sanitation facilities were built by donors or local governments but without sustainable function, as the role of improved sanitation cannot be well advocated by the engineers of building facilities (Velleman&Slaymaker, 2011, p.10; Evans, 2005, p.23). In this context, construction of sanitation facilities was focused on whereas the good hygiene practices

were largely neglected.

Sanitation led by WASH sector while hygiene promoted by health sector

Sharing responsibility for S&H seems to be a popular institutional arrangement. Several ministries will be involved in the management in a number of countries, such as Madagascar, Burkina Faso and the Democratic Republic of Congo (ODI, 2006, p.2). In this case, sanitation tends to be under the control of WASH sector, whereas hygiene is the responsibility of health sector (ODI, 2006, p.2). Take Rwanda as an example, Ministry of Lands, Environment, Forests, Water and Mines (MINITER) in Rwanda is responsible for formulating water and sanitation policy at national level while the Water and Sanitation Directorate, under MINITER, is responsible for implementation (USAID, 2008f, p.2). The Ministry of Health takes the responsibility on hygiene promotion (MOH, 2010, pp.44-5). Rwanda is one of four countries which are on track to sanitation MDGs in Sub-Saharan Africa.

Velleman and Slaymaker (2011, p10) depicted the delivery of S&H with parallel arrangement (figure 2.11). Good hygiene practice can be promoted by community health workers to reach the households while WASH sector appears to employ the approach of project management to delivery sanitation service. It is readily understood that project-based sanitation is the backbone of management model.

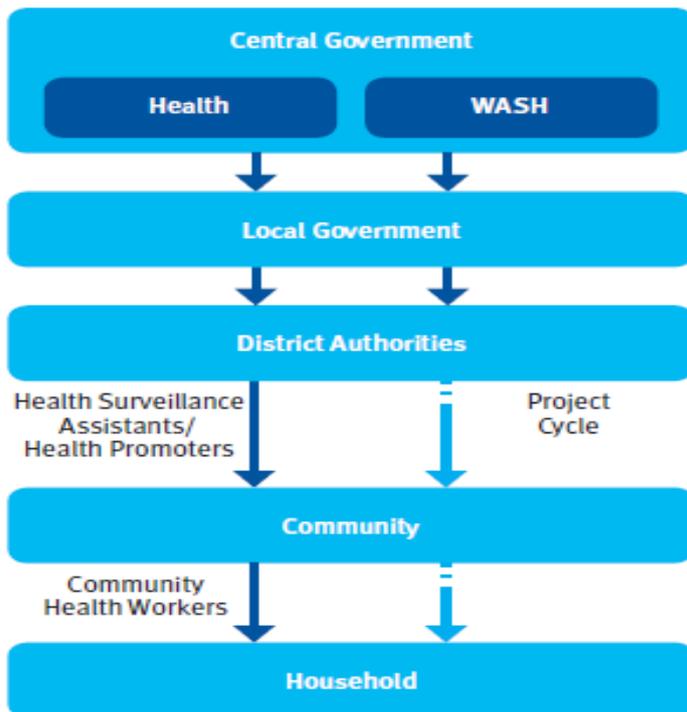


Figure 2.11 Comparative reach of health and WASH sectors

Source: Velleman and Slaymaker, 2011, p.10

Sanitation and hygiene led by the health sector

Sanitation and hygiene interventions led by the health sector appear to be an innovation of institutional arrangement in recent years. Under the model, sanitation is seen as the behavior change rather than facilities provision (Mara et al, 2010, p5). Meanwhile, provision of sanitation will be on the basis of household demand rather than supply demand. In other words, behavior change and demand-based approach would ensure the sustainability of use of sanitation facilities (Mara et al, 2010, p5).

A wide range of successful examples exist for health sector to promote sanitation. Successful sanitation marketing, community led total sanitation (CLTS) and Ethiopia's HEP (Health Extension Programme) are all the good practice for health sector led sanitation promotion (Mara et al, 2010, p5).

However, the health sector seems to be supported by WASH sector regardless of its leading role in sanitation and hygiene promotion. For example, selection of the appropriate sanitation

facilities, emptying and maintenance of facilities should be better managed by WASH sector (Mara et al, 2010, p5).

To sum up, the health sector tends not to take on a strong leadership role in sanitation and hygiene promotion. For instance, it seems difficult for the health sector to take it for granted that improving sanitation is their responsibility, despite the fact that poor sanitation is known as the root cause for various diseases including diarrhoea, which in turn would lead to the deaths of children younger than five ages of year (Newborne, 2010, p. 3). Especially in some regions, sanitation is ruled out by the policy of health sector (Velleman & Slaymaker, 2011, p.9). Consequently, little literature was identified about how the health sector made efforts on sanitation improvements in order to reduce the burden of disease (Bartram, 2008, p2). In contrast, a large amount of research on the interventions by the health sector reveals the findings such as immunizations and nutrition supplements. So, the focus of the health sector appears to be curative interventions in support of child survival.

2.6 Monitoring interventions and associated indicators

2.6.1 Mechanism for monitoring interventions

The Multiple Exposures Multiple Effects (MEME) model is the theoretical basis for monitoring and assessing the sanitation and hygiene interventions to child health outcomes. This model focuses on the complicated links between child health outcomes and environmental exposures, as demonstrated in figure 2.12. After identifying the driving forces, actions and relevant indicators can be confirmed to reduce exposures or health outcomes (WHO, 2011d). The children's environmental health indicators therefore can be introduced to monitor and assess the progress.

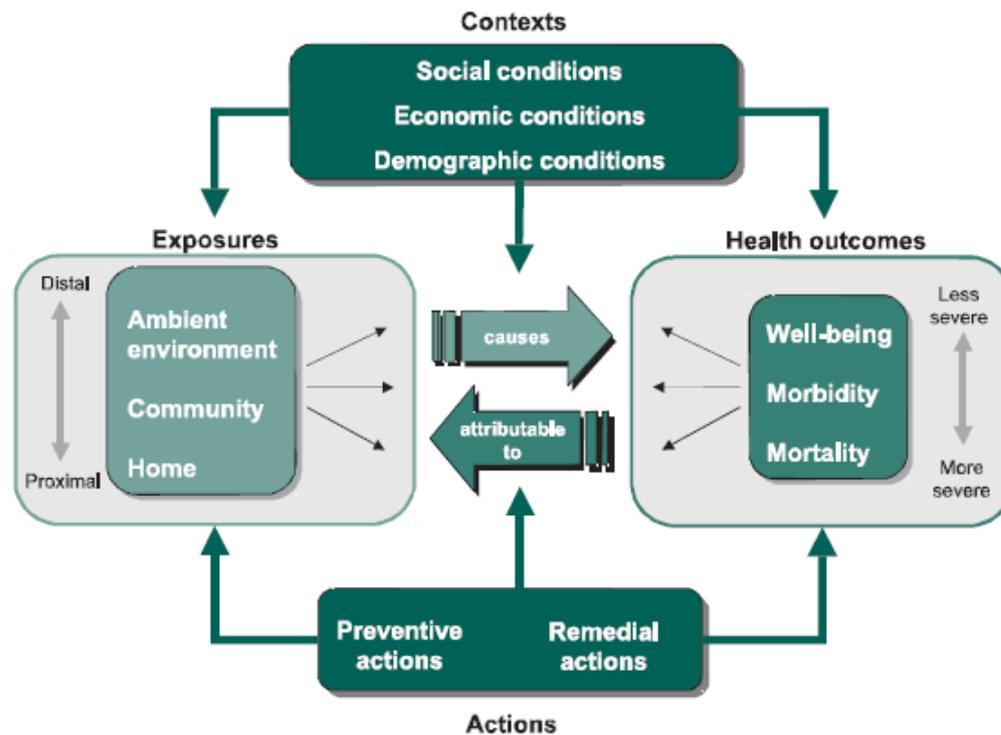


Figure 2.12 The MEME model for monitoring

Source: Briggs, 2003, p.14

2.6.2 Indicators for monitoring interventions

To monitor and assess sanitation and hygiene interventions in child survival and development at community and household levels, especially the impact upon child mortality and morbidity such as diarrhoea, the essential indicators should include the following elements (Kleinau et al, 2004, p.37):

- Health impact indicator
 - Percentage of children under-five with diarrhoea in the last two weeks
- Indicators on access to hardware
 - Percentage of households with access to an improved sanitation facility
 - Percentage of households with access to washing hands facilities, including water, soap, washing devices and clean drying material(optional)
- Hygiene promotion indicators
 - Percentage of adults to wash hands with soap at critical times
 - Percentage of households to use improved sanitation facility
- Enabling environment indicators

The rationale for selecting the indicators above is that good health outcome will generate if some pivotal behaviors can be changed after effective sanitation and hygiene intervention. In terms of reduction in diarrhoeal disease, the good household hygiene practices include (WSSCC and WHO, 2005, p.57),

- Handwashing with soap
- Safe dispose of all faeces, particularly those young children who may not use improved sanitation facility

2.6.3 Challenges for monitoring interventions

Because the radical factor of sanitation and hygiene interventions attempt to change behavior of individuals along with provision of promotion of sanitation facilities, measurement of interventions will confront a large number of challenges in practice.

Teamwork of multi-sectors

Monitoring cannot be accomplished by one sector independently. In other words, ministry of health, ministry of water/sanitation should cooperate with each other, together with ministry of environment, ministry of rural or urban development to conduct the monitoring (WSSCC and WHO, 2005, p.59). The good teamwork therefore will be essential factors to the successful monitoring. However, in effect, cooperation among intersections may make monitoring to spend a relatively long period and make it sophisticated. Who is responsible for leading monitoring will be a big challenge in practice, which will affect the quality of monitoring directly.

High cost for monitoring interventions

Monitoring sanitation and hygiene interventions may need relatively high cost. First, it will need time and the skilled manpower, which generate the relatively high costs. With regarding to guidelines for assessing hygiene improvement by Kleinau et al (2004, p.19), 69 indicators and hundreds of questions will be needed if a comprehensive monitoring and assessment is undertaken. Meanwhile, various tools may be employed during the period of monitoring, including sanitation surveillance questionnaires, supervision checklist, financial audits, participatory monitoring tools and network O&M checklists' (WSSCC and WHO, 2005, p.59). Furthermore, the baseline survey is always needed to a better monitoring, thus it would also

increase the costs for monitoring and evaluation. Finally, as Ram (2010, p.10) spoken, *“universally, measurement of health outcomes such as diarrhea incidence or prevalence is very costly”*. In other words, the special epidemiological expertise is needed to measure the health outcome (World Bank, 2005, p.42). It will directly result in the high cost of monitoring and evaluating interventions.

Difficult to achieve accurate results for monitoring

Indicators for hygiene promotion are largely in relation to behavior change, thus it may not be easily to collect reliable data. Take measurement of handwashing with soap as an example. In practice, no universally recognized applicable method exists which can measure the behavior of handwashing with soap accurately (WSP, 2011).

2.7 Selected Health sector led initiatives and tools that have considered

S&H integration

A wide range of health initiatives have been implemented in sub-Saharan Africa, which have already integrated with sanitation and hygiene interventions to some extent.

2.7.1 Accelerated Child Survival and Development Programme

Accelerated Child Survival and Development (ACSD) programme was undertaken by UNICEF in 11 West African countries between 2001 and 2005 with cost of some US\$27 million, aiming to reduce by 25% in child mortality by the end of 2006. Three implementation packages include immunization plus (EPI+), Antenatal care (ANC+), and improved management of pneumonia, malaria, and diarrhoea (IMCI+) (Bryce et al, 2010, p.573; Peterson, 2010; pp.530-1).The indicators for evaluation undertaken by Bryce et al (2010, p.574) consist of 14 targets set in three packages, plus some indicators in MDGs, for instance, child mortality, and the other two indicators relevant to under-nutrition and so on.

In terms of WASH related indicators in ACSD, they can be identified in the evaluation conducted by Hazel et al (2010, p.135). Of which improved excreta disposal is the intervention relevant to sanitation interventions as shown in table 2.3.

Table 2.3 Sanitation and hygiene related indicators in ACSD

S&H related coverage intervention	Correspondent Indicators used in model of List
Improved excreta disposal (latrine/toilet)	percentage of household report use of improved sanitation

Source: Hazel et al, 2010, p.135

The Lives Saved Tool (LIST) this time is used by the research group, which was a software package that can predict the changes in child mortality by inputting the necessary data sources (Hazel et al, 2010, p.133). However the ultimate purpose of LIST is to estimate the impacts on interventions and the budgets for interventions, thereby providing the reliable and objective data for decision makers (Boschi-Pinto, Young and Black, 2010, p.13).

ACSD intends to promote behavior change by community-based interventions, such as utilizing insecticide-treated nets, encouraging breastfeeding and so on (UNICEF, 2008, p25). However, the interventions by ACSD appear to make less impact than expected, especially in some ACSD focus area. Bryce et al (2010, p.573) explained some reasons, such as unsupportive policy, unavailable facilities and so on. In addition, Peterone (2010, p.530) suggested to employ the potential assessment model which will require assessors and implementers to work together rather than independently. Moreover, the implementation funding for scaling up of the child survival is recommended to increase, while reducing the investment for developing new technologies. In contrast, the efforts in implementation will make greater impacts on scaling up.

2.7.2 Marginal Budgeting for Bottlenecks costing toolkit

Marginal Budgeting for Bottlenecks (MBB) is a costing toolkit, based on Excel software, to assist users to plan and budget health program, thereby achieving the health MDGs targets, including goal 4, goal 5, goal 6 and target c in goal 1. Box 2.2 below presents the role of MBB.

Box 2.2 The role of MBB

The MBB can be used to answer the following questions:

- ✓ What is the cost of scaling up health services relevant to the health MDGs?
- ✓ What is the impact of interventions on health MDGs?

Source: Bitran & Asociados and PATH, 2008, p.18

The potential users tend to be policy makers, health economists or programmers in health

sector at national, sub-national and regional levels (WHO, 2011b; Bitran & Asociados and PATH, 2008, p.17). The tool is developed by UNICEF, the World Bank and WHO recently, the users can thus be trained or assisted by these organizations. It has been tested and applied in over 20 Sub-Saharan Africa countries (WHO, 2011b).

Through a “bottleneck analysis”, the constraints of implementation relating to six determinants in health system at national/sub-national level can be identified. It also can estimate costs and budgets through simulating the expected impacts of potential interventions. On the basis of outputs of the MBB, policy makers can make a decision on which packages will be the most cost-effective intervention to narrow the gaps on health MDGs in child survival (WHO, 2011b; Bitran & Asociados and PATH, 2008, p.20).

Interventions in MBB

The interventions in MBB tool cover eight areas, varying from child and adult immunizations, child health interventions to TB prevention and treatment, see Box 2.3 for details. Specifically, there would be total 91 interventions in the toolkit if they were divided by three service levels of community-based services, schedulable services and clinical services. Meanwhile, 12 subgroups can be identified inclusive family preventive/WASH service, family neonatal care and so on (Bitran & Asociados and PATH, 2008,

p.17-19). Of which three interventions in relation to sanitation and hygiene interventions can be found, as shown in table 2.4. The indicators therefore would be in line with the interventions accordingly.

Box2.3 Interventions in MBB

The tool includes the following interventions:

- ✓ Child and adult immunizations
- ✓ Child health interventions
- ✓ Family planning
- ✓ General health systems improvements
- ✓ HIV/AIDS prevention and treatment
- ✓ Malaria prevention and treatment
- ✓ Maternal health interventions
- ✓ TB prevention and treatment

Source: Bitran & Asociados and PATH, 2008,

Table 2.4 Sanitation and hygiene interventions in the MBB tools

Service level	Subgroup	Intervention
Community-based	Family Preventive/WASH service	Use of sanitary latrine
		Hand washing by mothers

Source: Bitran & Asociados and PATH, 2008, p.18

Challenges to the MBB tool

Admittedly, some challenges are head for health sector after testing MBB in some Sub Saharan Africa countries. To be more specific, the budget for sanitation interventions will be placed into health sector if bottleneck of sanitation is identified via the MBB tool. However, it may not be the responsibility of health sector to promote the sanitary latrine. Consequently, Ministry of Health may budget for the sanitation intervention while it cannot promote the use of facilities in effect. On the other hand, the WASH sector may not take measure to improve sanitation due to lack of funding, in spite of its responsibility of promoting the latrine use. Therefore, a conflict between two sectors may affect the improvement of sanitation in the countries or regions. Moreover, this initiative focuses upon the removal of bottlenecks and barriers through the provision of necessary facilities or services, such as sanitation facilities, while neglecting to raise public awareness (UNICEF, 2010, p.6). Therefore, the facilities may not be functional in practice. For example, a large number of toilets are applied to store firewood or raise animals (Mara et al, 2010, p.3).

Actually, seven out of 13 costing tools reviewed by Bitran & Asociados and PATH (2008, pp.152-3; p.8) can be used to address MDG4, of which MBB has the most interventions as many as 91. Meanwhile, it can also be worked towards MDG1, MDG5 and MDG6. In other words, it has the greater relevance to the child survival and development, particularly in the surveyed region where more than 20 countries have used it.

2.8 Challenges and Opportunities

2.8.1 Challenges to develop sanitation and hygiene in child survival and development

By the effective interventions both in preventive and curative areas, improvements on child

mortality and other rights have been made rapidly. But meanwhile, a wide range of constraints have arisen.

Lack of national laws to recognize sanitation and water as a basic right for child

National laws and regulations are fundamental to develop the sanitation and water as a basic right for child and human being. In Sub Saharan Africa, only South Africa and Kenya state basic sanitation as a human right in the national laws in spite of over 10 out of 27 countries commitment to water as the human right in the regulations (Rights to Water and Sanitation, 2011). In other words, more than 90% countries in Sub-Saharan African do not have the national laws or regulations to recognise improved sanitation as a human right while over 50% countries without laws or regulations to recognise the human right to water.

Lack of policy and strategies in S&H management

Without the sound guide of policy and strategies, various government departments which may overlap delivery of sanitation, hygiene and water, will not deliver the service effectively and efficiently. Particularly in terms of sanitation and hygiene, the policy is the fundamental factor for good institutional arrangements. It is surveyed by GLAAS (2010, p.38) that 10 out of 26 reporting countries in Sub Saharan Africa do not have a valid sanitation policy both in urban and rural areas.

Lack of clear institutional arrangement in S&H to improve health of child

Institutional arrangement in sanitation and hygiene are not well defined at the national level. It is commonly that two or more sectors may be responsible for sanitation and hygiene, which will make the service delivery unaccountable and less efficient. GLAAS (2010, p.39) found, in Sub Saharan Africa, 10 out of 26 countries have not the clear roles for institutional arrangement in sanitation and hygiene.

Insufficient funding for sanitation and hygiene

Relatively low priority-setting at both country and donor levels appear to result in insufficient funding for sanitation. According to GLAAS(2010, p.14)survey that international aid for

sanitation and water in 2008 consisted 5% of total funding, representing one quarter of largest aid in government and civil society. Meanwhile, central government in Sub Saharan Africa tends to make sanitation a low priority. For example, the sanitation funding from Ghana government only accounts for 0.1% of Gross Domestic Product (GDP) in 2011 national budget in spite of its commitment to 0.5% (IRC, 2011). Furthermore, lack of budget transparency, particularly in sanitation, can cause the majority of funding off budget. According to GLAAS (2010, p.43), only four out of 27 Sub Saharan Africa countries indicated that more than 75% of funds in sanitation is on budget.

Weak capacity building

It is well acknowledged that human resources play a vital role in delivering the service of sanitation and hygiene, including health workers, engineers, managers, marketing professionals and so on. Therefore, relatively weak capacity building in sub-Saharan Africa seems to affect the progress in sanitation and hygiene, attributing to the following areas (GLAAS, 2010, p.48)

- Lack of capable staff at various levels
- Lack of training
- Talents cannot be attracted and retained

Questionnaire undertaken by GLAAS (2010, p.49) discovered that 13 out of 27 countries in Sub Saharan Africa, do not have information whether human resources are addressed at the national level for planning and annual reviews while 3 out of 27 confirm there is no any talents in this field. In other words, less than half countries (11 out of 27) do not have the talents at the national level.

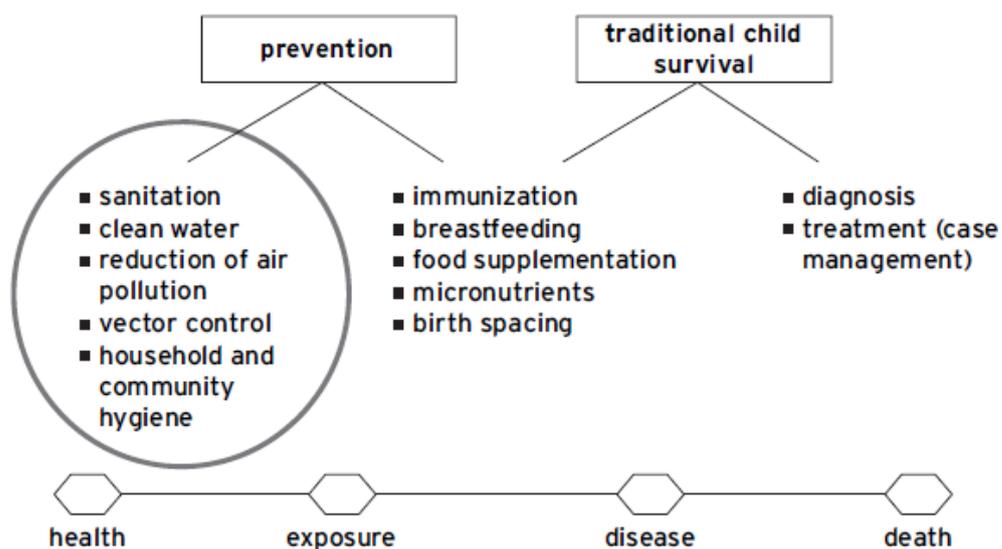
Neglect the interventions of sanitation and hygiene in health sector

Although S&H are supposed to have a big effect on child survival, the interventions on S&H may be easily neglected by the health sector which tends to be responsible for child mortality and morbidity in the majority of developing countries (World Bank, 2008, P.31). From the perspective

of the health sector, the measures on health and nutrition appear to be more critical and have an immediate effect on the cases of diseases, including vaccinations, micronutrient supplementation, promotion of breastfeeding as well as the treatment and diagnosis. By contrast, the improvements on water, sanitation and hygiene promotion may not be adapted as the preventive measures by the health sector. As presented in figure 2.13, these interventions on sanitation and hygiene promotion seem to fall outside of responsibilities of the health sector (World Bank, 2008, P.31).

Interestingly, 3 out of 91 interventions in the MBB can be identified to in relevance to WASH sector, whereas a large number of interventions in the health sector from vaccine to supplementation seemed prevalent as a whole. Furthermore, Santosham et al (2010, p. 63) noted that improved oral rehydration formulation, zinc supplementation and rotavirus vaccines would be recommended as the effective approaches to prevent, manage and treat diarrhoeal disease. Obviously, sanitation and hygiene improvements seem not be considered from the perspective of the health sector.

Figure2.13 Range of preventive activities in child survival and development



Source: Adapted from Favin, Yacoob, and Bendahmane 1999, figure 1-1.

Constraints to health system framework

The current health system framework tends to serve for improving case management of children’s illness, aiming to cure the cases of illness rather than preventing diseases (World

Bank, 2008, P.32). Yet the curative interventions tend to confront the increasing constraints to a large extent as presented below.

- Drugs for parasitic infections during pregnancy may bring adverse impacts for fetus (World Bank, 2008, P.33)
- Increasing drug resistance and misuse of antibiotics for curing children seemed less effective, particularly in the treatment of diarrhoeal disease (Thapar and Sanderson, 2004, p.648)

2.8.2 Opportunities

Admittedly, there are great opportunities ahead of the sanitation sector in child survival and development despite the fact that a large number of countries, especially in sub-Saharan Africa, are seriously off track for the sanitation MDG.

International focus transferring to sanitation

“Sustainable Sanitation: Five-Year Drive to 2015(5YD)” was launched by UN Secretary-General on 21 June 2011, which aims to accelerate sanitation coverage in countries where off-track sanitation MDG. The political will to improve sanitation is expected to build up as well as the promotion actions at all levels (UN, 2011b).

Equity-based interventions

The evidenced-based sanitation and hygiene interventions on child survival and development tend to be developed and employed globally nowadays, in an attempt to narrow the gaps on MDGs targets and end the poverty. However it might not work, particularly in the context of low-income countries with the big deprived population. The equity-focused interventions thus is innovated and studied by UNICEF, then tested in some countries in a recent couple of years, such as Nigeria. Its purpose is to identify and serve for the most vulnerable people, thereby realizing the true equity among society (UNICEF, 2010, p.1).

The leading role of the health sector in sanitation and hygiene

The institutional transformation is suggested for implementation, especially for the health sector which will take a leading role for improving sanitation and hygiene interventions and replace the

leading role of water sector in the responsibility of S&H (Evans, 2005, p. 23; Velleman and Slaymaker, 2011, p.9). In other words, the health sector should be strengthened to a large extent, focusing on preventive measures rather than case management alone. The comprehensive role of the health sector on sanitation would therefore be recommended. Rehfuss, Bruce and Bartram (2009) proposed six health sector functions, whereas Velleman and Slaymaker (2011, p.12) focused on four areas based on peer's suggestion, as presented in table 2.5 below.

Table 2.5 Health sector functions and roles in sanitation

Function	Health sector roles in sanitation
1. Norms and regulations	Policy and legislation provide a clear vision and establish basic principles and objectives to guide sanitary improvements
2. Inter-sectorial policy and coordination	Concerted action across a diverse range of sector to secure progress on sanitation and associated health gains.
3. Delivery of scalable sanitation programmes.	Safe sanitation practices are included within the list of desired health behaviours.
4. Collection and use of data	Build up the strong health-information systems for tracking trends and monitoring the effectiveness of health programmes.

Source: Velleman & Slaymaker, 2011, p.12-14

Strengthen integration of programming and policy

Enhance integration of policy and programming' was recommended by End Water Poverty et al (2010, p6), aiming to scale up water and sanitation for all the people. S&H programmes were thus suggested to integrate within health programme and to be combined with the health indicators in child survival. In this case, S&H can get back into the frame of health intervention, thereby preventing from the S&H-related diseases.

Upgrade surveillance system and data sources

Bartram (2008, p2) pointed out that the surveillance system was not effective enough to provide the support for policy makers or identify the outbreak of waterborne diseases, which should be strengthened by the health sector. In addition, it was revealed by Montgomery (2009, p5) that few

cities in developing countries could provide the reliable health data, for instance, Mexico City was one of them which could have cause-specific information of diseases available. There is no doubt that building up well-organized surveillance system and data sources would become the key step for successful preventing diseases caused by poor sanitation and hygiene promotion (Bartram, 2008, p.2; WHO, 2010b, p.6; Velleman & Slaymaker, 2011, p.14).

2.8.3 Defined questions addressed in the literature review

Through the literature review above, several defined questions designed for the research have been fully addressed as follows:

Research Aim A

- Is there any the present health initiatives that have considered sanitation and hygiene interventions? If so, what are they and what are problems?

Research Aim B

- What are the evidence base for sanitation and hygiene in child survival and development?

While the following questions may have identified the partial answers:

Research Aim C

- What are the indicators for measuring the interventions in sanitation and hygiene for child survival and development?

2.8.4 Potential gaps identified

Although it is well known sanitation and hygiene influence the health of child in part, why does a huge number of people in Sub-Saharan Africa still not have access to adequate sanitation and safe water, together with good hygiene practices? The big picture may have been identified in the literature above and some of the questions have been partially answered, but there still exists various gaps to be necessarily further discussed as follows.

- Despite that opportunities and constrains have been identified in improving sanitation and hygiene for child survival and development, the viability of initiatives and true causes should be further identified in Sub Saharan African countries.
- The suggestions on promoting sanitation and hygiene in child survival and development,

especially for the period of post 2015 should be further studied.

- Although WASH indicators should be incorporated into the health indicator proposed by End Water Poverty et al (2010), how to integrate and implement seems have no specific answer.

Based on gaps identified, the study conducted in the following sections would intend to fill the gaps and attempt to identify the appropriate ways to scale up the impact of sanitation and hygiene in child survival and development in Sub Saharan Africa.

Chapter 3 Methodology of Research

The qualitative methodology attempted to be employed and tested the hypothesis in the research. If the null hypothesis can be verified to be at fault, the primary hypothesis would be valid (Hart, 2005, p. 90). Semi-structured questionnaire, key informative interview were applied as the main approaches to collect data. Meanwhile, following the literature review two countries was focused on to develop case studies. To better build up a linkage between research aim and methodology, the framework has been designed as shown in Annex A.

3.1 Data collection

3.1.1 Semi-structured questionnaire

A questionnaire was designed on the principle of child survival and development as such child rights, the equity thus was considered as one of key elements. Additionally, effectiveness, efficiency and sustainability should also be taken into account. Exactly, equity may involve sanitation facilities coverage, washing hand rate and so on, especially comparison between the poor areas and rich areas (LACHSR, 1998, p.4).

In terms of semi-structured questionnaire, it allowed interviewees to develop their own ideas and thoughts, more exploratory and unexpected message could thus be obtained (Denscombe, 2010).

- Potential questionnaire respondents

The survey intended to acquire broader and larger responds from various sectors, the following potential respondents thus may include at least,

- Policy makers
- Practitioners
- Donors
- Academics and Researchers
- Consultants
- Social scientists

- Identify potential respondents

As a high reputation conference, the WEDC International Conference is a global platform for professionals *‘who lead water and sanitation innovations in developing countries’*, the participants therefore include policy makers, researchers, practitioners, and so on (WEDC, 2011). The 35th WEDC International Conference held at Loughborough University in 2011, was a great opportunity for the researcher to identify and contact with professionals in the sector. Through the initial communication with certain participants, the surveys may then be distributed to person who is interested to respond.

- Type of questionnaire area

Structured questions aim at basic information, such as critical background of respondents and whereas open questions tend to explore the new initiative and idea.

- Internet questionnaires

Internet questionnaires were used in the research for data collection. Specifically, a questionnaire was sent as an attachment to the potential professionals with an interest in the subject being surveyed.

- Designed sample size

The approximate 20 respondents were intended to obtain from the surveyors. In consideration of relatively low responding rate by internet survey, estimated approximate 20-30%. Therefore, an amount of 70 emails was sent by the researcher’s university email.

3.1.2 Key informative interview

Unstructured and semi-structured key informants interview were employed in the study to conduct the majority of interview, as they can give interviewees more opportunities to develop their views than structured interview. Through integrating two different interviews, the research topic can thus be discussed more widely than that of provided by the researchers (Denscombe, 2010, p.175).

WEDC International Conference is a good platform for communication and exchange of professionals particularly in water and sanitation sector across the world. The majority of interviewees can thus be achievable from the conference's attendants. The targeted sample size attempted to range between 10 and 15 interviewees, approximately representing one fifteenth of participates. Since the attendants of WEDC conference are very experienced in the sector, an unstructured interview may have a wide range of advantages as follows.

- Unanticipated important data obtained
- A huge amount of valid data collected
- Open and free answers

The potential interviewees were targeted as the main stakeholders such as donors (for example, UNICEF, it also is associated with child closely), NGOs (WaterAid), and various other organizations both in WASH sector and health sector. The targeted interviewees included,

- Policy makers
- Practitioners
- Donors
- Academics and Researchers
- Consultants

As participants in WEDC Conference were mainly from WASH sector, the potential interviewees from health sector also were identified through networking, introduction by the supervisor or conference's attendants. Through the interview both WASH and health sector, the comprehensive picture may be drawn thereby producing less bias in the research.

Open-ended questions were the main formats of questions, since they can fully make advantage of the experience of interviewees in a relatively limited duration of interviewing.

3.1.3 Case study

Case study employed in the research attempts to explore how a theory of hypothesis (H1)

performed in the context of real-life and can be studies in depth rather than in broad (Denscombe, 2010, p.55). As Yin (2009, p.8, p.13) noted, the application of case study can answer how and why questions and focus on contemporary events but with no or little needs of behavior control by the investigator.

The multiple-case study was intended to design in the research rather than single-case study. As Herriott & Firestone (1983, cited by Yin, 2009, p.53) pointed out that multiple cases would give much more convincing evidence and a broader perspective of theory. In other words, organizational theories reflected the attempt of the research, as it tried to find the better structure and functions of the health sector. The research thus attempted to explore the issues on organizational theories, including excellence in organizational performance, organizational structure and functions and so on (Yin, 2009, p.37). Furthermore, a single-case study may represent the special case which may not be applied in other contexts (Yin, 2009, p.37). However, the study attempted to identify an appropriate model, thereby scaling up as much as possible. Thus, a single-case study was not used in the research.

Identity the countries for case study

The potential countries of case study were identified by the criteria below.

- Child mortality, specifically death rate due to diarrhoea
- Access to improved sanitation, including open defecation
- Existing policy or framework for WASH

On the basis of above principles, Table 3.1 presented the latest key data for five sub-Saharan Africa countries. Of which the framework for WASH in these five countries can be found in Annex C. Through the framework, the health sectors in Ethiopia and Tanzania involve in WASH interventions greater particularly sanitation and hygiene, while other two countries (exclusive Kenya where the new transformation in 2008) follow WASH sector takes a leading role in sanitation and hygiene interventions. Moreover, diarrhoea is the first killer for under-five children in Ethiopia. Therefore a two-case study was employed in this research to further study, including

United Republic of Tanzania and Ethiopia.

Table3. 1 Comparison in potential countries for case study

Countries	Child under-fives mortality			Access to sanitation	
	Mortality rate live/1000 birth (2009)	Diarrhoeal deaths/year (2004) %/total (2008)	Ranking globally by diarrhoeal death	Unimproved sanitation million person (%total population) (2008)	Open defecation million person (2008)
Nigeria	138	151,700 15%	2	105 (68%)	33 (22%)
Ethiopia	104	73,700 27%	5	71 (88%)	49 (60%)
Kenya	84	27,400 20%	10	26 (69%)	6 (15%)
Zambia	141	- 15%	-	7 (51%)	2.3 (18%)
United Republic of Tanzania	108	23,900 17%	13	33 (76%)	5.5 (13%)

Source: WHO, 2011e; WHO&UNICEF, 2010b update

Validity of case study

To ensure the validity of the case study, the investigator used as many sources as possible to collect evidence of case study, including documentation, archival records and questionnaires (Yin, 2009, p.102). Obviously, the various sources can assure the validity of case study.

3.1.4 Documents

Documents would be a value for research if some written sources were identified, including government publications, official statistics, memos, website pages and so on (Denscombe, 2010, p.216). Hence, some proven data was used in the research.

3.1.5 Observation

Side event observation was employed as a compliment to the mainstream methodologies mentioned above. The researcher may collect the actual qualitative data and gain information hidden from view (Denscombe, 2010, p.206) as a participant observer. The method was not intended initially but happens by chance when the researcher participates in the 35th WEDC

International Conference.

3.2 Data analysis

Three key principles were followed in the research to analyse qualitative data, including iterative, inductive and research-centred (Denscombe, 2010, p.272). Although there was no software package used in the study to analysis data, it did not affect the quality of data analysis in the research.

The storage and access to data

The majority of data interviewed has been recorded in the recorder and then saved in the computer. Most importantly, the original recording was kept as backup and cannot be deleted. Similarly, the response from the questionnaire was kept both in the inbox of email and the laptop of researcher. It needs to be noted that no one can be access to original data except the researcher, for the sake of data security and secret.

Coding and presenting data

Coding data was undertaken by the researcher after conducting interview and questionnaire. As Denscombe (2010, p.284) suggested, the basic steps for coding may include unitizing and determining the contents of coding, such as event, opinion, action or certain expression. Moreover, in terms of presenting qualitative data, it may not be straightforward as much as the quantitative data. However, the good practice was employed to help present data in the research. For example, detail and rigour should be focused on in the analysis of data while depicting the process. The use of diagrams was also another good practice which will be also used in the research (Denscombe, 2010, p.295; p.297).

3.3 Ethical considerations for interview data

The following key issues were considered when collecting interview data, in order not to affect the basic principles of ethical research.

Do not harm respondents

Keeping respondents harmless is the key principle for the social research. The majority of the interview was conducted in face-to-face during the 35th WEDC International Conference while

others were undertaken via Skype. Respect for interviewees should thus be shown in the whole process of interviewing. In addition, the interests of participants should not be impaired after taking part in the research (ESRC, 2010, p23).

Participate in interview voluntarily

Obtaining consent is the first step to conduct a successful interview, therefore interviewees should be involved in the interview on the basis of voluntary contribution. The data collected then could reflect on the reality of the situation. Moreover, the information was informed to the respondents in advance including aim, usefulness, expected benefits, methods, risks, etc.

Withdraw freely at any time

Since interviewees can become involved in the researches voluntarily, they should be allowed to withdraw at any time. This way, the research was carried out with valid voluntary data.

Fortunately, all the interviewees were content to give an interview without case of withdraw.

Check responses freely

Responses should be allowed to be checked by respondents where necessary. Essentially, this issue is associated with the two points mentioned above, as they are on the basis of voluntary participation.

Identify competent participants

Competent participants should be identified before conducting. The valid and high quality data could then be collected through the interviews. Conversely, it would waste time and money for both interviewers and interviewees if inappropriate participants were involved. On the basis of this key principle, all the participants were identified in advance and gave comments to the questions.

3.4 Bias

Bias can be avoided through the good research design, sampling and questions arrangement.

To be more specific, data collection including questionnaire and interview attempted to identify

surveyors on behalf of various organizations or agencies. In this case, the broader data was collected thereby avoiding bias in part. In addition, the researcher is not from sub-Saharan Africa countries, which can also ensure the relatively objective perspective to develop the investigation.

3.5 Limits of methodology

The limits of methodology employed in the research mainly reflect on the following fields, including the risks of data collection and field survey.

The risk of data collection

The risk of data collection may mainly stem from the response of surveyed interviewees and questionnaire. As the qualitative methodology was applied in this research, the opinions of surveyors were the key determinants for the quality of data. The broader surveyors therefore were needed for the research. Meanwhile, the low response of internet questionnaire may be one of the major risks, as it may result in the relatively small surveyors and be difficult to generate available findings at scale.

Moreover, the research topic is the multi-discipline subject which requires surveyors from the diversity occupations, including engineers, policy maker, researcher, social scientist, practitioner and so on. Professionals both in WASH sector and health sector particularly in public health sector are needed to survey. In other words, the topic of research project may belong to the scope of public health to some extent, which may increase the complex to identify the appropriate surveyors not only in questionnaire survey but also in interview.

The risks of no implementation of namely field survey

A field survey was not conducted as part of the research as it was not possible to fly to any Sub-Saharan Africa countries to collect data. Some data especially at the community level may thus be neglected. However, the professionals who are now working or ever worked in the national, sub-national or community level gathered at Loughborough University by the platform of the 35th WEDC International Conference. In other words, the research can undertake the actual field-based research through interviewing conference attendants who had the direct voice

from the countries in the region.

Furthermore, the aims of research attempted to draw attention to the policy and strategy, institutional arrangement, as well as funding and capacity building etc., these kinds of factors related to enabling environment, which in part required more surveyors at relatively high level were interviewed in comparison with more individuals at the community level. However, the interview has sought some professionals who also have the rich experience at community level.

Chapter 4 Case study presenting

Two cases of United Republic of Tanzania and Ethiopia will be presented in this section. The study was based on documentary evidence.

4.1 United Republic of Tanzania

United Republic of Tanzania locates in Eastern Africa. Table 4.1 presents population, some economic and health statistics particularly associated with children under the year of five. It can be shown from the table, population rise by 73% between 1990 and 2008. Diarrhoeal disease contributed to 13% of total under-five child death, just below the death rate of malaria and pneumonia (both 16%).

Table 4.1 Population and health statistics in Tanzania

Population (2008)	42.5 million
Population (2004)	38.3 million
Population (1990)	24.5 million
Urbanization %	24%
Population below the poverty line(international, <\$1/day) (2000-01)	58%
Diarrheal Deaths/year (2004)	32665
DALYs for Diarrheal Deaths (2004)	29 DALYs/1000 cap/year
Under age 5 mortality rate (2009)	108/1000 live births
Under age 5 mortality rate due to diarrheal disease (2008)	13%
Under age 5 mortality rate due to malaria and pneumonia (2008)	16%, 16%

Source: WHO, 2011e; WHO, 2009a

4.1.1 MDG performance

Figure 4.1 illustrates the most recent performance of under-five child mortality MDG in the country. According to the figure, this MDG target cannot be achieved with the current trend. In terms of sanitation MDG in Tanzania, the relatively poor performance can be identified according to figure 4.2. The overall improved sanitation coverage rate is stable at the rate of 24% from 1990 to 2008 despite the dramatic increasing population, of which the rate of urban with 32% and rural area with 21% in 2008 (See figure 4.3). In other words, improved sanitation coverage is far behind the MDG target in 2015 (62%). Meanwhile, 13% of population still practices open

defecation. However, 4.1 million more people have accessed to improved sanitation facilities between 1990 and 2008 although there appears to be no progress in the coverage rate (WHO&UNICEF, 2010update).

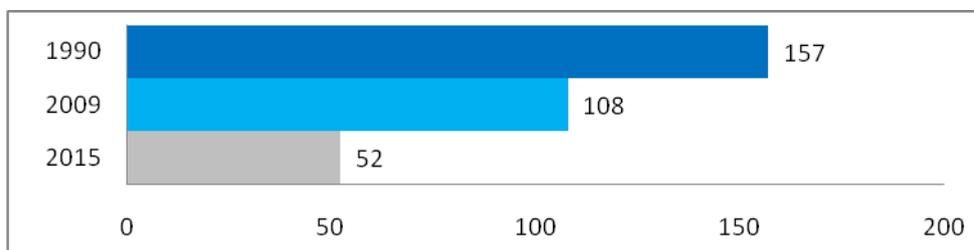


Figure4.1 Under-five mortality rate per 1,000 live births in Tanzania

Source: WHO, 2011e

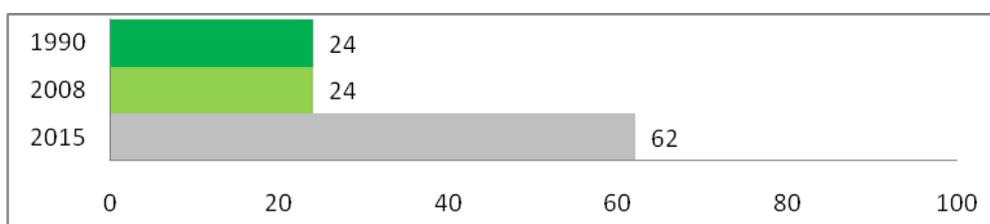


Figure4.2 Sanitation MDG target Performance in Tanzania (Coverage%)

Source: WHO/UNICEF, JMP, 2008.

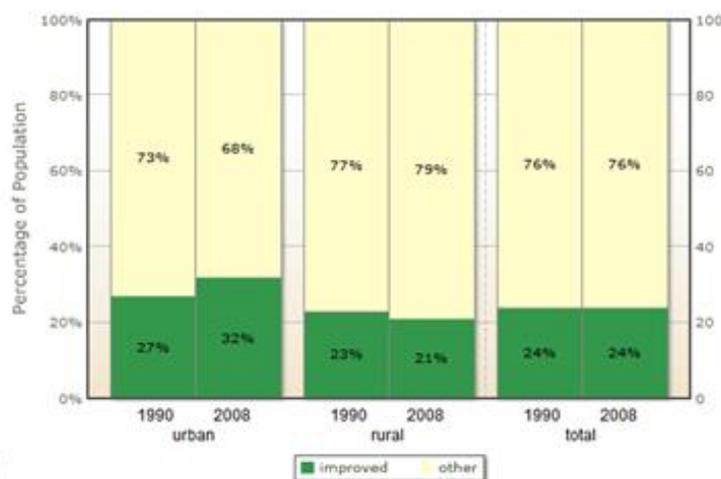


Figure4.3 Use of sanitation in Tanzania

Source: WHO/UNICEF JMP, 2008

4.1.2 Policy and strategy for developing sanitation and hygiene interventions

In light of the survey conducted by CSO and GLAAS between 2009 and 2010, there is no a sanitation policy agreed on by stakeholders and approved by cabinet (GLASS, 2010, p. 38). In others words, sanitation policy approved by cabinet at the national level, in consideration to child survival and development, may not exist.

However, a positive attempt has been undertaken. National Strategy for Growth and Reduction of Poverty: MKUKUTA II is issued by Ministry of Finance and Economic affairs in July 2010, of which the overall guidance has been provided, including goals on child mortality and sanitation and functional framework. For example, to achieve one of targets in goal 3 Addressing infant and child health and nutrition, some interventions in relevance to water, sanitation and hygiene will be implemented as follows (MKUKUTA Secretariat, 2010, p.73-4):

- IV/XI. Scaling up implementation of public health and primary preventive strategies such as use of safe and clean water.
- V/XI. Promoting personal hygiene and sanitary measures, implementation of environmental health programs.

4.1.3 Institutional arrangement for developing sanitation and hygiene interventions

The sector framework in water and sanitation in Tanzania involves four ministries, including Ministry of Water (MOW), Ministry of Health and Social Welfare (MOHSW), Office of Regional Administration and Local Government (PMO-RALG), Ministry of Education & Vocational training (MOEVT). Table 4.2 presents the specific responsibility for each ministry and other key agencies at the sub-national level.

Table 4.2 Key agencies involving in WASH in Tanzania

Agency	Responsibility description
Ministry of Water (MOW)	- National policies and strategy development
Ministry of Health and Social Welfare(MOHSW)	- Some sanitation policy development
Office of Regional Administration and Local Government (PMO-RALG)	- Organized under the Prime Minister's Office - Develops formula-based district resource allocation for rural and small town government allocation
Ministry of Education & Vocational training (MOEVT)	- WASH in schools
Urban Water Supply and Sewerage Authorities (UWSAs)	- Urban WSS service provider
Regional Water and Sanitation Team	- Oversees and coordinates WSS initiatives - Planning and allocation of resources
Communities/WATSAN Committees	- WSS service provision and hygiene promotion - Implementation of small capital projects

Source: USAID, 2008e.

Specifically, MOW has the overall responsibility of overseeing water-related functions at a national level whilst MOHSW has the mandate for limited sanitation policy formulation as well as at the national level (USAID, 2008e, p.1). Environmental Health and Sanitation Section, belonging to Preventive Health Services Division in Ministry of Health and Social Welfare, will implement the specific activities in relation to sanitation and hygiene promotion including (MOSHW, 2011)

- *‘Formulate sanitation policy guidelines’*
- *‘Monitor and evaluate effectiveness of sanitation interventions instituted in the country’*

In terms of implementation, Urban Water Supply and Sewerage Authorities (UWSAs) provide the water supply and sanitation service in urban area within the management of MOW’s Division. In contrast, the context appears complicated in the rural area (representing 75% of total area). Community-led committees are the direct service provider to users, with the support and management of Office of Regional Administration and Local Government (PMO-RALG) and MOW through Regional Water and sanitation Team. In other words, both PMO-RALG and MOW involve in implementing sanitation and hygiene promotion in rural area (USAID, 2008e, pp.2-3). In addition, school WASH is cooperated to implement by MOEVT and MOHSW. Figure 4.4 presents the specific responsibilities and activities for main actors.

KEY ACTORS AND THEIR ROLE	RESPONSIBILITIES							ACTIVITIES			
	Coordination	Policy making	Planning	Monitoring and Reporting	Regulation and control	Research and Development	Funding	Sanitation	Hygiene Promotion	Community Building & Training	Private Sector Development
Government Agencies (National & Local)											
MoHSW	√	√	√	√	√	√	√	√	√	√	W
MoWI			√	√	√	√	√	√	√	√	W
PMO-RALG			√	√	√	√	√	√	√	√	W
MoEVT			√	√	√	√	√	√	√	√	W
MNRT				√	√						W
LGAs	√		√	√	√	W	√	√	√	√	W
TASAF				√			√				W
LGCDG				√			√				W
UEDG				√			√				W
PSRP				√		√		W		√	W

Figure 4.4 Key sanitation and hygiene actors and their roles in Tanzania

Source: WSSCC, 2009a, p.15

In order to better facilitate cooperation among various ministries, a Memorandum of Understanding (MOU) among four parties including PMO-RALG, MOHSW, MOW and MOEVT was thus signed in 2009, thereby ensuring to achieve MKUKUTA goals and sanitation MDGs. What is important is that the responsibilities of ministries were highlighted while leading role would be played by MOHSW. It states, “Ministry of Health and Social Welfare should provide overall leadership on sanitation and hygiene by chairing, convening and coordinating the National Sanitation & Hygiene Steering Committee” (MOU¹, 2009, p.5). National Sanitation & Hygiene Steering Committee (NSHSC), along with the technical committee and two working groups is built up and implements the role of sanitation and hygiene promotion in practice (See figure 4.5).

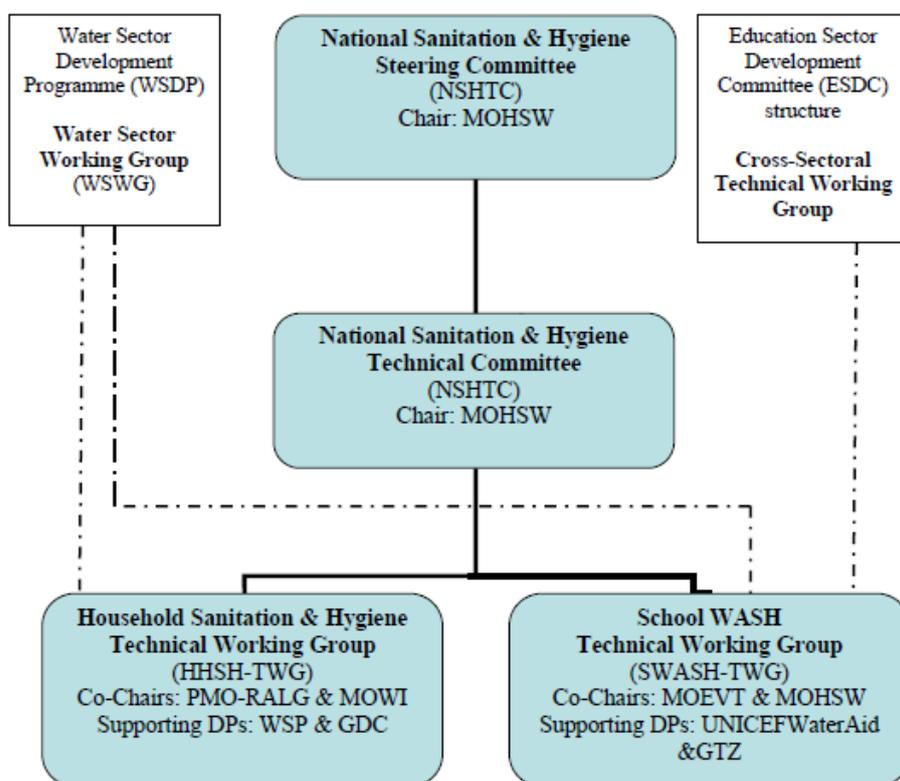


Figure 4.5 Organizational framework for sanitation and hygiene in Tanzania

Source: MOU, 2009.

Moreover, MOHSW take a positive action to improve sanitation and hygiene policy and implementation. According to Concept Note²: Tanzania Water Sector development Program

¹ The agreement among PMO-RALG, MOHSW, MOWI, MOEVT, for the integrated implementation of sanitation and hygiene activities in the mainland of the United Republic of Tanzania, 2009.

² Concept Note²: Tanzania Water Sector development Program: Rural Sanitation and Hygiene Program, n. d.

Rural Sanitation and Hygiene Program (n. d., p.1), the specific targets and indicators between 2011 and 2015, along with institutional arrangements have been defined. The implementation of a rural sanitation and hygiene program is focused on, thereby improving household sanitation facilities, school and household hand washing facilities. As written by Cardosi³, *MOHSW is finalizing and specific sanitation and hygiene policy that is expected to be issued later this year. Updates will be posted on their website (<http://www.moh.go.tz>). In addition the ministry is taking on more implementation, coordination for sanitation through a planned national campaign*".

4.2 Ethiopia

Ethiopia is also located in Eastern Africa. Table 4.3 presents population, main economic and health statistics relevant to children under the year of five. It can be shown from the table, population rise by 69% between 1990 and 2008. Diarrhoeal disease represented the highest death rate with 27% in 2008, followed by pneumonia with 17%.

Table 4.3 Population and health statistics in Ethiopia

Population (2008)	81 million
Population (2004)	77.4 million
Population (1990)	48 million
Urbanization %	16%
Population below the poverty line(international, <\$1/day) (2000-01)	23%
Diarrheal Deaths/year (2004)	112,100
DALYs of Diarrheal Deaths (2004)	49 DALYs/1000 cap/year
Under age 5 mortality rate (2009)	104/1000 live births
Under age 5 mortality rate due to diarrheal disease(2008)	27%
Under age 5 mortality rate due to pneumonia (2008)	17%
Under age 5 mortality rate due to malaria and AIDs	2%, 2%

Source: WHO 2011e; WHO&UNICEF, 2010update; WHO, 2009b

4.2.1 MDG performances

The latest performance of under-five child mortality MDG is shown in figure 4.6, MDG target cannot be achieved in 2015 with the current trend. By contrast, the sanitation MDG appears to fall well behind the 2015 target. Specifically, the overall improved sanitation coverage rate

³ Jason Cardosi via Eduardo A. Perez to Lin Feng, 5 July 2011.(Water and Sanitation Program – Africa, WSP)

increase slightly from 4% to 12% between 1990 and 2008(See figure 4.7). Of which the rate of urban areas rise from 21% to 29%, rural areas increase with 1% to 8% within the same period (See figure 4.8). In other words, improved sanitation coverage is far behind the MDG target. Unfortunately, 60% of population still practice open defecation, ranking the fifth place in Africa. However, 7.8 million more people were able to access to improved sanitation facilities between 1990 and 2008.

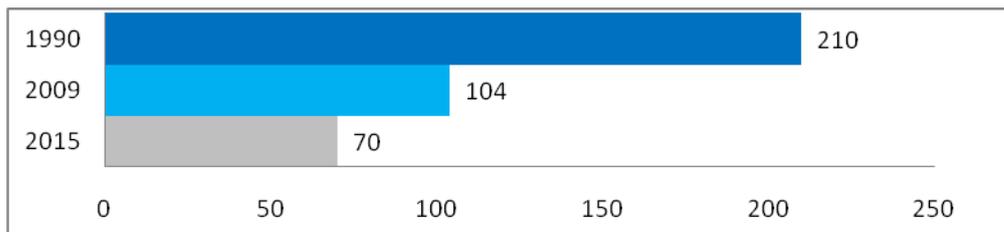


Figure4.6 Under-five mortality rate per 1,000 live births in Ethiopia

Source: WHO, 2011e

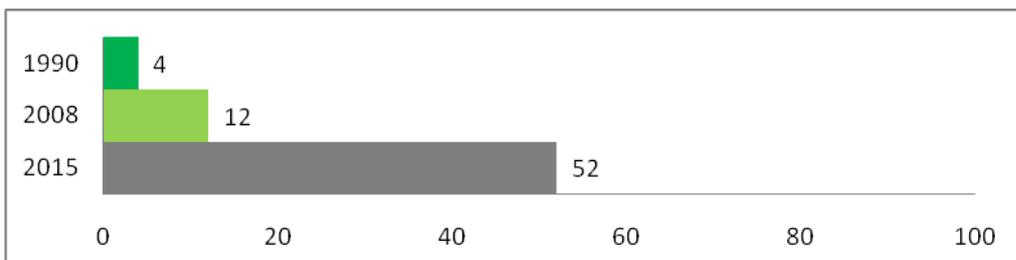


Figure4.7 Sanitation MDG target Performance in Ethiopia (Coverage%)

Source: WHO/UNICEF, JMP, 2008

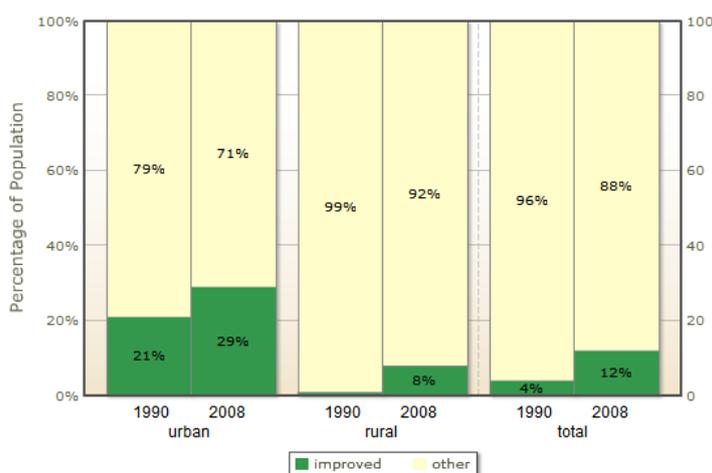


Figure4.8 Use of sanitation in Ethiopia

Source: WHO/UNICEF JMP, 2008

4.2.2 Policy and strategy for developing sanitation and hygiene interventions

No separate sanitation policy exists in Ethiopia, but the National Hygiene and Sanitation Strategy (NH&SS) was published by Ministry of Health in 2005, which can be adapted to

improved sanitation and hygiene practice particularly in the context of rural areas. Then, in 2006 a National Hygiene and "On-Site" Sanitation Protocol was drafted with emphasis on universal access both in the context of rural and peri-urban areas (WSSCC, 2009b, p.12).

4.2.3 Institutional arrangement for developing sanitation and hygiene interventions

The clear institutional responsibilities are arranged in improving sanitation and hygiene.

The Ministry of Health takes a leading responsibility for formulating policies related to sanitation and hygiene promotion while regional health bureau implements the strategy at sub-national level, along with regional WASH Office and Environmental Protection Authority. In addition, the Ministry of Education is charge of WASH in schools. The specific roles can be found in figure 4.9 below.

KEY ACTORS AND THEIR ROLES	RESPONSIBILITIES							AREA					
	Coordination	Policy Making	Planning	Monitoring and Reporting	Regulation and Control	Research and Development	Funding	Implementation	Sanitation	Hygiene Promotion	Community Development	Capacity Building & Training	Private Sector Development
<i>Government Agencies (National & Local)</i>													
Ministry of Health		✓	✓	✓	✓	✓	✓		✓	✓		✓	
Ministry of Water Resources		✓	✓			✓						✓	✓
Ministry of Education			✓			✓			✓	✓			
Ministry of Works and Urban Development		✓	✓			✓							
Ministry of Finance and Economic Development				✓			✓						
Environmental Protection Authority		✓			✓				✓	✓			
Regional Health Bureaus (9)	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	
Regional Water Bureaus (9)			✓									✓	✓
Regional Education Bureaus (9)			✓						✓	✓			
Local Urban Government Authorities (WASH offices)			✓					✓					
Woreda (District) Administration (WASH offices)			✓					✓	✓	✓		✓	✓

Figure 4.9 Key sanitation and hygiene actors and their roles in Ethiopia

Source: WSSCC, 2009b, p.12

4.2.4 Health Extension Programme

The Health Extension Programme (HEP) was developed in 2004 by the health sector (Mara et al, 2010), as the main driving for sanitation and hygiene promotion, delivering a package of basic and essential preventive and curative health services targeting households. Seven out of

16 components in the health extension cover hygiene and environmental sanitation, including excreta disposal, solid and liquid waste disposal, water quality control, food hygiene, proper housing, vector control, personal hygiene, health education and promotion. Meanwhile, 30,000 women will be trained as health extension workers within five years (WSSCC, 2009b, p.13).

4.2.5 Monitoring and indicators

The Ethiopia WASH Movement was launched in 2004, aiming to reduce mortality and morbidity caused by poor sanitation and hygiene practices, along with unsafe water (WSSCC, 2008, p.3). Baseline surveys were undertaken before the launch of project with monitoring and assessing as a major component. The indicators are:

- handwashing
- sanitation
- water quality

And then in 2007, the second baseline surveys were conducted with the indicator of water quality, as the “Keep Water Safe” campaign was carried out in 2008 (WSSCC, 2008, p.3). All the assessments will be carried out at the end of project in comparison with the data of baseline survey, thereby evaluating the progress. In addition, indicators will be tracing the update progress on regular WASH stakeholder meeting, activity report or yearly report.

Chapter 5 Findings from data collection

This chapter will demonstrate the data collected by the various methods of investigation introduced in chapter 3. The semi-structured questionnaire and key informative interview will be presented accordingly, and then the results from two case studies will be introduced.

Observations will be finally revealed at the end of the section.

Data were collected between 5th and 31th July, 2011. The various types of qualitative data have been thus successfully obtained, including answers to questionnaire, interview talk, reports and notes from the conference, as shown in Table 5.1.

Table 5.1 Types of qualitative data

Source of data	Research method	Format of data
Answers to semi-structured questions	Questionnaires	Text
Interview talk	Key informative interview	Recorded speech
Official statistics, memo, reports	Documents/case study	Printed text
Participating in the side event in the 35 th WEDC International Conference	Observation	Notes

5.1 Findings from questionnaire

Semi-structured questionnaire was undertaken between 21st and 31st July. 24 out of 72 respondents filled in the questionnaire with 33 percent of responding rate. Questionnaire sample can be found in Annex D. Potential surveyors are identified mainly from the authors whose papers are issued in the 34th and 35th WEDC International Conference and papers are relevant to sanitation and hygiene in Sub Saharan Africa. The minority of targeted surveyors are some professionals from health sector whose information are captured by country water and sanitation profile on the website of USAID (<http://www.usaid.gov/index.html>). As a result, 79 questionnaires were distributed via the researcher's university email unfortunately 7 out of 79 failed to deliver. Meanwhile, the primary surveyors kindly forwarded the questionnaire to 15 secondary surveyors. In total, 87 surveys were successfully distributed, including 72 valid questionnaires directly and 15 indirectly. Finally, 24 of 87 complete questionnaires and the response rate reaches 28 %. Without consideration of forwarding, the rate of responding should be 33% (See table 5.2).

Table 5.2 Questionnaire survey information

Source of surveyors	Sent questionnaires	Responding questionnaires	Delivery failure	Forwarded
35 th WEDC Conference papers' authors	49	13	4	15
34 th WEDC Conference papers' authors	22	2	1	0
Other	8	0	2	0
Subtotal	79(72 valid)	17	7	15
Response rate	24%			
Forwarded by primary surveyors	15	7	0	0
Total	87	24	7	15
Response rate 1	28%	-	-	-
Final Response rate	33%	-	-	-

Furthermore, 23 out of 24 survey respondents come from eight countries in Sub-Saharan Africa where they have most knowledge and are basing their responses(see figure 5.1), while one respondent with experience of 24 countries in West and Central Africa.

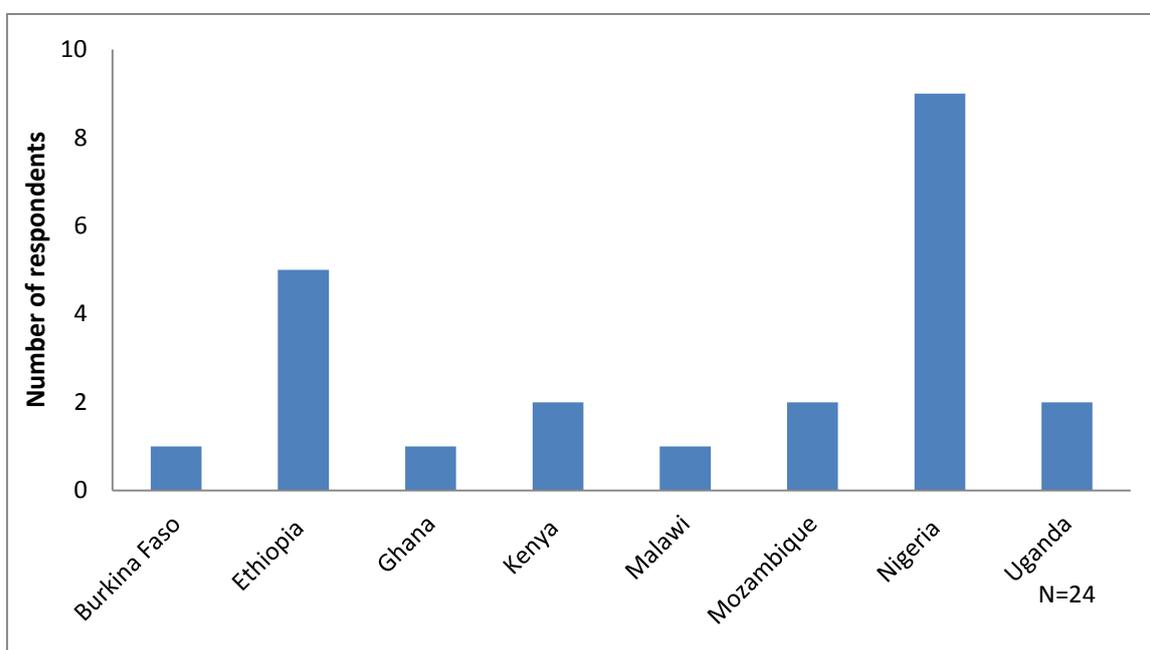


Figure 5.1 Questionnaire respondents by country

Meanwhile, the respondents work for a wide range of organizations, covering government, NGO and international NGO (such as UNICEF, EWB), university, multi-lateral and so on. The role of job varies from policy/decision maker, academics/researcher, practitioner, consultant to

engineer and social scientist, such as WASH programme Manager, Public Health Consultant and so on. Some of them play two or three roles while only one role will be recorded in the study. Figure 5.2 represents the questionnaires respondents by type. In spite of a small number of samples, survey respondents could represent a diversity of professionals from Sub Saharan Africa.

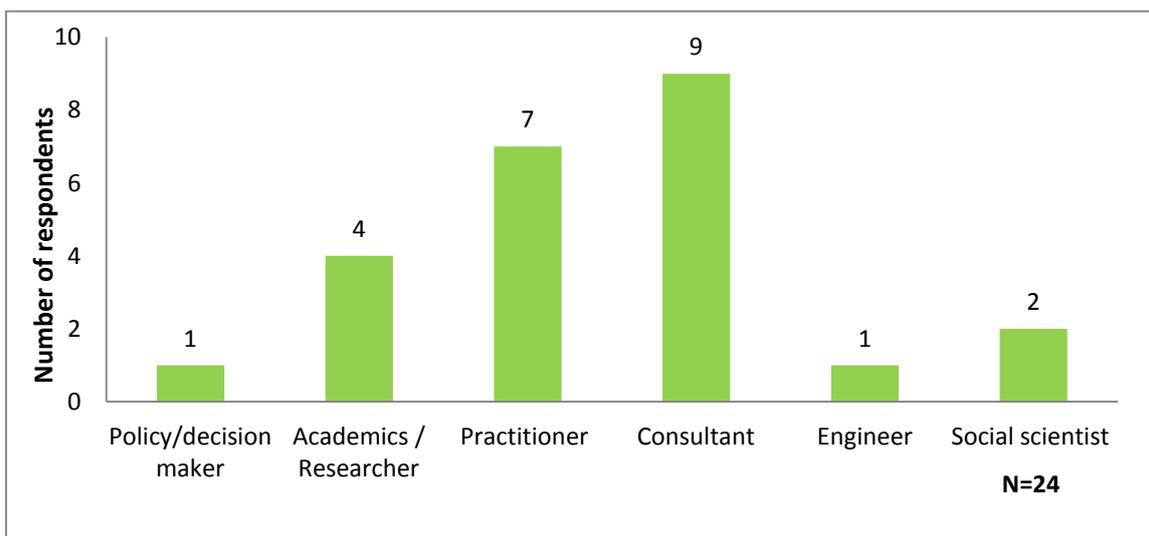


Figure 5.2 Questionnaire respondents by type

5.1.1 Identify key factors to successful sanitation and hygiene intervention in child survival and development

A large number of factors to successful sanitation and hygiene in child survival and development, including significant enabling environment and important people will be identified through the questionnaire survey. In addition, the greatest bottlenecks to hinder progress on scaling up impact of sanitation and hygiene interventions in child survival and development will also be provided by surveyors from various countries.

Significant enabling environment

A variety of enabling environment factors may contribute to successful sanitation and hygiene in child survival and development. An enabling national policy and funding are pointed as the top two important factors as shown in figure 4.3, with the support by 70% and 78% of respondents respectively. Of which nearly 50 percent of respondents take the national policy as the first priority. It is followed by institutional arrangement at national and sub-national levels. If looking at institutional arrangement as a whole, this factor will rank the top position supported by 83% of

respondents. In addition, poverty and low level of education and lack of adequate and safe water are raised by respondents as the other key factors in their countries while political will in the region. Interestingly, one of the options was provision of engineers and was not be ranked by any respondents. It thus does not be illustrated in figure 5.3.

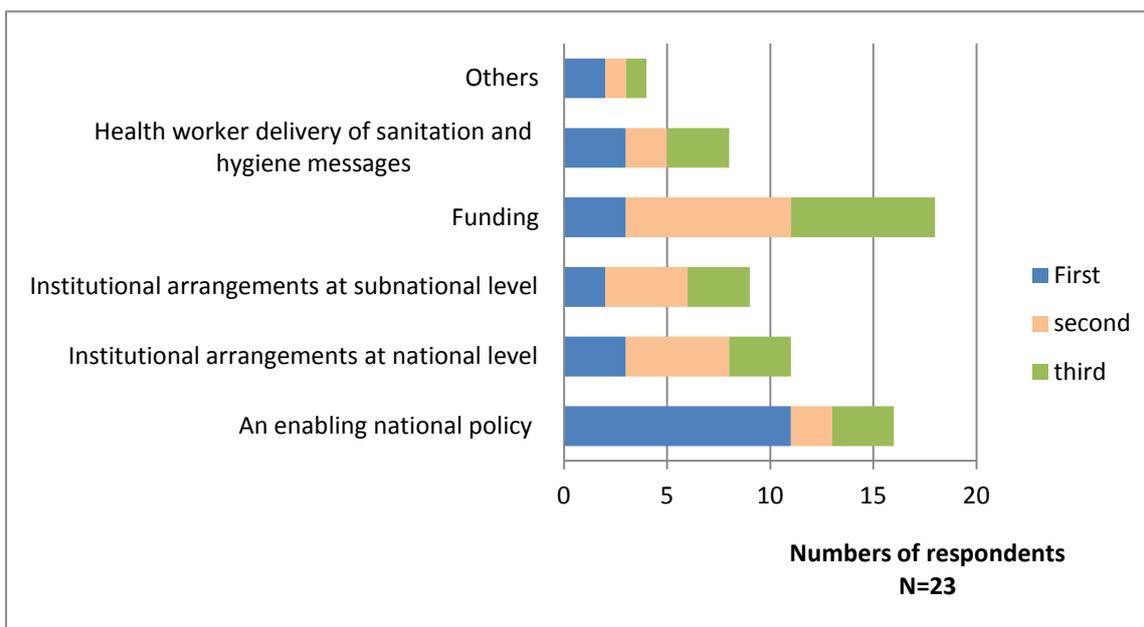


Figure 5.3 Significant sanitation and hygiene factors to impacting child survival and development

Important people

Policy makers at national level are noted by nearly 80 percent of the respondents as the most important people to influence sanitation and hygiene as essential interventions for child survival and development (see figure 5.4). Implementers and sub-national level government officers rank the following important positions by the majority of surveyors (both over 55 percent). In others words, officers at national and sub-national levels play a pivotal role in sanitation and hygiene interventions in child survival and development. As the respondent points out, “Need governments to take action at top level which impacts outputs and outcomes at lower tiers of government.” Moreover, in terms of the role of implementers, “an expert can make a change and this has been proofed in some districts in some regions”, noted by a surveyor in Ethiopia.

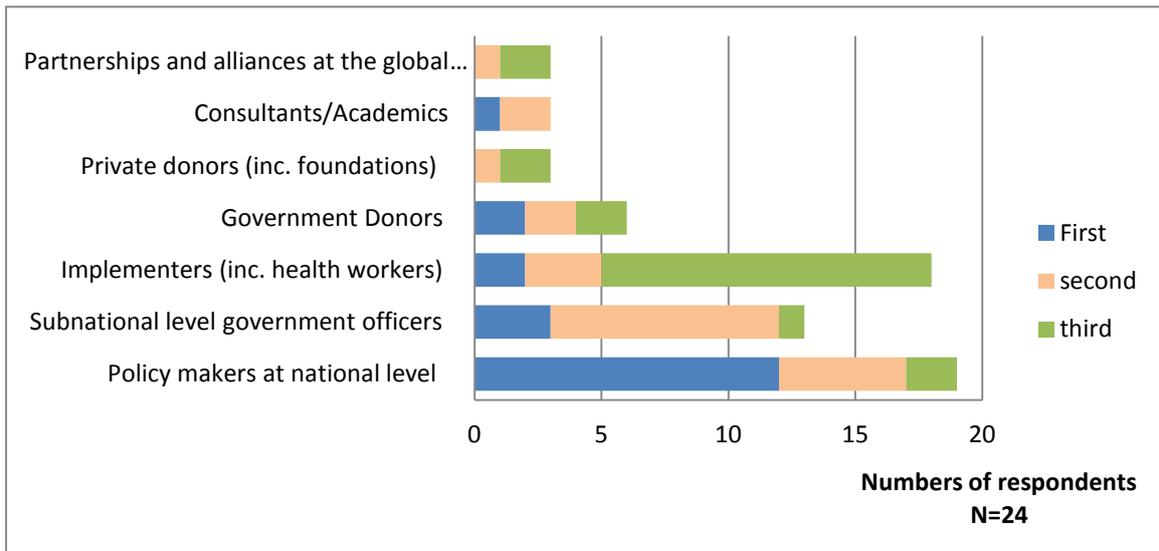


Figure 5.4 Important people to influence sanitation and hygiene interventions for child survival and development

Bottlenecks by country

Respondents also identify the greatest bottlenecks to hinder progress on scaling up impact of sanitation and hygiene interventions in child survival and development. As for Ethiopia part, it will be illustrated in section 5.3.3, the finds for case study of Ethiopia. In light of the results below, the critical bottlenecks link to politics, policy and strategy, as well as the corresponding implementation.

- ✓ West and Central Africa-- politics
- *“Lack of political Will”*
- ✓ Kenya --- policy and politics
- *“Low priority given to sanitation at all policy levels (local – national)”*
- *“Political willingness”*
- ✓ Malawi—Institutional arrangement
- *“Institutional set-up and health care system that does not promote ongoing support and access to sanitation and hygiene services”*
- ✓ Mozambique --- strategy and education
- *“Lack of clarity on strategy, water projects implemented as stand-alone without sanitation”*
- *“The education level and cultural barriers of their parents”*

- ✓ Ghana --- implementation
 - *“Weak enforcement of sanitation laws by government”*
- ✓ Nigeria --- politics, funding, implement capacity and monitoring
 - *“low political will”;*
 - *“Lack of political commitment which leads to poor budgetary allocations at sub-national level and hence low coverage of implementers (health workers) at village level.”*
 - *“Lack of political wiliness to deliver activities on hygiene and sanitation”*
 - *“Bureaucracy and corruption”*
 - *“The leadership at national and sub national levels are not given the issue required attention and resources”*
 - *“Government commitment to sanitation and hygiene intervention compared to capital project: Poor participation at top level and low government investment”*
 - *“Lack of credible data, lack of regulatory framework and poor sector funding”*
 - *“Lack of funding”*
- ✓ Uganda --- Political, funding and implementation capacity
 - *“Poor enforcement of policy, legal and regulatory instruments due multiple of factors that include poor funding for implementation, political interference, inadequate staff capacity”*

5.1.2 Identify effectiveness of interventions

Effectiveness of interventions will be identified from three areas, including sanitation facilities for under-five children, approaches to achieve sanitation as well as sanitation and hygiene promotion activities.

Suitability of sanitation facilities for under-five children

To identify the most suitable sanitation facilities for children under-five, six improved latrine options are list in the questionnaire, including flush toilet, flush/ pour flush to pit latrine, ventilated improved pit latrine, pit latrine with slab, composting latrine and potty. As a result, on a scale of 1 to 6 with 1 being the most effectiveness, potty and ventilated improved pit latrine (VIP) is responded with an average of 2.8 as the most suitable facility to children under-five, whilst composting latrine with the score of 3.8 is being the least effective (see figure 5.5). *–These are all suitable for children if designed properly. If not designed or maintained properly then they will*

fail", stated by one respondent, which may be one of reasons why the appropriateness of these improved latrines are similar. By his opinion, *"Pit latrine with slab is best entry level toilet while potty requires excreta to be handled"*.

On the other hand, the values representing effectiveness for six facilities vary from 2.8 to 3.8, a relatively narrow scope. It means the majority of improved latrines may be suitable for under-five children depending on the contexts. As one surveyor who does not respond this question explains, *"Not possible to answer this question. Depends on circumstances, e.g. rural/urban; income levels, etc"*.

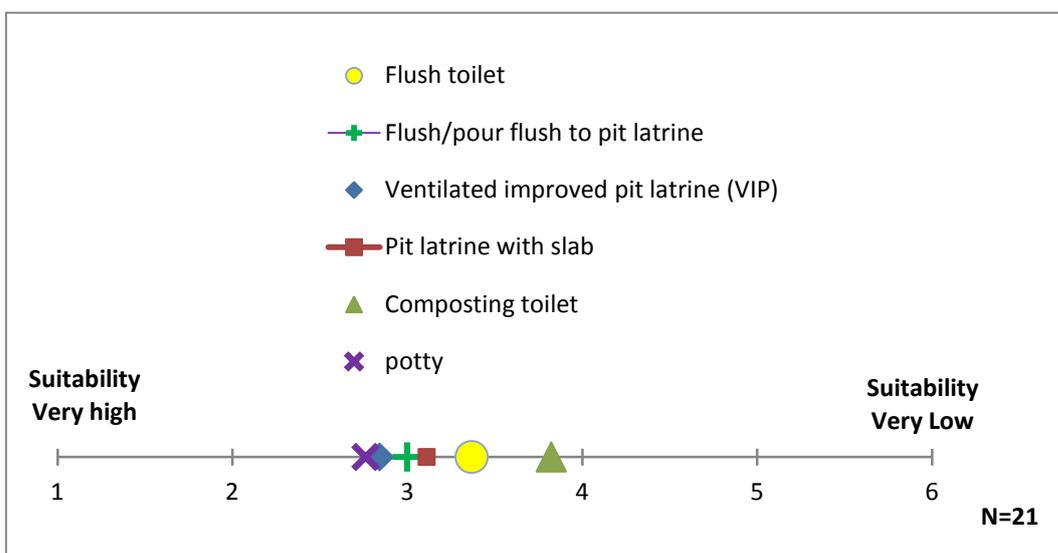


Figure 5.5 Suitability of improved latrine suitable for children under-five

Effectiveness of approaches to achieve sanitation

As can be seen from figure 5.6, Community-Led Total Sanitation (e.g., CLTS, CATS) ranks the most critical and effective sanitation interventions to impact upon child survival and development, with an average of 1.4 on a scale of 1 to 5 with 1 being the most effectiveness. In contrast, approaches that emphasis low cost and sanitation marketing may have least effectiveness with volume of 3.0. In addition, the effectiveness of school-based and community-based sanitation/health (or hygiene) clubs just follows by Community-Led Total Sanitation. The four approaches to sanitation interventions exclusive Community-Led Total Sanitation appear to be similar effectiveness with the values between 2.7 and 3.0.

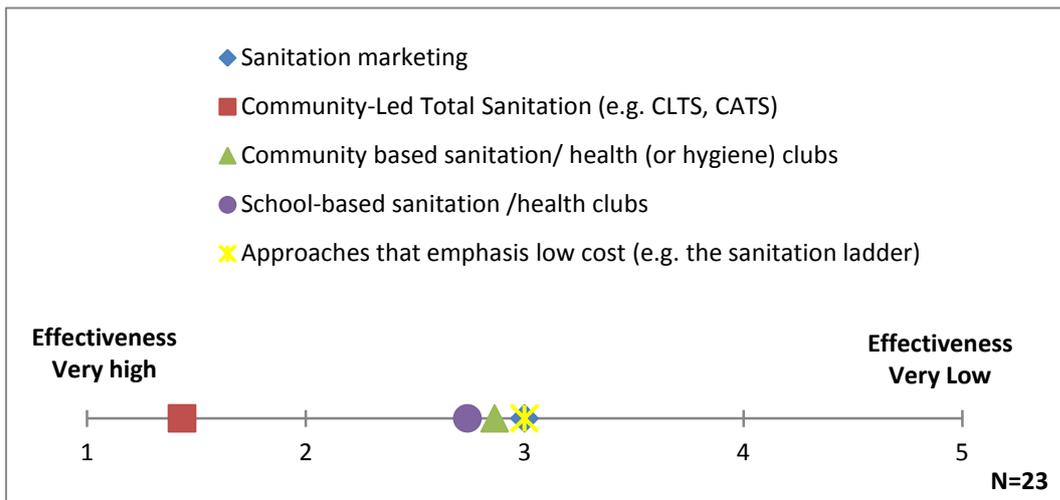


Figure 5.6 Effectiveness of approaches to achieve sanitation

Effectiveness of sanitation and hygiene promotion activities

A variety of sanitation and hygiene promotion activities are been ranked by effectiveness on the scale of 6 being 1 with the most effectiveness, in order to identify the parameter with the greatest influence on child survival and development. The result is demonstrated in figure 5.7 below.

Raising public awareness on good hygiene practice to mothers/primary careers of under fives is regarded as the most critical promotion activity which may have the greatest impact on child survival and development, with the average score of 2.0. It is followed by handwashing with soap at home (2.4) and hygiene promotion to primary school children (2.6). By contrast, education on the appropriate use of latrines with the score of 3.8 may not be as effective on the improvement in child health as other activities. However, the majority of activities will have a relatively high impact on child survival and development, since the scores locate between 2.0 and 3.8.

In addition, the substitute to soap, like a kind of ash in Ethiopia, has been proved a good material for helping handwashing. It is also a good practice for people in Ethiopia and recommended by the professional locally.

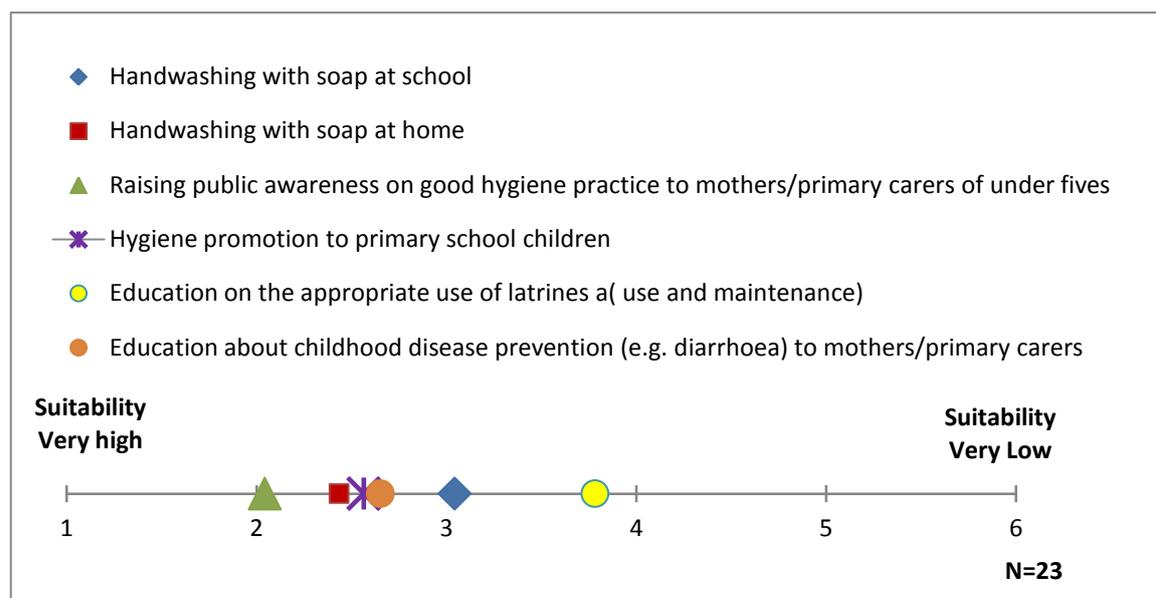


Figure 5.7 Effectiveness of sanitation and hygiene practices promotion

5.1.3 Identify the appropriate institutional arrangement

Current and future institutional arrangements are endeavored to investigate in this section respectively.

Current institutional model

The survey attempts to be aware of the specific institutional arrangement among various countries in the region. But in practice, the institutional arrangement seems not be straightforward and the diverse sector may interface. In order to simplify the framework, four models below thus have been classified as the benchmarks.

- a. Health sector provides both sanitation and hygiene promotion
- b. WASH sector provides both sanitation and hygiene promotion
- c. WASH sector provides sanitation (hardware) and sanitation promotion (part of software) while health sector conducts hygiene promotion (part of software)
- d. WASH sector provides sanitation (hardware) while health sector conducts sanitation and hygiene promotion (all software)

Meanwhile, in the light of some sanitation facilities may be provided by government or donors in effect, such as improved latrines for the poorest, piped sewer system and so on, the institutional model therefore introduce the concept of hardware which is used to compare with sanitation promotion (e.g., maintenance of improved latrines which is easily neglected in practice) and

sanitation interventions (CLTS, sanitation marketing, etc.). The benefits for these four kind models will make the theoretical and abstract hypothesis introduced in section 1 to be adaptive to the practical working mode. Therefore, the classification is, in essence, consistent with the hypothesis.

Table 5.3 presents the survey results to reveal the current institutional models in eight countries. As shown in the table, four institutional modules have been already been employed in these surveyed countries. Due to the sophisticated contexts in effect, even the respondents from the same country may have the different understandings to the institutional arrangement from the perspective of themselves at the different levels, which can be identified from the figure of percentage of respondents. As one respondent explains, “where there is good WASH structure at district level and provision of WASH service, it is actually provided by WASH team which is collected from health, water, education and other sector officers. It means, at the regional level, the service is not only provided by health sector but also WASH sector. System is found at infancy stage and not covered at all level”. In addition, the respondents from Nigeria think that three institutional models are employed in the country. Therefore, the survey results reflect that the institutional arrangement in practice is complex indeed.

Table 5.3 Current institutional arrangement by country

	a	b	c	d	Current model identified
Burkina Faso		100%			b
Ethiopia	60%			40%	a
Ghana		100%			b
Kenya			100%		c
Malawi			100%		c
Mozambique			100%		c
Nigeria		63%	25%	12%	b
Uganda				100%	d

Meanwhile, the current institutional arrangement by percentage of respondents is illustrated in figure 5.8, to better make a comparison with the institutional model in Chapter 6.

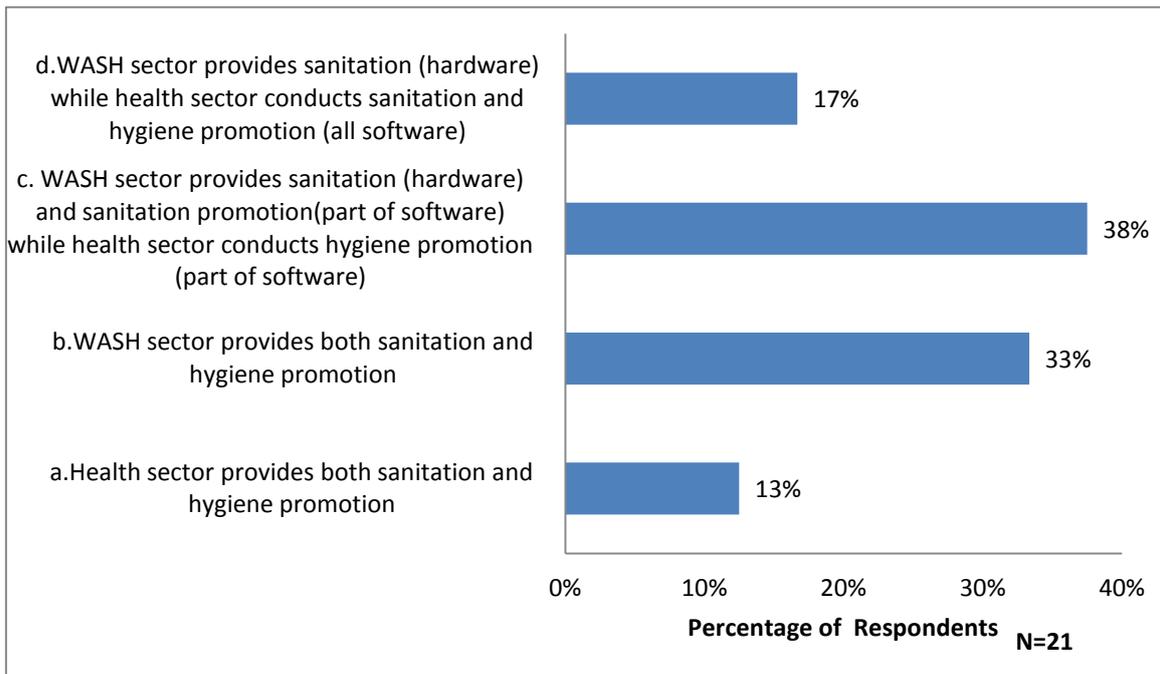


Figure 5.8 The current institutional model by percentage of respondents

Appropriate institutional model for future

The question “Which institutional arrangement do you think is the most appropriate model to follow to ensure the impact of sanitation and hygiene on child survival and development?” is distributed to the respondents. 20 out of 24 surveyors provide their opinions. From the data in figure 5.9, it is apparent that institutional arrangement of model c is the most supportive by half of responding surveyors. That is WASH sector provides sanitation and associated sanitation promotion (hardware and part of software) while health sector conducts hygiene promotion (the part of software). It is followed by WASH sector provides both sanitation and hygiene interventions supported by 23% of respondents.

In terms of the potential model by country, four out of eight countries can be deduced to follow which specific model through the survey results (Table 5.4). Specifically, respondents from Ethiopia, Mozambique and Nigeria may hope to change their current institutional arrangement, while Ghana will consist in the current model. Apart from that, it is not sure for the other four countries. Respondents from Kenya and Uganda could not reach a common position. There was no response from the remaining two countries: Burkina Faso and Malawi.

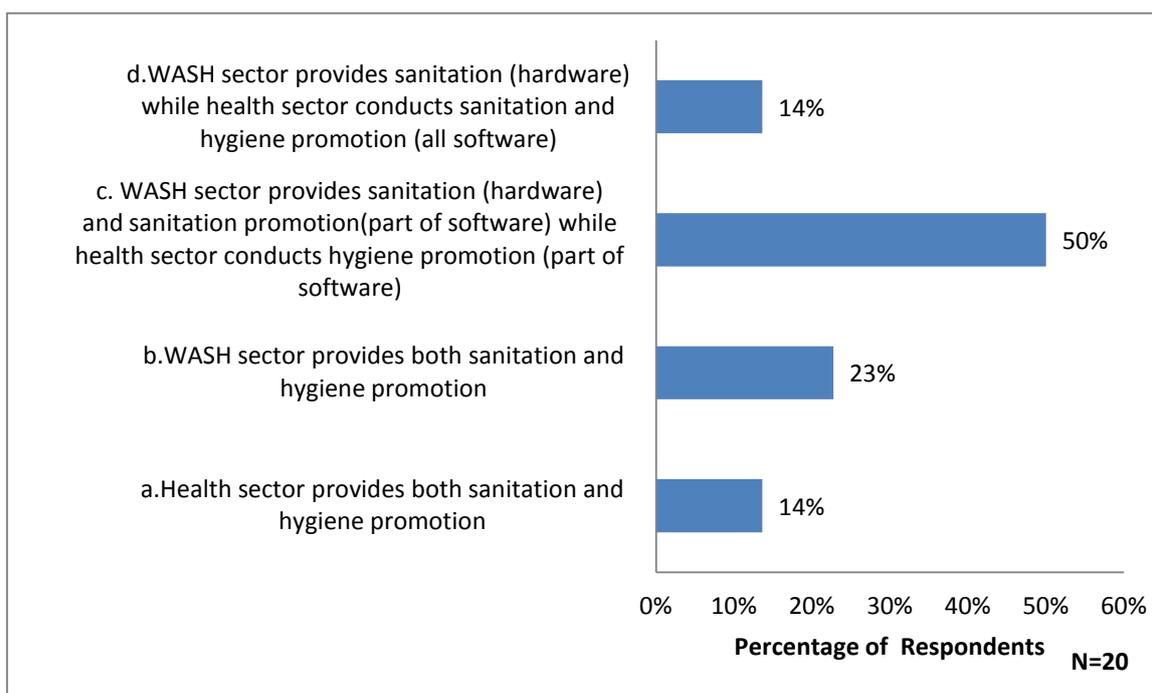


Figure 5.9 Appropriate institutional model for future

Table 5.4 Potential future institutional arrangement by country

	a	b	c	d	potential model to follow
Ethiopia	10%		60%	30%	c
Ghana		100%			b
Kenya	50%		50%		Not sure
Mozambique	100%				a
Nigeria		33%	55%	12%	c
Uganda		50%	50%		Not sure

5.2 Findings from interview

Key informative interview was conducted during 5th and 12th July. Both face-to-face interview and internet interview via Skype are applied. As a result, a total of 13 interviewees have given the interview with approximately 180 minutes. Of which two are health professionals, 11 professionals are working in water and sanitation sectors. In addition, three out of 13 respondents are female whereas eight interviewees are male professionals.

All interviewees are very knowledgeable about the sector of water and sanitation or public health, including decision maker at national level, practitioners at sub-national level, academics and researcher, consultant, social scientist(NGO) and so on (See figure 5.10). In spite of a small

group of interviewees, they are able to represent the perspectives of global, national and sub-national levels. Meanwhile, UNICEF as a key stakeholder which plays a critical role in improving child survival and development, two professionals from the organization give the interview. The full list of interviewees is presented in Annex E while the questions for interview are demonstrated in Annex F.

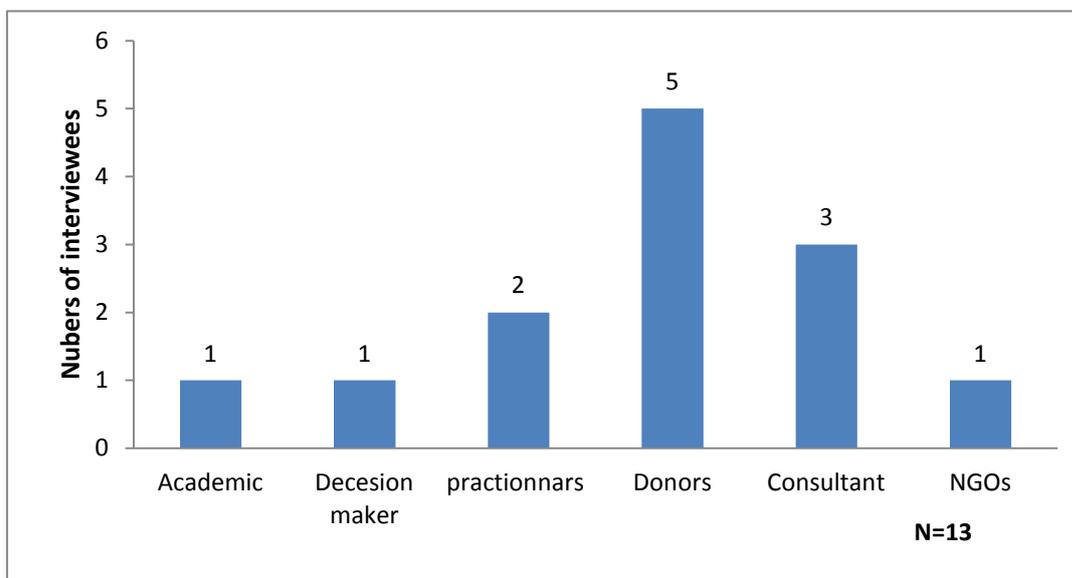


Figure 5.10 Interviewees by type

5.2.1 Rationale for relatively poor sanitation and hygiene practices

One critical rationale for relatively poor sanitation is that sanitation should be behavior change rather than provision of facilities alone. Sanitation is more difficult because it’s associated with behavior change. By contrast, malaria is easier, just to erase mosquito by good water management. Nutrition may give tablets”, commented by Sarah House, Independent Consultant, who previously worked in Tanzania on behalf of UNICEF, “Meanwhile sanitation is difficult at scale and measure is also the problem.” Similarly, Shelter & WATSAN Advisor in British Red Cross, Melvin Tebbutt also said, “If you look at sanitation and good hygiene practices, they are associated with behavior change.” The majority of respondents do think behavior change is more difficult and sophisticated.

5.2.2 Constraints to limiting the progress

As for the slow progress on sanitation and hygiene interventions in child survival and development, respondents gave a wide range of factors covering policy, institutional

arrangement, implementation, capacity building and so on.

Policy and implementation

In terms of policy in Nigeria, there seems no exists policy on the ground. Director of LAGOS State Ministry of Rural Development said, “When we make decisions, the incidence of diseases or child mortality will not be taken into account”. The policy or strategy does not have the related requirements. Actually, the state ministry will take on a variety of roles from decision making, planning to implementation at the sub-national level in the country.

On the other hand, the implementation of policy appears to be a challenge. “Enforcement is a problem”, consequently “rural sanitation is horrible”, noted by Mr. Sottie M. Bomukama, Director for water development, Ministry of Water and Environment in Uganda.

Institutional arrangement

In terms of current institutional arrangement for sanitation and hygiene interventions in Sub Saharan Africa, professionals think hygiene promotion definitely falls in the responsibility of health sector. Senior Health and Care Adviser, Catherine Mears noted, “I am not saying this because I surveyed all the health policy in sub-Saharan Africa, but from experience, particularly at district level primary health care, I feel [that] with recent experience, [there was a] very strong commitment and awareness of the need to include hygiene promotion in the health promotion agenda—you know it's high on the general health promotion agenda”. She is working for International Division in British Red Cross with rich experience in public health over many years. Similarly, Senior Adviser, Mr. Peter Harvey working for Water, Sanitation & Hygiene Programme in UNICEF New York commented, “Both sanitation and hygiene promotion is typically led by Ministry of Health, typically by mental health workers and community health workers who do the interventions with the households, with the community members. Mainly relies on Ministry of Health's structure.” In addition, “One of the problems is that sometimes ministries of local government have the mandate for water and sanitation. But what happens is that sanitation is always separated and then the focus is on water”.

Moreover, Shelter & WATSAN advisor, Melvin Tebbutt thought that the function of the curative and preventive interventions is often separate. Health department usually deals with curative things while neglecting preventive measures. In contrast, WASH sector conducts more preventive measures, like sanitation interventions. Consultant Sarah House pointed out, –Ministry of Health is normally headed by doctors. It’s very difficult for them to take a priority on water, sanitation and hygiene. Even in Tanzania, the head has public health background and support WASH, while not priority on sanitation and hygiene.”

Donors’ funding

Donors’ funding appears to guide the investments in part and plays an increasingly pivotal role in improving sanitation and hygiene. But in effect, the majority funding seems not to be spent in sanitation and hygiene. –Big money goes to HIVAIDA and malaria, while less funding on sanitation and hygiene”, said by Sarah House, an Independent Consultant. Moreover, Advisor Mr. Melvin Tebbutt explained the reason in detail, –The donors like to give more money to the cure than to the prevention, that’s a problem. ...in terms of diarrhoea, it’s like the provision of water, change of hygiene practice and provision of sanitation is what breaks the cycle for getting diarrhoea. You can’t give people tablets to stop them getting diarrhoea, you have to work on habits, to change their habits to protect themselves from the bacteria and the cause of diarrhoea. To me one of the biggest problems is the funding. It’s better easy to pay for the curative, it’s not easy to pay for the other side.”

Capacity building

Capacity building is one of the major constraints for scaling up the impacts of sanitation and hygiene in Sub-Saharan Africa, particularly for human resource. –In terms of capacity building in Sub-Saharan Africa, their challenges for resources, particularly human resources and trained human resources, people with public health qualifications and qualifications relevance to this, are very few far and between. Even if they have graduated in the country, they emigrate. So it’s challenges of producing enough human resources trained appropriately, who will stay and work within that country and within that health system and that’s linked to political will.” Senior Health

and Care Adviser, Catherine Mears noted above, –In Sub Sahar Africa, staying work in the areas which are outside the capital city, areas in the provinces, in the rural areas, in the distant towns, are very difficult to get people with qualifications and stay very long, make sustained contributions to the development.”

As for the causes to relatively poor capacity building, some professionals give comments. –That’s link to the political will.” Senior Health and Care Adviser, Catherine said. In addition, Sarah, Independent Consultant noted, –Capacity building at scale is expensive and how to do capacity building is another issue”.

In terms of health workers, the situation seems worse. –One of the challenges there is those same workers are often required to do many other health interventions, even if they focus on the environmental health, they get drawn into clinical, and immunization campaigns. They are often overloaded. Status of immunization is more prestige to be involved in sanitation or handwashing. Those health workers will do immunization rather than handwashing. Health workers who deliver the message may not see the importance of hygiene promotion and sanitation”, commented by Senior Adviser, Mr. Harvey from UNICEF. Similarly, Independent Consultant, Sarah House also thought, –Health workers at community levels are trained various things, curative and preventive interventions, including HIV/AIDS, also environmental health stuff. They are used to sanitation and hygiene promotion work. But they are not paid and unpaid. For example, a huge community, one or two volunteers. They also have their own children to be looked after.”

Insufficient communication

Insufficient communication is a neglected problem but very meaningful. The story is happened in rural Tanzania, –Education on women in the rural area is also important, and they can’t get the information like in the urban area. Husband will take the battery out from the radio when they leave, and women may not read. It’s also the problem. But in practice, they are willing to get the information and communication”, told by Sarah House, Independent Consultant.

Other neglected constraints

“In practice, child is easily neglected and has less consideration from the perspective of programme”, mentioned by Field team Leader and Anthropologist, Shireen Alchlu.

5.2.3 Equity-focused Principle

Equity is a key principle for big donors, like UNICEF and British Red Cross. Both of them commit to provide the service to reaching the vulnerable group. Mr. Demort Carty, Deputy Director for Office of Emergency Programmes in UNICEF stated, “UNICEF will identify the most vulnerable children through the criteria and put all energy and efforts to them through the package”.

Meanwhile, they will follow the principles below in the actual work.

- Deliver the package rather than the single intervention
- Look at from the health perspective, WASH perspective, nutrition perspective and food perspective, thereby identifying who are the most vulnerable

“British Red Cross promotes projects both sanitation and hygiene to reach the vulnerable people in the context of emergency and long term”, told by Mr. Melvin Tebbutt, Shelter& WATSAN Advisor.

In addition, as a Programme Manager, Cristina Mecerreyes also highlighted it is important to take more consideration on equity from the perspective of programme.

5.2.4 Identify effectiveness of interventions

Handwashing at critical time is regard as an effective way to prevent diseases by a number of professionals, especially for diarrhoeal disease. Senior Adviser, Mr. Peter Harvey said, “with the evidence that handwashing has a strong impact on diseases-child mortality”. Independent Researcher in Technical University of Catalonia (Barcelona, Spain), Mr. Alejandro Jimenez does suggest handwashing with soap to be an effective intervention and should be promoted, who previously worked in Tanzania.

Furthermore, other interventions are also suggested by Senior Adviser, Mr. Peter Harvey noted, “Handwashing with soap more than other hygiene interventions is probably best focus on, then sanitation promotion, water safety within the house”.

Nevertheless, the effectiveness of interventions still needs to take into account more factors. Like Mr. Melvin Tebbutt, Shelter and WATSAN Advisor in British Red Cross pointed out, “The effectiveness of sanitation and hygiene interventions varies from the context of the locations and environment”.

5.2.5 Cost-benefits for sanitation

Sanitation can be a good business. As Jeremy Ockelford, Independent Consultant observed, “People prefer to build health clinic rather than sanitation facilities and hygiene promotion nowadays. But if look at the benefits in economic, it will attract more people involve in the sanitation business”. Sarah House supported the idea in part, “Economic lost, sanitation is a big investment but readily neglect”.

In addition, Social Development Advisor in WaterAid Nepal, Mr. Om Prasad Gautam gave a novel idea for sanitation and hygiene promotion, “Health sector may lose the opportunity cost when they focus on curative aspect alone, because they do good immunization. For instance, In Nepal, 600,000 children get immunization every year. It means 600,000 women see health workers just get vaccine. If WASH promotion cannot be provided at the same time, it means opportunity cost are lost, because they are already there.” A good example outside Sub Saharan Africa may be the best experience to learn.

5.2.6 Suggestions on future

A wide range of suggestions for future development of sanitation and hygiene interventions in child survival and development are raised by the interviewees, varying from policy, institutional arrangement, monitoring and indicator, to communication, public awareness raising.

Policy

Senior Advisor, Mr. Harvey suggested, “In terms of policy and institutions, it’s a lot of work advocating with MOH, putting resources into the MOH, which is specifically sanitation and hygiene, and thereby raising the status of environmental health and public health, preventive health, institutions within countries. But you can’t do that without resources. And you are always competing in a sense with the curative health and medical health. So putting more resources in,

making ensure that the status of environmental health is respected and seen as important which can help strengthen both institutions and policy.”

Furthermore, policy at community also needs to be strengthened. Take Tanzania as an example. -Put sanitation policy from government level to the community level. The policy and regulations at community level is very loose now, that’s the key problem”, suggested by Alejandro Jimenez, Independent Researcher.

Institutional arrangement and responsibility

All interviewees believe that health sector or WASH sector cannot scale up the impact of sanitation and hygiene interventions on child survival and development independently. But the majority of interviewees think that health sector should be responsible for hygiene and sanitation promotion in relation to the behavior change while WASH sector contribute to the hardware of facility associated with engineering issues.

- Voice from practitioners

-Both WASH and health sector should involve in. Facilities are more about engineering things, while software (promotion) will be the responsibility of health sector”, said by Director of LAGOS State Ministry of Rural Development in Nigeria.

- Voice from consultants

-Health sector and WASH sector should work together. Health sector should pay more attention to good hygiene practices”, Project Manager Cristina Mecerreyes, at Amphosze Consulting SL in Spain, having the working experience in Tanzania and Mozambique.

- Voice from academics

-Health sector should take a leading role in sanitation and hygiene promotion, particularly these kinds of thing related to behavior change. They are not something that WASH sector can have capacity to do, but health sector have extension workers, people from community development to do these things. WASH sector should do more things in technical issues, for instance,

construction and guidelines for development.” Independent Researcher, Alejandro Jimenez said.

- Voice from NGOs

“WASH hardware is difficult to be provided by health sector, which is better conducted by WASH sector. For health sector, it should have more responsibility of promotion, including hygiene (handwashing), sanitation, household water treatment practices and water quality surveillance, etc. It’s not feasible for health sector to provide the technology or hardware, but the education on prevention, this kind of social issues are easily done by health programme.” Social Development Advisor, Om Prasad Gautam said.

- Voice from Donors (WASH sector)

“In terms of responsibility, it has to be driven by Ministry of Health. I mean there is not really an alternative”, commented by Senior Advisor, Mr. Harvey.

- Voice from Donors (Health sector)

“Primary healthcare strategies... in which water and sanitation, health promotion and health education are very much crucial part of the aids of strength primary health care along with provision of health services”, Senior Health and Care Adviser, Catherine Mears said, “Primary health care approach is not a belonging one sector or one line ministry only; a keywords of that or key concept is multi-disciplinary or inter- sectoral”. In other words, “Sanitation and hygiene are never been the only responsibility of one sector”. On top of the health workers, people from other sector are also suggested to be involved, such as the Ministry of Education, Urban Planning or Rural Development. “For Urban Planning or Rural Development, they have responsibility of providing the appropriate and affordable technology and increasing the coverage to reduce the risk.”

In terms of the role of improving sanitation and hygiene for health sector, Catherine thought health sector is crucial but not an exclusive responsibility. In addition, she also shared the

thoughts in terms of the responsibility of health sector, particularly at community and primary levels, it's very much around situation analysis and public health needs assessment which will often sit with public health, departments of Ministry of Health, and it's of course vital that needs assessment including sanitation provision in terms of coverage, type, appropriate nurse, cost as well as the population use of that, understanding of it and hygiene practices. The health sector may need to lead the public health assessment when you have multi-sectoral public health assessment."

Capacity building

Look at community-led sanitation. It's the community that takes the lead, so it's all about behaviour change. So if you look at sanitation, handwashing, household water treatment, it's all behavior change", suggested by Senior Advisor, Mr. Harvey, "The skills are needed in communications, engagement and promotion rather than engineers".

Improve indicators

To improve indicators at global level is one hand. Senior Advisor, Mr. Harvey suggest that the good way for post 2015 may be the new global indicators to try on packaging all three aspects including water, sanitation and hygiene. He commented the status quo of MDGs, "Separating water and sanitation means that you don't necessarily have the best impact on both and one may suffer because of the other and hygiene got lost completely." for example, water on track the target while sanitation off track. He also suggested it should include water quality not just quantity and handwashing with soap, "these three have to be partly integrated with community health care package. That's more probably significant". In terms of handwashing, he explained it further, "Particularly Handwashing doesn't exist in the system, because handwashing is no target and difficult to measure, so it gets lost. Probably use indicators for handwashing at the global level, and then subsequently at regional and national levels".

On the other hand, Project Manager Cristina Mecerreyes suggested that indicators at national or sub-national level, even in the specific contexts should be strengthened.

Better communication

Interviewee also provide a variety of solutions for strengthening communication between different sectors, including

- Put a mechanism with Ministry of Health, Ministry of Education, Ministry of Social Welfare and the Department of Local Government on sanitation, etc, and build a forum with the meetings and discussion. Once it is done, the forum can be able to identify perspective of a certain issue (e.g child-related health) and also for local government to understand the issues as a multi-sectoral response is needed to a certain issue (e.g child- related health). It was suggested by Mr. Maxwell Madzikanga, Health Advisor for Africa in British Red Cross.
- -Strengthen the cooperation between WASH and health sector and share the data”, raised by Social Development Advisor, Mr. Om Prasad Gautam.

Raising awareness

Anthropologist Shireen Alchlu said, “The education on good hygiene practice on mother is needed to further take into account.” She is a former Field Team Leader for water and sanitation team in World Bank, Bangladesh.

Experience draw on from outside Africa

Social Development Advisor, Om Prasad Gautam, also introduced the good experience in Nepal. In 2010, the health sector established 5-year plan programme and put sanitation and hygiene underneath. Some key points are identified below.

- Water, Sanitation and hygiene are on-going programme
 - Identify some indicators in health sector which are actually direct to WASH, particularly handwashing and use of hygienic latrine in household
 - Establish water quality surveillance, as it’s the health sector’s responsibility
- Coordinate across the sector

In terms of implementing for 5-year plan

- Form the group of technical at the community for surveillance water quality, so the community give response to the health sector

- Celebrate global washing day lead by Ministry of Health in 2010

5.3 Findings from case study

Findings from case study are identified from the key formative interview and questionnaire survey in United Republic of Tanzania and Ethiopia respectively.

5.3.1 United Republic of Tanzania

The implementation of strategies and institutional arrangement will always confront a wide range of challenges in practice. As Sarah House, Independent Consultant said, –Gomplicated in fact, there isn't money to sanitation and hygiene while swap to water supply, in spite of \$2.8 billion over 25 years loan by the World Bank, African Development Bank and other national donors. So, Ministry of Water has the money while Ministry of Health and Social Welfare has the responsibility.”

In addition, the situation at the community level seems not very optimistic. Independent Researcher, Mr. Alezandro Jimenez commented, –Nobody take a leading role. They just have a policy. Nobody do something in hygiene promotion.” He is still confusing about Tanzania’s case.

5.3.2 Ethiopia

In Ethiopia, challenges are identified from the response of questionnaire. Surveyors raised a wide range of bottlenecks for improving sanitation and hygiene promotion itself and associated changes of child survival and development in practice.

- ✓ Politics
 - –Political commitment at various level”
 - –Less commitment from higher level decision makers”
- ✓ policy and strategy
 - —Here is no sanitation policy”
 - –Bad water policy that does not minimize water pollution and cleaning up in our watersheds”
 - “Less attention given on hygiene promotion (software component)”

- ✓ Institutional arrangement
 - ~~Lack of clear definition on roles and responsibilities~~
 - ~~The right people do not take part in major decision making at national, regional, and even at local level~~
- ✓ Implementation capacity
 - ~~Policy and strategy are not more than paper work or are not well practical~~
- ✓ Funding and resources
 - ~~limited resources and funding~~
 - ~~Limitation of resources~~
 - ~~Lack of satisfactory budget allocation from government and donor agencies~~
 - ~~Inaccessible, inadequate and unsafe water supply~~
- ✓ Capacity building
 - ~~Less integration and coordination among line sector offices at all levels~~
- ✓ Challenges for sanitation interventions
 - Inconsistency of some approaches like PHAST
 - Challenges with CLTS approaches specifically with post triggering issues and with consistent monitoring and supportive supervision after pre triggering of the CLTS
- ✓ Complex history rationale
 - ~~Ethiopia is a very big country with more than 85 million people. Due to various reasons including war, famine, illiteracy, the dependence of the country's economy on a very backward agricultural system etc the economic situation of the country remains to be very low. Because of the above reasons the hygiene and sanitation situation of the country remains to be very poor/low and it needs a lot of investment and time any sanitation and hygiene interventions to bring the desired level of impact child survival and development in your country.~~

However, there exists some good performance. As one questionnaire respondent states, ~~In our~~ setting we have more than 35,000 health extension workers in the country living close to the community. This unique position they hold and the fact that they are working both on hygiene

and sanitation and maternal and child health issues, their influence on hygiene and sanitation issues and any intervention on child survival and development is immense.”

5.4 Findings from observation

The demand of end users, such as children and women, the disabled and the old people are readily neglected in effect, commencing from the stage of planning. The researcher attended one of the side events on 7th July during the 35th WEDC International Conference at Loughborough University. The topic of the session was “Environmental sanitation planning for cities of the South: linking local initiatives with city-wide action”, convened by International Water Association and Eawag-Sandee. Around 30 participants, divided into three groups, attended the role playing over one and half hours on behalf of the related stakeholders, including donor, various ministries, local authority, international and local NGOs, CBO, consultant, end users (farmers) and so on. The main purpose for the discussion is to identify the key factors for providing sanitation facilities with the donation from international donors. The researcher as a listener involved in the role playing discussion. There are some key facts are as follows,

- ✓ Nobody in all the groups mentioned any demands of vulnerable people including children.
- ✓ The stakeholders in the meeting, referring to the researcher’s group always look at the issues on their own interests and do not consider the problems from the perspective of other parties.
- ✓ No common ground was reached by the group when the researcher attended.

While some observations are also identified by the researcher, as one of the attendants commented, “The real world is just like this”, the observations below are thus meaningful to the research.

- ✓ In effect, participation of stakeholders on behalf of child under-five is a big challenge.
- ✓ Demand of child under the age of five will be readily neglected if mothers with under-five child do not attend the meeting of stakeholders as a representative from the planning stage.

- ✓ Sanitation and hygiene promotion will hardly impact upon child survival and development if they are forgotten from the beginning.

Chapter 6 Analysis and Discussion

The total amounts of 37 surveys including 24 questionnaire respondents and 13 interviewees have been conducted to collect the data associated with the research questions. Meanwhile, two case studies in United Republic of Tanzania and Ethiopia are demonstrated and observations from the 35th WEDC International Conference were obtained. Despite some disagreements on questions, common ground has already been able to be found. This section will discuss in depth the issues based on the findings in section 4 and section 5.

6.1 Critical interventions to child survival and development

Critical sanitation and hygiene interventions to child survival and development have been attempted to identify in section 5.1.2 and 5.2.4, using the method of questionnaire and interview respectively. But before finding the most effective intervention, it is necessary to be aware of the link between sanitation and behavior change.

6.1.1 Sanitation and behavior change

Sanitation is more than the provision of facilities. Rather, it is in relation to behavior change. The ideas have been raised by surveyors several times in section 5.2. Actually, after implementing projected-based sanitation programme, people find that they are a failure because the toilets built by donors, NGOs or other organizations are not applied by users. That means the sanitation facilities cannot be functional if users do not change their behaviour of open defecation. In other words, sanitation appears to have more association with behaviour change rather than hardware provision. On the basis of the new understanding to sanitation, Community-Led Total Sanitation, sanitation marketing and similar interventions emerges in recent years. The common element for these initials is that users must pay for facilities by themselves rather than provided by donors or governments for free (Kar and Chambers, 2008, p.8). In addition, vulnerable group may be subsidised by governments to aid them build up sanitation facilities. They are the proven interventions which can improve sanitation coverage and reduce the incidence of diseases, especially diarrhoea. Therefore, it is critical to consider sanitation as behaviour change.

6.1.2 Critical sanitation and hygiene interventions to child survival and development

Critical sanitation and hygiene interventions are identified mainly by the methodology of semi-structured questionnaire and key informative interview. It will be analysed and discussed by package and separate intervention accordingly.

Sanitation interventions

The effectiveness of sanitation interventions to impact child survival and development is ranked through the questionnaire survey, illustrated in figure 6.1.



Figure 6.1 Effectiveness of sanitation interventions

The result reflects that Community-Led Total Sanitation appears to have greater effect on child survival and development than any other interventions, especially in the countries or regions where respondents are working or have most knowledge and are basing their responses on. In addition, community or school based sanitation/ health (or hygiene) clubs are also have relatively great impact. It indicates that the interventions based on community or school tend to have greater effective on child survival and development than non-community based interventions.

Community-Led Total Sanitation (e.g., CLTS, CATS) is identified as the most effective method to achieve sanitation through the questionnaire survey, particularly in the context of rural areas where more people practice open defecation than the urban areas. Similarly, some interviewees also reflect the views in praise of CLTS. Hence, UNICEF develops a model to scale up CLTS in Africa, particularly in eastern and southern Africa where a large number of people still practice

open defecation (Kar & Milward, 2011, p. 25). On the other hand, sanitation marketing as an emerging approach, it is promoted by WSP, despite the relatively low effectiveness in the questionnaire survey. The successful experience in Tanzania for sanitation marketing has been introduced by WSP specialist in the 35th WEDC International Conference. Interestingly, like one interviewee commented, “UNICEF promotes CLTS while the World Bank focuses on sanitation marketing”, which may result in the limited resource to be distributed into various interventions. It seems no an absolutely successful interventions.

Nevertheless, in practice, the effectiveness of interventions in part is determined by contexts. All these approaches need to be combined, and cannot be very effective in isolation. The different interventions should work together to address towards MDG, as illustrated in figure 6.2.

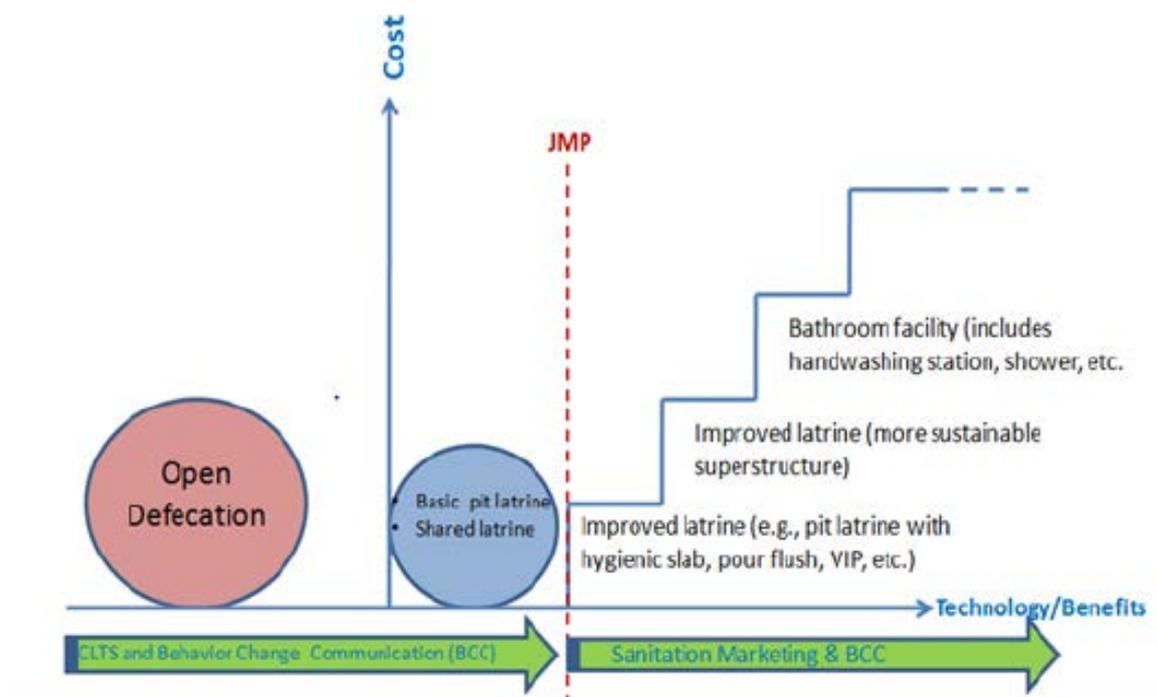


Figure 6.2 Programmatic model moves communities up the sanitation ladder

Source: Perez, 2011, p. 2

Hygiene promotion

Handwashing with soap at critical times is regard as an effective way to prevent diseases by a number of professionals during the interview, as examined in section 5.2.4. To further investigate its effectiveness in various contexts and in comparison with other promotion activities, the questionnaire asks respondents to identify the greatest promotion activity to

impact on child survival and development. The result is shown in figure 6.3. Among which the greatest impact is the first activity, the least impact is the last.



Figure 6.3 Effectiveness of hygiene promotion

The highest ranking activity is the education of adults concerning health and hygiene practice. Accordingly, sufficient and competent health workers are needed to deliver the message. Interestingly, the effective activities tend to change individual's idea first, and then good outcomes will be generated. For example, hygiene promotion to primary school children is considered to have greater impact than handwashing with soap at school, as it is believed that children will change their bad habits if they understand the importance of the behaviour of handwashing with soap. Similarly, handwashing with soap at home is the outcome of education to mothers. Moreover, education of women is very important as they can pass on the health and hygiene issues to their children and secondly education of women normally results in a reduced birthrate which can in turn reduce the poverty.

Appropriate sanitation facilities for under-fives

The appropriateness of six sanitation facilities for under-five children is identified by the questionnaire in section 5.1.2. According to suitability in figure 5.5, the priority can be roughly classified by three groups in figure 6.4.

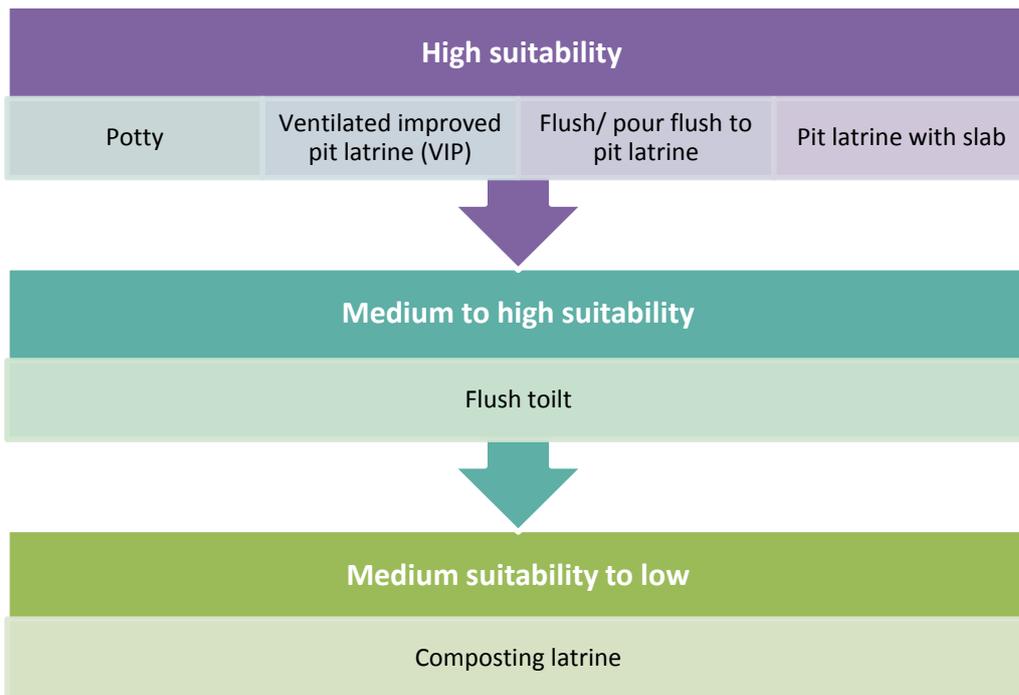


Figure 6.4 Suitability of sanitation facilities

VIP latrine appears to be the high effectiveness figure, but it also has its own drawback. Children particularly for the under-five children may be afraid of using VIP latrine due to dark superstructure (Dondo and Scott, 2006). But it could be addressed if accompanying by adults and using small torches. Therefore, the appropriateness of these facilities to under-five children will be subject to the contexts. In addition, *“One the mother is most comfortable with (and preferably has been involved in building)”*, as the respondent commented. It is also reliable to the social and economic development.

Package intervention

Despite the fact that the interventions have been identified the effectiveness individually, any of them alone may not generate a beneficial change in child survival and development. In other words, the package intervention will be necessary to affect much on child mortality and morbidity. For instance, one professional commented that on top of handwashing with soap, sanitation promotion and water safety at home are also critical. Conversely, handwashing with soap and other good hygiene practices cannot perform without improved water supply. Take UNICEF as an example. All the intervention will be delivered as a package rather than the single intervention. More than this, they will look at issues not only from WASH perspective, but also health, nutrition

and food perspectives to ensure the most vulnerable children to be served (referring to section 5.2.3).

6.2 Significant sanitation and hygiene factors and people to child survival and development

Significant sanitation and hygiene factors to child survival and development have been identified by respondents of questionnaire in section 5.1.1. The top three are:

- ✓ An enabling national policy
- ✓ Institutional arrangements both at national and sub-national levels
- ✓ Funding

Therefore, policy makers at national levels who can affect a national policy and institutional arrangement to the largest extent are ranked by the top important people. Government officers at sub-national level and implementers (including health workers) are the other two important groups who will assist or deliver the sanitation and hygiene services to children on the ground. It is quite certain that all these factors are the key components of the enabling environment to scaling up sanitation and hygiene promotion in child survival and development.

6.3 Constraints and bottlenecks to interventions

Figure 6.5 presents the bottlenecks to interventions in child survival and development.

Interestingly, the bottlenecks and constraints are also attributed to enabling environment for improving sanitation and hygiene interventions, which are identified through the responding questionnaires and interview in section 5. There seems to be an obvious link between significant factors and bottlenecks. It means that the considerable advancement will be achieved if the crucial factors and people can play a

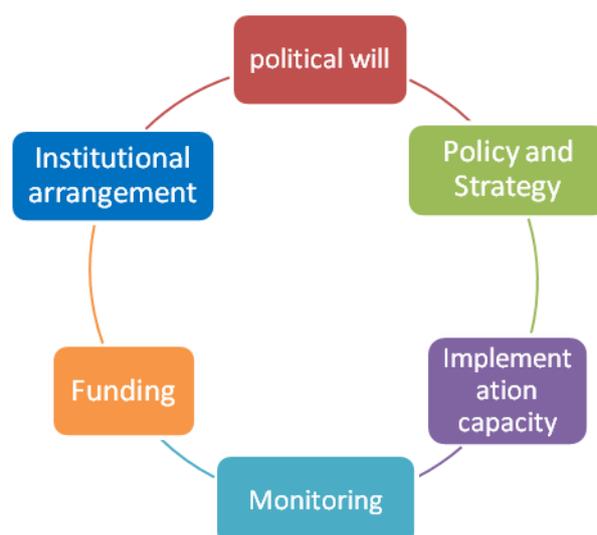


Figure 6.5 Bottlenecks in enabling environment

greater role.

6.3.1 Political will

Low political will is regarded as the most critical bottleneck by many respondents in the survey. The political will can affect policy and strategy, relatively weak policy and strategy is, in large part, associated with less political support.

6.3.2 Policy and strategy

Policy and strategy weaknesses can be mainly reflected in following areas.

- ✓ no separate sanitation policy at national level

Not all countries have sanitation policy at national levels, which will lead to poor sanitation coverage essentially. By investigation of GLASS (2010, p.38), nearly 40 percent of surveyed Sub Saharan African countries do not have a sanitation policy approved by cabinet at national level. It is also verified by several respondents in section 5.1.

- ✓ Low priority to sanitation at all levels even though there exists sanitation policy

This fact is supported by the majority of respondents. Meanwhile, it can be proved by GLAAS (2010, p.13) survey between 2009 and 2010. Health, population and HIV/AIDS as the top priority area is supported by 90 percent of respondents while water and sanitation sector are prioritized by 40% of total respondents. Furthermore, sanitation and hygiene promotion is placed lower priority compared with water, because of undefined and overlapped roles and responsibilities in sanitation, integrating sanitation with water and considering sanitation as a household issue (GLAAS, 2010, p.13).

- ✓ No sanitation policy in consideration to child survival and development

The incidence of childhood diarrhoeal disease apparently is not a determination which practitioners will take into account when they implement WASH project, because no related policy and strategy exists. (See section 5.2.2).

6.3.3 Institutional arrangement

Complicated and overlapped roles and responsibilities for sanitation and hygiene interventions are confirmed as one of constraints. Basically, sanitation and hygiene promotion do not have a defined institutional arrangement as clear as water, because they are not straightforward and have a variety of sectors including a range of disciplines such as water sector, health sector, education sector or environment sector and so on. Sanitation thus is merged with the water sector in some countries while integrating at a national level with the health sector in other countries. The four basic institutional models can be identified in all responding countries in the region (see section 5.1.3), of which water and health as two main sectors considered in the research.

- a. Health sector provides both sanitation and hygiene promotion
- b. Water or water and sanitation sector provides both sanitation and hygiene promotion
- c. Water or water and sanitation sector provides sanitation (hardware) and sanitation promotion (part of software) while health sector conducts hygiene promotion (part of software)
- d. Water and sanitation sector provides sanitation (hardware) while health sector conducts sanitation and hygiene promotion (all software)

However, the changes in contexts may result in the different institutional arrangements in the same country. For example, water sector is responsible for sanitation in the urban areas whereas health sector is responsible for sanitation and hygiene in rural area. In other words, the complex institutional arrangement may readily lead to the overlapped and spare roles and responsibilities for improving sanitation and hygiene interventions in the process of planning, implementation, monitoring and assessing.

Take Tanzania as an example. Basically, the institutional arrangement is in accordance with the hypothesis H_1 to some extent, as Ministry of Health and Social Welfare provide an overall leadership on both sanitation and hygiene in light of MOU. However, Ministry of Water and PMO-RALG have more responsibilities on sanitation when implementing interventions. In other

words, these three key actors will have the overlapped roles for interventions. In addition, MOHSW have the mandate of sanitation while funding is distributed to MOW along with the project of water supply. In this case, MOHSW may have the namely responsibility for sanitation.

- By contrast, the institutional arrangement in Ethiopia appears to be more straightforward and clear. Ministry of Health takes an overall role on both sanitation and hygiene at both national and regional levels, despite the fact that regional WASH offices implement the intervention. The institutional model is in line with the hypothesis H₁ exactly. Health Extension Programme with the leadership of MOH has achieved numerous successes since 2004(Mara et al, 2010, p.5). However, the institutional arrangement also faces challenges through questionnaire survey, such as the competent people may not be involving in the decision making.

6.3.4 Implementation capacity

Implementation capacity is the weak linkage in terms of scaling up sanitation and hygiene in child survival and development, as demonstrated in figure 6.6.

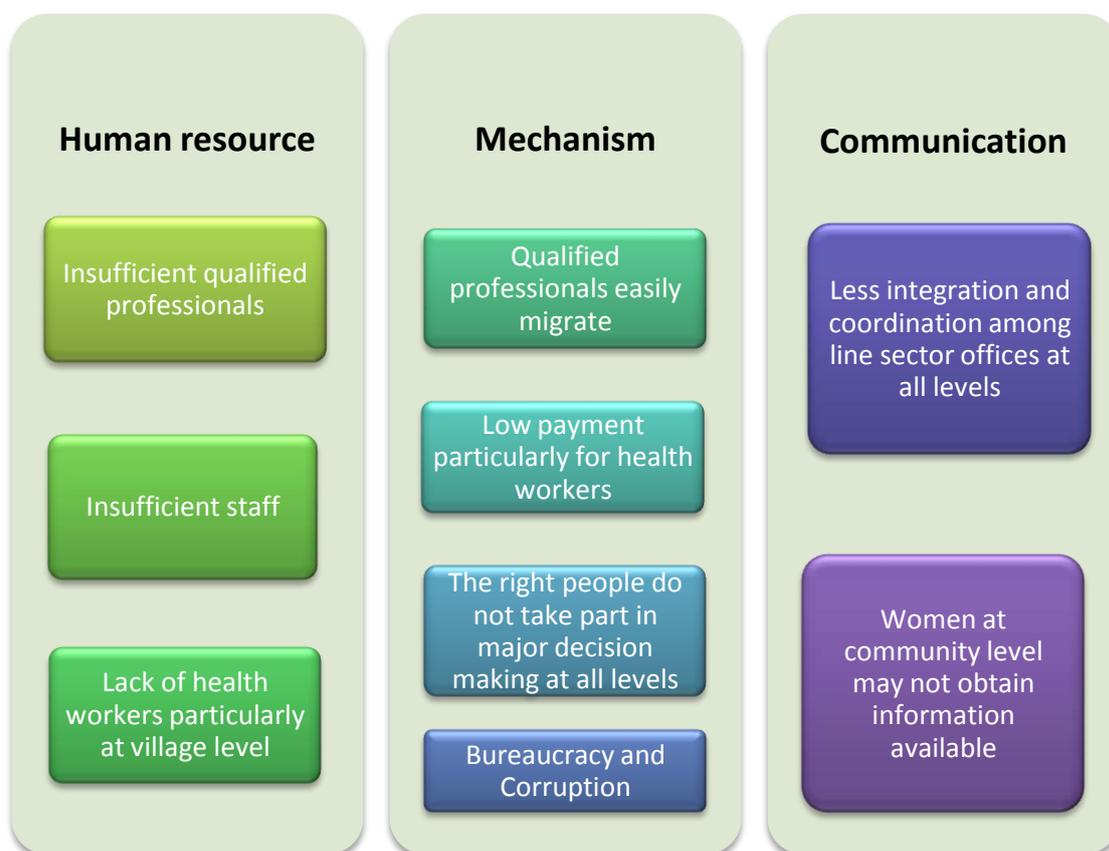


Figure 6.6 Bottlenecks in implementation capacity

It should be mentioned that health workers as the key implementer, they will deliver the good health and hygiene practice to households directly. A huge number of health workers seem to be needed. But the insufficient health workers in practice will mean the service cannot be reached by the users. In other words, each health worker on the ground may undertake the workload of as many as two or more health workers done in theory. On the other hand, health workers also need to be well trained and well paid, which can ensure the sustainable hygiene promotion.

6.3.5 Funding

Obviously, insufficient funding is the critical bottleneck for sanitation and hygiene interventions in the surveyed countries, such as:

- Insufficient funding at all levels
- Lack of satisfactory budget allocation from both government and donor agencies
- Low government investment to sanitation and hygiene interventions compared to other infrastructure projects (inclusive water supply)
- Donor's funding prefers to health and curative area, e.g., HIV/AIDS, malaria, immunization, etc while less investment in sanitation and hygiene.

In terms of the rationale behind donor's investment directing to curative measures, donor countries can see progress with smallpox vaccinations as the outcomes can be measured and the politicians can then show how successful they have been. By contrast, educating people to use toilets and wash their hands is not something the politicians can sell to their electorate and they cannot measure success.

Although funding plays a vital role in sanitation and hygiene interventions in child survival and development, it will be a big challenge to ensure the sufficient funding for sanitation and hygiene interventions and use it efficiently.

6.3.6 Monitoring and assessment

Monitoring and assessment as a big bottleneck can be reflected on the following areas,

- Lack of regulatory framework

- Lack of liable data
- Poor baseline survey
- Inconsistent monitoring and insufficient supportive supervision after pre triggering of the CLTS

It is believed that a good monitoring and assessment system is critical for the development of policy and strategy and vice versa.

Admittedly, these key elements in the enabling environment for improving sanitation and hygiene interventions in child survival and development are certainly linked and interactive each other. On one hand, a good policy and strategy appears to be a fundamental factor for the well functional enabling environment, as it will determine other elements to the large extent, such as good institutional arrangement and sufficient funding, which will in turn generate powerful implementation capacity and ensure policy and strategy to be enforced well. On the other hand, monitoring and assessment will provide the necessary and reliable information to policy makers who will improve sanitation and hygiene policy and strategy to impact upon child survival and development. Accordingly, the virtuous circle can be generated. Conversely, it will be a vicious circle if there is poor monitoring and poor policy.

6.4 Potential solutions discussion

Potential solutions to current bottlenecks are mainly grasped from the interviewees' suggestions based on their rich experience, in-depth case study, documents provided by professionals and observations from the participating in WEDC International Conference.

6.4.1 Political will, policy and strategy

Low political will can limit the development of sanitation and hygiene interventions and its impact on child survival and development. It is identified as the major bottleneck in the survey countries. Therefore, it will be a good way to make advantage of international organizations to promote the political will at the national level. For example, United Nations launched the campaign –Sustainable Sanitation: Five-Year Drive to 2015(5YD)” on 21 June this year, which is definitely a great opportunity to boost political will.

In terms of policy and strategy, there exist some initiatives in which sanitation and child mortality and morbidity can be considered simultaneously through the case study and interview. With the guidance of policy and strategy, health sector will take a leading role in sanitation and hygiene interventions. Conversely, if policy or strategy requires water sector to conduct sanitation, it may not easily for water sector take into account the factor of child survival and development with sanitation intervention. In addition, it is also suggested to develop policy, strategy and regulations at community level, as it cannot be implemented well on the ground without any regulations and rules.

Take a country inside the region as an example. In Tanzania, the National Growth and Poverty Reduction Strategy provides an overall guidance and includes roles and responsibilities from various ministries, in which Ministry of Health and Social Welfare with targets and statements on sanitation and child mortality. In this case, sanitation and child survival and development can be integrated well.

Outside Africa, there also seems to have a good example to follow. For example, the health sector in Nepal developed a five-year plan programme for 2010 to 2015 and take actions on promoting hygiene and sanitation. It stated, *“Promote hygiene and sanitation in conjunction with other essential health care services to mainstream hygiene and sanitation promotion. Adopt key performance indicators for behaviour change toward improved hygiene practices”*, according to NHDP-IP2⁴ (2010, p.39).

6.4.2 Appropriate institutional arrangement discussion

The survey of appropriate institutional model is carried out by methodology of questionnaire and interview, as well as case study. The results are shown below,

Suggestions from questionnaire

⁴ NHDP-IP2, 2010. *Nepal health sector programme-implementation plan* (NHDP-IP2). Final draft. Ministry of Health and Population Government of Nepal

- By percentage of respondents

According to table 6.1, the current model c is projected to follow in future with the supporting rate rising from 38% to 50%. That is WASH sector provides sanitation (hardware) and sanitation promotion (part of software) while health sector conducts hygiene promotion (majority of software).

Table 6.1 Comparison in current and future institutional models by respondents' percentage

Institutional model	Percentage of respondents for current institutional model	Percentage of respondents for future institutional model
a	13%	14%
b	33%	23%
c	38%	50%
d	17%	14%

- By country

Due to the different numbers of respondents in surveyed countries, the result is also interpreted by country (table 5.3 and 5.4). Not all respondents answer this question, so there are only four countries' data available. Table 6.2 present the results. Interestingly, three quarters of countries may alter the models except Ghana. Half countries attempt to follow model c.

Table 6.2 Comparison in current and future institutional models by country

Country	Current institutional model	Future institutional model
Ethiopia	a	c
Ghana	b	b
Mozambique	c	a
Nigeria	b	c

Model a: Health sector provides both sanitation and hygiene promotion

Model b: WASH sector provides both sanitation and hygiene promotion

Suggestions from interview

The majority of interviewees suggest that health sector should play a leading role in scaling up sanitation and hygiene in child survival and development. But it may be difficult for health sector to provide the service of both sanitation and hygiene promotion. Because the sanitation and hygiene interventions are the multi-discipline subject, the health sector may not accomplish the

interventions without the support of other sector, particularly facilities adoption are largely link to the field of engineering.

Hint from case study

In the contexts of Tanzania and Ethiopia, it appears that both health sectors take a leading responsibility in sanitation and hygiene interventions despite the fact that water sector may take some responsibilities. Particularly in Ethiopia, the health sector seems to take an overall role at the national level. Since it is not easy to find data available which can show the variations before and after institutional changes, the institutional arrangement for this model may not be followed as a compelling example. Admittedly, the questionnaire survey suggests they attempt to alter the current institutional arrangement in Ethiopia. In other words, this institutional model may confront a number of challenges in practice.

To conclude, the potential appropriate institutional model surveyed through the research methodology requires WASH sector and health sector to work together rather than health sector or WASH sector alone, as demonstrated in figure 6.7. The circles of sanitation promotion (intervention) software and hygiene promotion are much larger than areas of sanitation hardware. It means that in essentially, the sanitation and hygiene interventions are more like software rather than hardware. The sanitation hardware should not be provided by non-users, such as governments or donors to all the consumers. Rather, it should be the procured by users. In this case, the sanitation facilities would be well functional in practice. It is also the key reason why the majority of supply-based projects are failure to take effects. The concept of sanitation is understood as the hardware provision rather than behaviour change in that case.

Under this institutional arrangement, health sector is suggested to take a leading role, as hygiene promotion appears to be a bigger contributing factor than others. The aim of hygiene promotion is to change behaviour through education or other effective ways, which should be a starting point for the whole task. In other words, health sector should conduct promotion first to persuade community or individuals to change the behaviour, then WASH sector may need to

provide technical supports, such as the option of sanitation facilities, build up of facilities. But unfortunately, it may not find a compelling example in two case studies for this model. Because the institutional arrangements in practice is much sophisticated than the model itself. The basic model may vary from the specific contexts. The system thus may not be functional due to the unclear and overlapped responsibilities of some issues. Therefore, how to make the institutional model operate well seems to be a big challenge ahead.

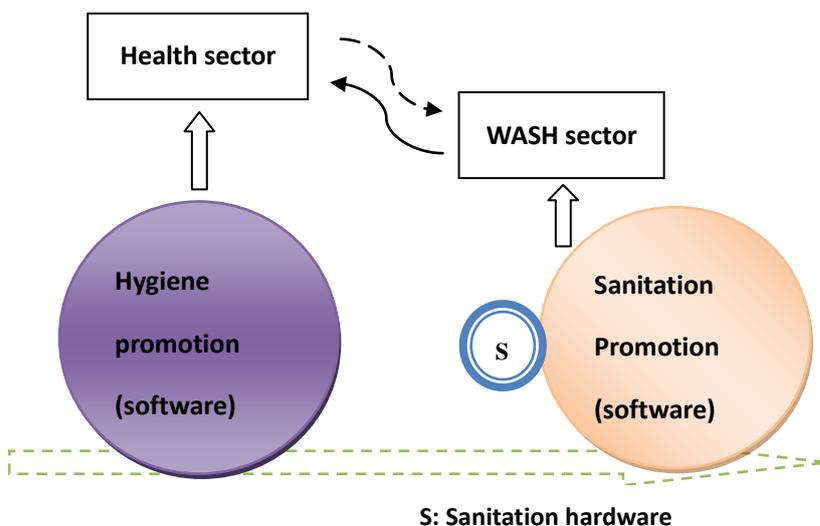


Figure 6.7 Potential appropriate institutional model

6.4.3 Implementation

A variety of bottlenecks are in relation to poor implementation of policy and strategies.

Implementation are attempted to be strengthened in various ways below.

Capacity building

A wide range of human resource should be trained while more qualified professionals are needed to educate, particularly the health workers. Some successful initiatives can be introduced to a wide region. Take Ethiopia EHP as an example. Approximate 30,000 health workers will be cultivated in five years. This kind of large-scale training programme undoubtedly will make a big difference. Moreover, the good mechanism and welfare system to keep sustainable talents are also necessary to be developed in the region.

Mechanism and communication

Some potential solutions to better communication and development of system will be introduced

as follows.

- Build up a mechanism for communication

It is suggested to build up a mechanism for the better coordination among various ministries which may involve in the sanitation and hygiene promotion, such as setting up a forum for meeting and discussion. Moreover, strengthening the cooperation between WASH and health sector is highlighted, which will be largely beneficial to data sharing between two sectors.

- Link sanitation with child in planning

In order to fulfill sanitation interventions in child survival and development, it is critical to apply the initiative planning approach rather than conventional method particularly in urban contexts, such as Community-led Urban Environmental Sanitation (CLUES) and the Sanitation 21 framework (Luthi & Parkinson, 2011, p. 1). These initiatives will take into account the social and environment factors in the planning while the conventional approach aims to meet the technical factor alone. Furthermore, it is important to list and ask the necessary parties to take part in stakeholder meeting during the stage of planning. They should include a diverse set of vulnerable people, such as disabled, mothers with children under-five and so on. In this case, the voice representing children can be heard in practice. Similarly, this kind of method can be employed in the context of rural area to address the same problems.

6.4.4 Funding

There is no way but increasing funding in sanitation and hygiene interventions in child survival and development. On one hand, it is vital to alter a dilemma that donors invest more in curative measures while neglecting sanitation and hygiene, along with water as the most effective prevention through communication, awareness raising and more convincing examples.

Moreover, government should recognize the importance of expanding investments in sanitation and hygiene interventions in child survival and development and transfer the strategy to invest water and other infrastructures whilst weakening sanitation. On the other hand, sanitation as a good business can be further explored and practiced. The good policy and strategies should thus be formulated by governments. For example, tax policy will guide the business investment in part, especially for the private sector. It means that the sufficient funding may be put by private

or other sectors if the governments can introduce the good policy or strategy.

However, increasing investment is not the only way to scaling up impacts. It appears to be more meaningful how to take advantage of the limited resources. For example, the more fruitful impacts could be made if health workers had more important material available, well arranged and defined responsibilities (WHO, 2007, p.8). Moreover, an alternative way for funding rising may be to identify the most cost-effective interventions and scale up. Take CLTS as an example. It might be the most effective approach in the context of rural areas where open defecation. In this case, applying CLTS might be the most cost-effective way.

6.4.5 Monitoring and assessing

Monitoring progress on child survival and development before and after sanitation and hygiene interventions should be a key step for the well functional system. The bottlenecks in monitoring and assessing can be addressed through the efforts made in the following areas.

Indicators for sanitation and hygiene interventions

As for indicators for measuring sanitation interventions in child survival and development, it should better link with the most effective intervention. With CLTS being identified as the most effective sanitation intervention in surveyed Sub-Saharan African countries, it is necessary to set the leading indicator for this intervention. Therefore, no open defecation would probably be a most appropriate indicator for monitoring and assessing the progress. It is also clear that CLTS aims to stop open defecation and change the behaviour of a whole community (Kar and Chambers, 2008, p.10). In other words, reduction in open defecation will mean the advancement made by CLTS. Furthermore, consistent monitoring before and after triggering, prior and post CLTS campaign are always a challenge for the field work.

In terms of hygiene intervention, handwashing with soap at a critical time, such as before eating food, after using the toilet and after handling a child's faeces, can be a good indicator to be monitored. Despite raising public awareness on good hygiene practice to mothers identified as the most effective hygiene intervention, it may not be readily monitored compared with

handwashing with soap which is essentially the output of the former intervention. In other words, monitoring handwashing with soap is also an indirect indicator for raising public awareness on good hygiene practice to mothers.

Indicators for post 2015

Improving the indicators will highlight the period of post 2015. There exists no indicator on hygiene promotion in MDG at the moment, new indicators on hygiene promotion are therefore necessary to be added for post 2015, thereby accessing the improved sanitation and safe water for each children as the basic child right . For example, handwashing with soap can be seen as a good indicator to trace the behaviour change for children. Moreover, it is probably a good way to integrate water and sanitation, along with hygiene interventions as a package indicator. In other words, water and sanitation are currently two separate MDG targets with different indicators. The majority of countries focus on water while neglecting sanitation. In this case, they can achieve one target at least. If the comprehensive indicator can be set to measure the progress on a whole, it may accelerate the progress on sanitation and hygiene interventions on child survival and development. Finally, water quality is also suggested to put to the indicators rather than the coverage alone.

Strengthen monitoring at low level

It is suggested that monitoring at national, regional and community levels should be further strengthened, particularly in the regional and community levels. If the community and regional cannot collect the reliable data, the information at national level will not be available and cannot guide the policy and strategy, even funding.

Public health assessment

It is suggested that the multi-sectoral public health assessment is carried out with the leadership of health sector, including sanitation provision in terms of coverage, type, appropriate nurse, cost as well as the population use of that, understanding of it and hygiene practices.

Surveillance system

It is proposed that a functional surveillance system is built up gradually at both levels. The multi-sector team should be set up and share the data within the various sectors. For example, the technical groups at the community level are set up for surveillance, so the community gives response to the health sector directly in Nepal.

Chapter 7 Conclusions and Recommendations

Evidence from a wide range of sources proves that unimproved sanitation and poor hygiene practices, along with unsafe water are the root cause for childhood diseases, which result in the high child mortality and morbidity, such as diarrhoea.

In other words, not achieving the sanitation MDG will lead to failure of the health MDG for child, particularly for under-five children. The relationship among sanitation and hygiene, child survival and development and MDG in this research is demonstrated in figure 7.1.



The aim of this research is therefore to look at the viability of the health sector integrating certain sanitation and hygiene interventions along with associated impact indicators, thereby accelerating progress towards the track MDG targets in Sub-Saharan Africa.

Figure 7.1 The relationship among sanitation, child and MDG

The main methodologies of the research employed are semi-structured questionnaire, key informative interview and case study. 37 professionals including 24 questionnaire surveyors and 13 interviewees participate in the surveys. They work for a wide range of organizations, covering government, NGO and international NGO (such as UNICEF, EWB, WaterAid), university, multi-lateral and so on. The role of job varies from policy/decision maker, academics/researcher, practitioner, consultant to engineer and social scientist in WASH sector and health sector. In addition, United Republic of Tanzania and Ethiopia are studied as two cases individually.

It was attempted to verify the validity of the hypothesis with this research, particularly by the case study. Despite the fact that there was some successful leadership for sanitation and hygiene interventions by Ministry of Health in Ethiopia, such as Health Extension Programme (HEP), a comprehensive assessment of the outcomes was not available. Moreover the status before the programme initiation and the current position is not known so the improvement

cannot be quantified. Therefore, as there is insufficient evidence, it is not possible to offer clear conclusions on hypothesis H_0 or H_1 .

The research aims are largely achieved. Specifically, the first research aim is to identify which sanitation and hygiene interventions are critical to child survival and development in the surveyed region. Community-Led Total Sanitation and raising public awareness on good hygiene practice to mothers of under-fives children are probably the most critical sanitation and hygiene interventions to child survival and development through the questionnaire survey, thus they can be further employed in the region to speed up the progress. But other sanitation interventions are also necessary depending on the specific contexts.

To identify the most appropriate policy and institutional responses to make sure these interventions reach children is the second research aim. Through case study and interview, the appropriate strategies were identified in Tanzania and Ethiopia. Targets on sanitation and child mortality are confirmed and have fallen. Sanitation and hygiene interventions can therefore be integrated better. Moreover, equity-based policy/strategy is to be recommended particularly for the post 2015. As the fundamental guidance for a number of organizations to deliver their service, such as UNICEF, British Red Cross, the most vulnerable group or children can be focused on with the support of policy or strategy. UNICEF (2010, pp.3-5) has piloted the equity-based approach in 15 countries in the region. It is assessed as the most cost-effective way to improve the sanitation and hygiene interventions in child survival and development, thereby accelerating both related health and sanitation MDG targets.

In terms of most appropriate institutional responses, the shift to public health within the context of the health sector for sanitation and hygiene interventions may be an appropriate institutional arrangement to follow, as it can make sure sanitation and hygiene interventions reach children. Under this institutional model, measurement of child mortality and morbidity as a critical factor in child survival and development can be the primary focus. The department will consist of a multi-discipline team, including public health professionals, sanitation professionals, social

scientist, engineers and so on. The aim of task should focus on changing behaviour rather than facilities provision.

The third aim is to explore what the indicators are for these interventions and how they can best be integrated into child survival and development programmes. No open defecation would probably be a most appropriate indicator for monitoring and assessing the sanitation intervention CLTS, while handwashing with soap at critical times should be a good indicator for hygiene promotion. The best method to integrate the indicator into child survival and development programmes may not be identified due to the dearth of the appropriate programmes and associated comprehensive evaluation report in the case study countries. The defined questions for this research aim thus may not be well answered. They are How to set the indicators mentioned above? and When the actions are intervened and monitored?

As for the final research aim, recommendations on post 2015 in respect of the first three aims have partly introduced above, such as policy and institutional response. Meanwhile, there remain some to be recommended on interventions and indicators. First, the community based sanitation and hygiene interventions are also suggested. It is revealed that these interventions have greater effectiveness on child survival and development in Sub Saharan Africa surveyed countries. Therefore, on top of Community-Led Total Sanitation mentioned in the first aim, community based sanitation/health (or hygiene) clubs and community based management of childhood illnesses (IMCI) are suggested to apply due to relatively high effectiveness. Second, new indicators for MDG are recommended for post 2015. Specifically, hygiene indicators are suggested to add to sanitation MDG. Handwashing with soap is quite probably the appropriate indicator for monitoring. In addition, the indicator of package including sanitation, hygiene practices, as well as water quantity and quality. However it is recommended that the feasibility should be explored further, thereby assessing the progress on sanitation and hygiene interventions, along with water supply on the whole.

Although the research has achieved some research aims mentioned above, there remains

further research to be explored in depth for future in the following areas.

- As for the appropriate the institutional model identified in the research, how to better employ in the real world? In others words, some countries currently practice this model, but the survey result reveal that the system is confronting some challenges. So, it is worthwhile to explore how to improve the system in practice or modify the model in theory and fill in the gaps between the theory model and practical system.
- In terms of monitoring interventions, what is the big difference between the sanitation and hygiene promotion with considering or without considering child survival and development? How to best take advantage of data in child survival and development in sanitation and hygiene interventions? And vice versa.

Lastly, it is necessary to draw on some lessons which are a treasure for researcher's future study and may be a reference for other researchers. Basically, the methodologies applied in the research project have made effect on the related research aims and defined questions. For example, the direct findings have been obtained from the questionnaire survey while in-depth explanations behind the finds are explored by key informative interview. In addition, case study is a good complement to the research. However, the selection of case should be improved in further research, thereby ensuring the sufficient evidence to prove the hypothesis.

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Annex A Research Project Framework

Research Aims	Objectives / Aims achieved by	Defined questions	Methodology
Which sanitation and hygiene interventions are critical to child survival and development?	<ul style="list-style-type: none"> • Which sanitation interventions are critical to child survival and development? • Which hygiene promotion is critical to child survival and development? 	<ul style="list-style-type: none"> • Which sanitation intervention is critical to child survival and development? • Which hygiene intervention is critical to child survival and development? • What kinds of interventions are made at different levels? • Is there any the present health initiatives that have considered sanitation and hygiene interventions? Is so, what are they and what are problems? • Which improved latrine option is the most suitable for children under-five? 	<ul style="list-style-type: none"> • Literature review • Questionnaire • Key informative interview
Which are the most appropriate policy and institutional responses to make sure these interventions reach children?	<ul style="list-style-type: none"> • Looking at the situation in different countries to understand which policy and institutional models assist the aims to find out who was, are or will be responsible for doing the interventions and monitoring the corresponding indicators; • What kinds of interventions are made at different levels; and when the actions are intervened and monitored? 	<ul style="list-style-type: none"> • What are the evidence base for sanitation and hygiene in child survival and development? • What are the most significant sanitation and hygiene factors and people to impacting child survival and development? • What are the constraints to hinder progress on scaling up impact of sanitation and hygiene interventions in child survival and development? • Is there any significant factor or bottleneck related to policy and institutional arrangement? • In terms of policy, what is the most appropriate policy to make sure the effective interventions to reach children in Sub-Saharan Africa? • As for the institutional arrangements, what is the most appropriate response to make sure the interventions to reach children in Sub-Saharan Africa? 	<ul style="list-style-type: none"> • Literature review • Questionnaire • Case study • Documents

<p>What the indicators are for these interventions and how they can best be integrated into child survival and development programmes?</p>	<ul style="list-style-type: none"> • What has happened during the period of the MDGs and the trends that have resulted in some child survival and development initiatives taking on sanitation and hygiene? 	<ul style="list-style-type: none"> • What are the indicators for measuring the interventions in sanitation and hygiene for child survival and development? • How to set the indicators mentioned above? • When the actions are intervened and monitored? 	<ul style="list-style-type: none"> • Literature review • Case study • Documents • Key informative interview
<p>To make recommendations about post 2015 in respect of the above</p>	<ul style="list-style-type: none"> • What are the opportunities for sanitation and hygiene interventions to impact upon child survival and development in future, particularly for 2015 onwards? 	<ul style="list-style-type: none"> • What is the most appropriate policy to ensure the impact of sanitation and hygiene on child survival and development in future, particularly for post 2015? • What is the most appropriate institutional model to follow to ensure the impact of sanitation and hygiene on child survival and development in future, particularly for post 2015? • What are the appropriate indicators for monitoring sanitation and hygiene interventions to impact upon child survival and development in future, particularly for post 2015? • What are the other commendations for sanitation and hygiene interventions to impact upon child survival and development in future, particularly for post 2015? 	<ul style="list-style-type: none"> • Key informative Interview • Literature review • Observations

Annex B MDGs relevant to child survival and development

Goal 1: Eradicate extreme poverty and hunger

Target 1.C: Halve, between 1990 and 2015, the proportion of people who suffer from
hunger

Indicator 1.8: Prevalence of underweight children under-five years of age

Goal 4: Reduce child mortality

Target 4.A: Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate

Goal 5: Improve maternal health

Target 5.A: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio

Target 5.B: Achieve, by 2015, universal access to reproductive health

Goal 6: Combat HIV/AIDS, malaria and other diseases

Target 6.A: Have halted by 2015 and begun to reverse the spread of HIV/AIDS

Target 6.B: Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who
need it

Target 6.C: Have halted by 2015 and begun to reverse the incidence of malaria and other
major diseases

Goal 7: Ensure environmental sustainability

Target 7.C: Halve, by 2015, the proportion of people without sustainable access to safe
drinking water and basic sanitation

Remark: Goal 2: Achieve universal primary education does not mentioned, as it will not be studied in the research

Source: UN, 2008

Annex C Framework for WASH in five Sub Saharan Africa Countries

(Source: USAID, 2008a, 2008b, 2008c, 2008d, 2008e)

Agency	Description
Federal Ministry of Water Resources (FMWR)	<ul style="list-style-type: none"> Overall responsibility for WSS services Policy formulation Data collection Water resources management National funding Research and development Technical support
State Water Agencies (SWAs)	<ul style="list-style-type: none"> Establishment, operation, quality control and maintenance of urban and semi-urban water supply systems License and monitor private water suppliers
Local governments	<ul style="list-style-type: none"> Rural WSS service Establish, fund, and equip Water and Environment Sanitation (WES) departments
Ministry of Environment	<ul style="list-style-type: none"> Some sanitation policy and strategy formulation

Agency	Description
Ministry of Energy and Water Development (MEWD)	<ul style="list-style-type: none"> Water resources management Administers water rights Some financial management of WSS sector
Ministry of Legal Government and Housing (MLGH)	<ul style="list-style-type: none"> Administrative and financial management of WSS services
Department of Infrastructure and Support Services (DISS)	<ul style="list-style-type: none"> Technical support to WSS service providers Oversees development and rehabilitation of WSS infrastructure
National Water Supply and Sanitation Council (NWASCO)	<ul style="list-style-type: none"> Independent WSS service regulation
Commercial Utilities (CUs)	<ul style="list-style-type: none"> Provide WSS service to urban and peri-urban areas 11 CUs exist in eight out of nine provinces
District Water, Sanitation and Health Education Committees (D-WASHE)	<ul style="list-style-type: none"> Promoting sustainability of service through local control and oversight of WSS service which may be provided by local WASH committees or CUs
Rural Water Supply and Sanitation Unit (RWSSU)	<ul style="list-style-type: none"> Works to strengthen the institutional support of rural WSS service providers

Agency	Description
Ministry of Water and Irrigation (MWI)	<ul style="list-style-type: none"> Develops national water policy Overall regulation and monitoring of sector
Water Services and Regulation Board (WRSB)	<ul style="list-style-type: none"> Regulation of WSS services Implements national policy Water rate policies Licenses WSBs Sets standards
Water Services Trust Fund (WSTF)	<ul style="list-style-type: none"> Mobilizes government and donor funds for water supply in poor areas
Water Services Boards (WSBs)	<ul style="list-style-type: none"> Seven WSBs exist at regional level Maintain, plan, develop assets
Water Services Providers (WSPs)	<ul style="list-style-type: none"> Contracted by WSBs to provide WSS services on performance basis at town/community level Typically owned by local authorities
National Water Conservation and Pipeline Corporation (NWPC)	<ul style="list-style-type: none"> Raw water development and conveyance Drills wells; constructs pipelines and conservation structures

Agency	Description
The Ministry of Water Resources (MoWR)	<ul style="list-style-type: none"> Sets policies, strategies, regulations and standards Supports regional water bureaus
The Ministry of Health (MoH)	<ul style="list-style-type: none"> Through the Regional & Environmental Health Dept. (REHD) develops & implements health policies related to sanitation & hygiene Coordinates with MoE on sanitation
The Ministry of Environment (MoE)	<ul style="list-style-type: none"> Shares responsibility of MoH sanitation functions in developing and implementing policies & strategies through MOU agreement
Regional Water Bureaus	<ul style="list-style-type: none"> Made up of 9 regional bureaus and the Dire Dawa area Program planning, management, coordination, & capacity building at regional scale Approve Woreda programs and targets technical assistance as needed to WWD & Town Water Boards
Woreda Water Desks (WWD)	<ul style="list-style-type: none"> Planning, managing, monitoring & evaluation of local service providers set-up at Woreda & community level Decentralization Coordinates NGOs
Town Water Boards	<ul style="list-style-type: none"> Planning & administration of town WSS services Operations are contracted out using performance or service contracts
Addis Ababa Water Supply and Sewerage Authority (AAWSA)	<ul style="list-style-type: none"> Manages and operates the Addis Ababa system
Water Supply, Sanitation and Hygiene Committees (WatSan)	<ul style="list-style-type: none"> Responsible for WSS service at community level

Agency	Description
The Ministry of Water (MOW)	<ul style="list-style-type: none"> National policies and strategy development
Urban Water Supply and Sewerage Authorities (UWSAs)	<ul style="list-style-type: none"> Urban WSS service provider
Office of Regional Administration and Local Government (PMO-RALG)	<ul style="list-style-type: none"> Organized under the Prime Minister's Office Develops formula-based district resource allocation for rural and small town government allocations
Regional Water and Sanitation Team (RWST)	<ul style="list-style-type: none"> Oversees and coordinates WSS initiatives Planning and allocation of resources
Regional Secretariats (RS)	<ul style="list-style-type: none"> Regional representative of the MOW Work closely with PMO-RALG and RWST
Ministry of Health and Social Welfare (MOHSW)	<ul style="list-style-type: none"> Some sanitation policy development
Ministry of Finance (MOF)	<ul style="list-style-type: none"> Main channel for intra-government funding and fiscal transfers
Energy and Water Utility Regulatory Authority (EWURA)	<ul style="list-style-type: none"> WSS Regulator
Communities/ WATSAN Committees	<ul style="list-style-type: none"> WSS service provision and hygiene promotion Implementation of small capital projects

Nigeria Framework for WASH

Zambia Framework for WASH

Kenya Framework for WASH

Ethiopia Framework for WASH

Tanzania Framework for WASH

Annex D Questionnaire:

The impacts and monitoring of sanitation and hygiene interventions in child survival and development in Sub Saharan Africa

1. Working country _____ (or country where you have most knowledge and are basing your responses on)

2. What's your job? Please tick where appropriate(√)

Policy/decision maker _____ Practitioner _____ Engineer _____

Academics / Researcher _____ Consultant _____ Social scientist _____

Other (please state here where appropriate, particularly for health sector) _____

What type of organization do you work for: (e.g. donor, i-NGO, NGO, university, multi-lateral)

3. In your opinion, what have been the most significant sanitation and hygiene factors to impacting child survival and development in your country? Please choose the most important three factors and rank them 1, 2 and 3, with 1 being the most important.

- An enabling national policy (please state the name of the policy)

- Institutional arrangements at national level _____
- Institutional arrangements at sub-national level _____
- Funding _____
- Engineers _____
- Health worker delivery of sanitation and hygiene messages _____
- Other (Please state here where appropriate) _____

4. What do you think are the greatest bottlenecks to hinder progress on scaling up impact of sanitation and hygiene interventions in child survival and development in your country?

5. In your opinion, who are the most important people to influence sanitation and hygiene as essential interventions for child survival and development? Please choose the most important three factors and rank them 1, 2 and 3, with 1 being the most important.

- Policy makers at national level _____
- Subnational level government officers _____
- Implementers (inc. health workers) _____
- Government Donors _____
- Private donors (inc. foundations) _____
- Consultants/Academics _____
- Partnerships and alliances at the global level _____

6. Which improved latrine option do you consider to be the most suitable for children under-five? Please rank the following effectiveness of approaches to achieve sanitation by 1 to 6 with 1 being the most effectiveness.

- Flush toilet _____ ①②③④⑤⑥
- Flush/pour flush to pit latrine _____ ①②③④⑤⑥
- Ventilated improved pit latrine (VIP) _____ ①②③④⑤⑥
- Pit latrine with slab _____ ①②③④⑤⑥
- Composting toilet _____ ①②③④⑤⑥
- potty _____ ①②③④⑤⑥

7. Identify the critical and effective sanitation interventions to impact child survival and development. Please rank the following effectiveness of approaches to achieve sanitation by 1 to 5.

Assessment scale: 1=very high 2=rather high 3=medium 4=rather low 5= very low

- ✓ Sanitation marketing _____ ①②③④⑤
- ✓ Community-Led Total Sanitation (e.g. CLTS, CATS) _____ ①②③④⑤
- ✓ Community based sanitation/ health (or hygiene) clubs _____ ①②③④⑤
- ✓ School-based sanitation /health clubs _____ ①②③④⑤
- ✓ Approaches that emphasis low cost (e.g. the sanitation ladder) _____ ①②③④⑤

8. Identify the critical sanitation and hygiene promotion activities that you believe have the greatest impact on child survival and development. Please rank the effectiveness of following promotion by 1 to 6 with 1 being the most effectiveness.

- ✓ Handwashing with soap at school _____ ①②③④⑤⑥
- ✓ Handwashing with soap at home _____ ①②③④⑤⑥
- ✓ Raising public awareness on good hygiene practice to mothers/primary carers of under fives _____ ①②③④⑤⑥
- ✓ Hygiene promotion to primary school children _____ ①②③④⑤⑥
- ✓ Education on the appropriate use of latrines a(use and maintenance) _____ ①②③④⑤⑥
- ✓ Education about childhood disease prevention (e.g. diarrhoea) to mothers/primary carers _____ ①②③④⑤⑥

9. What's the current institutional arrangement in your country? Please tick where appropriate(✓)

- Health sector provides both sanitation (hardware) and promotion (software) _____
- Water sector provides both sanitation (hardware) and promotion (software) _____
- Water and sanitation sector provides sanitation (hardware) and sanitation promotion(part of software) while health sector conducts hygiene promotion (part of software) _____
- Water and sanitation sector provides sanitation (hardware) while health sector conducts sanitation and hygiene promotion (all software) _____
- Other (Please state here) _____

10. Which institutional arrangement do you think is the most appropriate model to follow to ensure the impact of sanitation and hygiene on child survival and development?

Please tick where appropriate(√)

- Health sector provides both sanitation (hardware) and promotion (software)_____
- Water and sanitation sector provides both sanitation (hardware) and promotion (software) _____
- Water and sanitation sector provides sanitation (hardware) and sanitation promotion(part of software) while health sector conducts hygiene promotion (part of software) _____
- Water and sanitation sector provides sanitation (hardware) while health sector conducts sanitation and hygiene promotion (all software) _____
- Other (Please state here) _____

11. Any suggestions on future development or other comments on the research project are warmly welcome

Annex E List of Key Informative Interview

Item	Name	Agency	Job title	Gender	Date	Duration	Method	Data Storage
1	Melvin Tebbutt	British Red Cross	Shelter& WATSAN advisor	M	5/7/2011, 18.05-18.25	15min	Face to face	Recorded speech
2	Sottie M. Bomukama	Ministry of Water and Environment, Uganda	Director for water development	M	5/7/2011, 17.55-18.01	6min	Face to face	Notes
3		LAGOS state ministry of rural development, Nigeria	Director	M	6/7, 17.25-17.30	5min	Face to face	Recorded speech
4	Dermot Carty	Deputy Director	Office of Emergency Programmes, UNICEF	M	6/7 21.15-21.21	6min	Face to face	Recorded speech
5	Peter Harvey	UNICEF NY, Water, Sanitation &Hygiene Programme	Senior Adviser	M	7/7, 11.50-12.10	19min	Face to face	Recorded speech
6	Cristina Mecerreyes	Amphosze Consulting SL, Spain	Project Manager	F	7/7 19.28-19.45	17min	Face to face	Recorded speech
7	Alezandro Jimenez	Technical University of Catalonia, Barcelona, Spain	Independent Researcher	M				
8	Jeremy Ockelford	-	Independent Consultant	M	8/7, 11.15-11.23	8min	Face to face	Recorded speech
9	Shireen Alchlu	World Bank, water and sanitation, Bangladesh	Field team leader /Anthropologist	F	8/7 11.00-11.13	13min	Face to face	Recorded speech
10	Sara House	-	Independent Consultant	F	8/7 15.30-15.59	29min	Face to face	Recorded speech
11	Om Prasad Gautam	WaterAid Nepal	Social development Advisor	M	8/7 19.52-20.20	28min	Face to face	Recorded speech
12	Maxwell Madzikanga	British Red Cross	Health Advisor_Africa	M	8/7 12.30-12.43	13min	Face to face	Recorded speech
13	Catherine Mears	International Division, British Red Cross	Senior Health and Care Adviser	F	14/7 16.32-16.53	21min	Skype	Recorded speech

Annex F Reference for interview questions

QA Interviewee background information

QA1 Name

QA2 Country

QA3 Agency/Organization

QA4 Job title

QA5 Gender

QA6 Contact information: email

QB Institutional management, policy, legislation and regulation

• For implementer, decision maker

QB1 Are you or your agency responsible for sanitation service (or hygiene promotion, or both)? If so, to QB2. If not, to Q11. (E.g., hand washing with soap& the right use of latrine)

QB2 If so, Could you please say something in detail? what's that? For instance, what's the main task for your job (decision making, planning, designing, construction, monitoring, etc.).

QB3 Which level? Is that national level, subnational level or others?

QB4a (Available for planning or designing)

Do you need any approval for the planning/designing? From who? Who make decisions to do it or not?

Is there any major policy or regulation affect your job?

QB4b (For construction people)

Who makes decisions to do the projects or not? Who assess the outcome of projects?

Is there any major policy or regulation affect your job?

QB4c (For monitoring people)

What kinds of indicators are monitored now? Any tools? When? How often?

Is there any major policy or regulation affect your job?

QB4d (For decision makers)

What are the major rationales/reasons to decide whether or not to implement the project? Where, when?

Is there any consideration on incidence of disease? diarrhoea. If so, how to get the data? Any tool? MBB

QB5 Are there any cooperation with other sector, particularly horizontal sector? E.g., health sector

QB6 Are there any problems for your job? (Funding/HR, talents/ training (skills))

QB7 Do you have any suggestions for improving sanitation and hygiene? (Policy, legislation or regulation, capacity building, funding)

QB8 Do you think is it possible for health sector to have an overall responsibility or leading role for S&H?

If so, what's role for WASH sector? If not, why? The main challenge?

QB11 If not, do you know who is responsible for sanitation and hygiene? Are you happy to say sth about them in your country? For example, policy, legislation, institution, funding, etc. And could you have any comments on improving sanitation and hygiene?

• Donors / NGOs

QB1 Do your organization contribute to improve sanitation and hygiene in sub-Saharan Africa?

QB2 what's the major job responsibility, both sanitation and hygiene? For instance, what's the main task for your job (e.g., decision making, monitoring).

QB3 What's the main criteria for making decision (where, when)? Particularly in terms of child survival and

development, for example, death rate of diarrhoea under-five (if so, how to get data information)? Tools?

QB4 When conducting the project, how to monitor and assess the project? What's the main indicators for monitoring? When? How often? Any tools?

QB5 Do you think which sanitation and hygiene intervention is the most effective way?

QB6 Are there any cooperation with central or local government? Which department? (health sector)

QB7 Do you have any suggestions for improving sanitation and hygiene? (Policy, legislation or regulation, capacity building, funding)

QB8 Do you think is it possible for health sector to have an overall responsibility or leading role for S&H? If so, what's role for WASH sector? If not, why? The main challenge

- **Academic/Consultant**

QB1 What's your role in SH? (E.g. give suggestions on decision-making, planning, monitoring, assessment)

QB2 When you give suggestion on making decision, what's the main elements? Is there consideration on the child survival and development, for example, death rate of diarrhoea under-five (if so, how to get data information)? Tools?

QB3 When conducting the project, how to monitor and assess the project? What's the main indicators for monitoring? When? How often? Any tools?

QB4 Do you think which sanitation and hygiene intervention is the most effective way?

QB5 Do you have any suggestions for improving sanitation and hygiene? (Policy, legislation or regulation, capacity building, funding)

QB6 Do you think is it possible for health sector to have an overall responsibility or leading role for S&H? If so, what's role for WASH sector? If not, why? The main challenge