MOBILE PHONE BASED APPLICATIONS IN IMPLEMENTING CHOLERA PREVENTION AND CONTROL EDUCATION IN COMPLEX HUMANITARIAN EMERGENCIES – A FEASIBILITY STUDY IN MOGADISHU, SOMALIA

by

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SUPERVISOR: DR K A MABOE

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D E C L A R A T I O N

I declare that **MOBILE PHONE BASED APPLICATIONS IN IMPLEMENTING CHOLERA PREVENTION AND CONTROL EDUCATION IN COMPLEX HUMANITARIAN EMERGENCIES – A FEASIBILITY STUDY IN MOGADISHU, SOMALIA** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.

16 February 2015

FULL NAMES   **DATE**

Jesee Wainaina Kinyanjui

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ABSTRACT

The aim of this study was to identify and describe the viability of using cell phones to conduct rapid assessments, pass key health messages and conduct monitoring and evaluation in complex emergencies. The study setting was in a cholera outbreak response situation in Mogadishu, the capital of war torn Somalia.

Quantitative, descriptive research was conducted to determine the feasibility. Data collection was done using structured questionnaires, self-response mailed questionnaires as well as follow-up telephone interviews. Three groups of respondents participated in the study. The respondent groups included 383 internally displaced persons (IDPs), 5 water, sanitation and hygiene (WASH) specialists and 5 specialists from 5 mobile phone providers in Mogadishu. The study showed that there is good potential for an effective, cost efficient and scalable short message service (SMS) based public health education platform in Somalia. The study has also come up with recommendations on key considerations to ensure viability of the Public health education platform.

It is envisaged that the recommended platform shall increase speed, access, spontaneity, coverage and reduced cost per capita, a combination of which form the hallmark of a good emergency health response. Ultimately this effort shall contribute to improved health, reduced suffering and reduced deaths in fragile humanitarian contexts.

KEY CONCEPTS

Feasibility study, Quantitative descriptive study, Mobile phone platform, restricted access, insecure areas, Cholera outbreak, Complex emergency, Mogadishu, Somalia, Internally displaced persons (IDP) camps, SMS platform, Feasibility, mVouchers, Interactive education, Non food items (NFIs) distribution.

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LIST OF ACRONYMS

3G	Third generation
AMISOM	African Union Mission to Somalia
ALNAP	Active Learning Network for Accountability and Performance
API	Application programming interface
AWD	Acute Watery Diarrhoea
CAP	Consolidated Appeals Process
CARE	Cooperative for Assistance Relief Everywhere
CHAP	Common Humanitarian Action Plan
DBMS	Database management system
DFID	Department of Foreign and International development
DOI	Diffusion Of Innovations
ECHO	European Commission for Humanitarian Coordination
EPI	Expanded Programme on Immunization
FEWSNET	Famine Early Warning Systems Network
FSNAU	Food Security and Nutrition Analysis Unit
GAM	Global Acute Malnutrition
GIS	Geographic information system
GPS	Global Positioning System
GPRS	General Packet Radio Service
GSM	Global System for Mobile communication
GUI	Graphical User Interface
HCI	Human-computer interaction
HIF	Humanitarian Innovation Fund
HTML	HyperText Markup Language
IASC	International Agencies Standing Committee
IDPs	Internally Displaced Persons
IEC	Information education and communication
IRC	International Rescue Committee
IRIN	Integrated Regional Information Networks
ITU	International Telecommunications Union
MORB	Mobile Originated Reverse Billing
NFI	Non Food Items
NGO	Non Governmental Organisation
NRC	Norwegian Refugee Council
OXFAM	Oxford Committee for Famine Relief

PC	Personal computer
PDA	Personal digital assistant
SAM	Specific Acute Malnutrition
SMS	Short Message Service
SIRIP	Somalia interactive radio instruction program
TFG	Transitional Federal Government
UML	Unified Modelling Language
UMTS	Universal Mobile Telecommunication
UNICEF	United Nations International Children's Emergency Fund.
UNDP	United Nations development program
UNHCR	United Nations High Commissioner for refugees
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
WAP	Wireless Access Protocol
WASH	Water Sanitation and Hygiene
WHO	World Health Organisation
YBI	Youth Business International

LIST OF ANNEXURES

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

Somalia is defined by its seemingly endless crises − 20 years as a collapsed state, failed peace talks, violent lawlessness and warlordism, internal displacement and refugee flows, chronic underdevelopment, intermittent famine, piracy, regional proxy wars, and Islamic extremism. Between 2012 and 2014, Somalia has descended into terrible levels of displacement and humanitarian need, armed conflict, assassinations, political meltdown and radicalisation (Menkhaus 2008:1). As a result, access to affected areas is not possible even in times of acute disease outbreaks such as cholera, when urgent humanitarian response is needed.

Cholera is endemic in Somalia has had cyclic outbreaks since 1992 when state run health services collapsed. In 2012 a total of cholera 10,213 cases (70% of them being children under five) were reported in Mogadishu (WHO 2012:1). During the first quarter of 2013 there were widespread cholera outbreaks in several regions, the most severe one being in Mogadishu. According to the 2013 World Health Organization (WHO) issue of the Somalia emergency health update, cholera in Mogadishu accounted for 3.5% of the total case load in 2012 (WHO 2013:1). This was further exacerbated by the increased internally displaced persons (IDPs) numbers in the city. In 2012 alone an estimated 100,000 IDPs moved into Mogadishu due to ravaging famine in the countryside, adding to the 400,000 IDPs that had been there since 2009 (WHO 2013:2).

In spite of all these challenges, Somalia has a well-functioning mobile phone network covering most of the country. According to the International Telecommunication Unit (ITU) World Telecommunication/ICT Indicators Database (ITU 2014:7), Somalia's mobile phones have increased seven fold from 0.9 million subscribers in 2011 to 5,138,000 subscribers in 2014 translating to 49.38% national mobile phone penetration rate. According to Vital Wave Consulting (2009:8) by the end of 2013, half of all individuals in remote areas of the world were projected to own mobile phones.

This growing uptake coupled with ubiquity capabilities makes mobile phones a viable technology that can support health programme implementation in inaccessible areas.

This research therefore, entailed conducting a study on the feasibility of using mobile phones to implement cholera prevention and control education programme in complex emergencies, particularly in situations where access is denied by insecurity. The study looked at the viability of using cell phones to conduct rapid assessments, pass key health messages and conduct monitoring and evaluation in a cholera outbreak response setting in Mogadishu, the capital of war torn Somalia.

1.2   BACKGROUND TO THE STUDY

1.2.1 Impaired humanitarian access

The humanitarian challenge in Somalia is complex and unpredictable. There is little "humanitarian space" in which aid can safely be delivered. An important indicator of constraints affecting humanitarian space is the number of aggressive incidents involving humanitarian personnel and assets. According to the consolidated appeals process (CAP) (CAP 2013:1) there have been increases in abductions and killings of humanitarian workers in the South – Central regions of Somalia. Bureaucratic impediments and restrictions to humanitarian agencies is another challenge. The extensive use of check-points and roadblocks make access to communities onerous and time consuming, and coupled with the uncertainty and seemingly arbitrary nature of requests for assistance, cause delays in the provision of aid (United Nations Office for the Coordination of Humanitarian Affairs [UNOCHA] 2013:5).

While the humanitarian community is still able to maintain programmes primarily through national staff and Somali Non-Governmental Organisations, it increasingly finds itself having to provide assistance where it can, rather than where needs are highest. The ability to move in an unrestricted manner outside established compounds remains a challenge. As a result, there is very limited capacity for humanitarian agencies to manage and monitor the provision of aid; or to determine the actual impact assistance and service delivery has on the beneficiaries (UNOCHA 2011:6).

In an effort to overcome these challenges, local Somali non-governmental organisations, individuals and institutions, have increasingly become directly involved in the provision of assistance supported from outside Somalia by international aid agencies. This approach often referred to as "remote control", raises issues of overall capacity of the local partners, both in terms of effective delivery of assistance and in terms of the skills needed for proper monitoring, accountability and transparency. In this context, the need for an innovative approach to support national actors, improve delivery of assistance, accountability and preparedness for future crisis, as well as to ensure a successful implementation of the Common Humanitarian Action Plan (CHAP) is necessary and urgent (UNOCHA 2011:32).

1.2.2 Health-related humanitarian situation

By the end of 2013, the number of internally displaced persons (IDPs) in Somalia was estimated to be 1.6 million out of a population of about 10.8 million in Somalia (World Population Report 1:2014). Among them, one million Somalis fled Mogadishu in 2007 and 2008, following an outbreak of violence between the Transitional Federal Government (TFG) and insurgents starting in February 2007. Over 500,000 of them now live in makeshift shelters along the road linking Mogadishu to a town called Afgooye, some 30 Kilometres to the west of the capital. Over half a million others live in neighbouring countries as refugees (UNHCR 2013:1).

As a result Somalia has some of the worst health statistics in the word. Adult mortality stands at 381/1,000 (male 447/1,000, female 312/1,000), maternal mortality is at 1,400 /100,000 while under-five mortality is at 142/1,000 (male 140/1,000; female 144/1,000) (WHO 2013:7). In addition, the ongoing conflict and the consequent conditions of insecurity have had a debilitating effect on the social services infrastructure and particularly health provision. Increasingly, gaps in the coverage of essential and life-saving health services are compounded by inadequate access to safe water and sanitation, and compounded by eroded livelihoods and mass displacement. The frequency of communicable disease outbreaks such as cholera and measles, rising rates of severe acute malnutrition, decreasing immunisation rates have seriously impacted on the health of the most at risk groups, particularly women and children (UNOCHA 2011:5).

In 2011, Somalia experienced one of the worst droughts in its history. According to the 2012 Consolidated Appeals Process (CAP 2012:5), the nutrition situation indicated a deteriorating crisis countrywide. The national median rate of Global Acute Malnutrition (GAM) rate was above the World Health Organisation (WHO) emergency thresholds at 15.2% and 2.4% for Severe Acute Malnutrition (SAM) rate. This translated to an estimated 230,000 acutely malnourished children, of whom 35,000 were severely malnourished, representing one in seven and one in 42 of all children under five respectively.

October to March is one of the many peak seasons for cholera in Mogadishu. According to the WHO emergency health update of December 2011, a cumulative total of 9,839 cholera cases had been treated at Banadir Hospital, the main hospital in Mogadishu since April 2011. Out of these 6,957 (70%) cases were children under the age of five. There were a total of 405 deaths resulting in a fatality rate of 4.1%, which was four times, above the WHO acceptable rate of below 1% (WHO 2011:1). Health, water and sanitation actors estimated a 100,000 (compared to 67,000 in 2007) cholera cases including 80,000 moderate cases and 20,000 severe cases by end of the cholera season in March 2013 (IRIN Somalia 2014:1).

1.3   RESEARCH PROBLEM

Undoubtedly, a multiplicity of factors has exacerbated deterioration of the already debilitated public health situation particularly in the overcrowded IDP camps around Mogadishu. This has resulted to increased need/urgency for life saving public health interventions. Consequently public health actors are challenged to scale up the delivery of assistance while being progressively limited by inaccessibility to affected communities.

This rapidly deteriorating situation requires that the health actors change tact and employ alternative approaches that can improve delivery of health services through increased reach and bolster community participation. Due to limited access to many parts of South/Central Somalia, small windows of opportunity will need to be maximised to deliver life-saving assistance.

The new approach therefore, must be innovative, transformative, low cost and based on what is at the community's disposal (Krishna, Boren & Balas 2009:234). Employment of technology is one of the ways that can address the challenges present in Somalia.

One technology that can be employed to facilitate interactive community participation and ensure maximised reach and beneficiary accountability in the delivery of public health education to the unreachable communities is mobile telephony (Zurovac, Sudoi, Akhwale, Ndiritu, Hamer, Rowe & Snow 2011:84). Mobile phone technology is one of the digital technologies with widest reach to unreachable communities in developing countries like Somalia (Mechael 2009:154). This technology has capability to enable programme implementation to anyone, anytime and anywhere by removing location, time and other constraints (Ravi & Prasanna 2004:2673). In humanitarian and disaster response, mobile phone application is a new entrant and is gaining recognition as a technology that can aid emergency response. In the recent big emergencies in Haiti a number of mobile phone applications were used. Notable mobile phone applications used were Ushahidi − used mainly in incident mapping and Episurveyor and Poimapper which were used for data collection during the first stages of the emergency.

However none of the existing applications have been used to engage and provide public health education to affected communities. Furthermore, all of the existing applications are stand-alone applications addressing only one aspect of public health promotion. None integrates all the critical aspects of public health promotion in humanitarian emergencies and have not been tried in hard to reach/insecure emergencies. There is therefore no off the shelf ready to use mobile phone based public health promotion application that is available to address the challenges present in Somalia, particularly in Mogadishu where the worst cholera outbreak in years happened in the first and second quarter of 2012.

This brings to fore the urgent need for a mobile application platform that integrates incident mapping, data collection and an interactive communication interface that supports public health education. The resultant platform should be contextualised to the unique needs and ground realities in Somalia (Zimic, Coronel, Gilman, Luna & Curioso 2009:639).

1.4   AIM OF THE STUDY

The main aim of this study was to identify and describe the feasibility of using mobile phones to implement cholera prevention and control education programme in complex emergencies, particularly in situations where access is denied by insecurity. The study looked at the viability of using cell phones to conduct rapid assessments, pass key health messages and conduct monitoring and evaluation in a cholera outbreak response setting in Mogadishu, the capital of war torn Somalia.

1.5   RESEARCH OBJECTIVES

The following research objectives were formulated to guide the study:

- To describe the level of access, channels of delivery and utilisation of cholera prevention and control information by Internally Displaced Persons (IDPs) in Mogadishu camps.
- To describe the factors or barriers that would influence uptake of mobile phone based cholera prevention and control education approach by the internally displaced persons (IDP) community in Mogadishu.
- To investigate the interest and capacity of key players (including mobile phone providers and key public health humanitarian actors) to support a mobile phone based cholera prevention and control education in Mogadishu.

1.6   RESEARCH QUESTIONS

The following were the three key questions that have been answered in this study:

- What was the level of access, delivery channels and utilisation of cholera prevention and control education by Internally Displaced Persons (IDPs) in Mogadishu?
- What were the enabling factors or barriers that would influence adoption and use of mobile phone based cholera prevention and control education by the IDP community in Mogadishu?
- What were the interest levels and capacities of the key public health humanitarian actors and mobile phone providers regarding supporting a mobile phone health cholera prevention and control education in Somalia?

1.7   SIGNIFICANCE OF THE STUDY

This study will contribute to the improvement of coverage and maximise reach of public health services to communities in hard to reach areas during emergencies. It is envisaged that successful development of a scalable mobile phone based integrated public health promotion will enable actors to collect data quickly, engage communities within and outside of Mogadishu and provide an interactive communication medium to educate communities on disease prevention, particularly cholera. It will also help humanitarian actors to monitor and evaluate programme delivery remotely.

1.8   DEFINITIONS OF TERMS

1.8.1   Definitions of key concepts

1.8.1.1   Feasibility study

Feasibility study looks at the viability of an idea by looking at technical ability, cost and other factors that would pose a challenge (Wolfe 2010:76).

1.8.1.2   Internally Displaced Persons (IDPs)

IDPS are persons who have been forced to flee their home/place or residence but who remain settled within their country's borders (The migration network 1992:1).

1.8.1.3   Humanitarian aid/response

Humanitarian aid refers to material or logistical assistance provided for humanitarian purposes, typically in response to humanitarian crises. The primary objective of humanitarian aid is to save lives, alleviate suffering, and maintain human dignity (Humanitarian coalition 2013:1).

1.8.1.4   Complex humanitarian emergency

Complex humanitarian emergency is a crisis in a country, region or society where there is total or considerable breakdown of authority resulting from internal or external conflict and which requires an international response that goes beyond the mandate or capacity of any single agency and/ or the ongoing United Nations country programme (Humanitarian coalition 2013:1).

1.8.1.5   Remote programme implementation

Remote programme management is about managing team or programme activities from a distance. Remote programme implementation and management becomes necessary when it is not possible to directly reach the affected community because of insecurity or weather related challenges (Mechael 2009:264).

1.8.1.6   Mobile health

This is a term used for the practice of medical and public health, supported by mobile devices and commonly used in reference to using mobile communication devices, such as mobile phones and personal digital assistants (PDAs), for health services and information (Vital Wave Consulting 2009:9).

1.8.2 Operational definitions

1.8.2.1   Enablers

These factors that would enhance uptake of mobile phone based of cholera prevention and control education approach by the IDP community in Mogadishu.

1.8.2.2   Inhibitors

These are factors that would prevent uptake of mobile phone based of cholera prevention and control education approach by the internally displaced persons (IDP) community in Mogadishu.

1.8.2.3 Stakeholder interest

Interest by key stakeholders that include phone companies and key humanitarian organisations to implement mobile phone based cholera education in Mogadishu.

1.8.2.4 Viability

This refers to the practicality of implementing a mobile phone based public health education platform in Mogadishu.

1.8.2.5 Cost efficiency

This refers to the minimal expenditure of money, time, and other elements necessary to achieve a functional mobile phone based public health education platform in Mogadishu.

1.8.2.6 Scalability

This refers to the ability of the mobile phone based health education platform to be enlarged to accommodate growth. Also refers to the ability to be adapted for use in other contexts.

1.9 FOUNDATIONS OF THE STUDY

This study was based on the diffusion of innovations theory as described below.

1.9.1 Diffusion of Innovations (DOI) Theory

The adoption of a new product or idea by the general public falls under the theory of Diffusion of Innovations (DOI). Originally developed with respect to the dissemination of new agricultural techniques, it has since been applied to many other fields. The theory was fully laid out in 1962 by Rogers (1995). With respect to public health, experience has shown that the most effective interventions are those that require no action by the public at large. Health behaviours that require more effort, such as changing one's diet or hand washing are much harder to implement.

First the appropriate knowledge must be disseminated, and then the individual must be convinced to implement the change. How to effectively promote an intervention and overcome the seemingly inherent "health inertia" of the populace is currently a hot topic of research.

According to Edberg (2007:12), diffusion of innovations can be thought of as "the process by which a behaviour or technology makes its way into a population and is (or is not) adopted. The DOI theory categorises the process into five stages: innovation development, dissemination, adoption, implementation and maintenance. Table 1.1 below depicts the 12 key attributes to successful introduction of a new approach.

Table 1. 1   Product attributes of a successful innovation

Advantage	Is the innovation better than previous options?
Compatibility	Does the innovation fit with the intended user?
Complexity	Is the innovation easy to use?
Trialability	Can it be tried out before committing to it?
Observability	Are the results easy to measure?
Impact on Social Relations	Is the innovation disruptive to people's daily lives?
Reversibility	Can it be discontinued easily?
Communicability	Can it be understood clearly and easily by all users?
Time	Does it take too long to implement?
Risk and Uncertainty level	Is there a minimum amount of risk involved?
Commitment	Can it be done without a large investment of resources?
Modifiability	Can it be changed over time to fit updated needs?

(Adapted from Edberg 2007:14)

1.9.2 Conceptual framework of variable relations

The graphical model below depicts both the independent and dependent variables. The study measured the following independent variables:
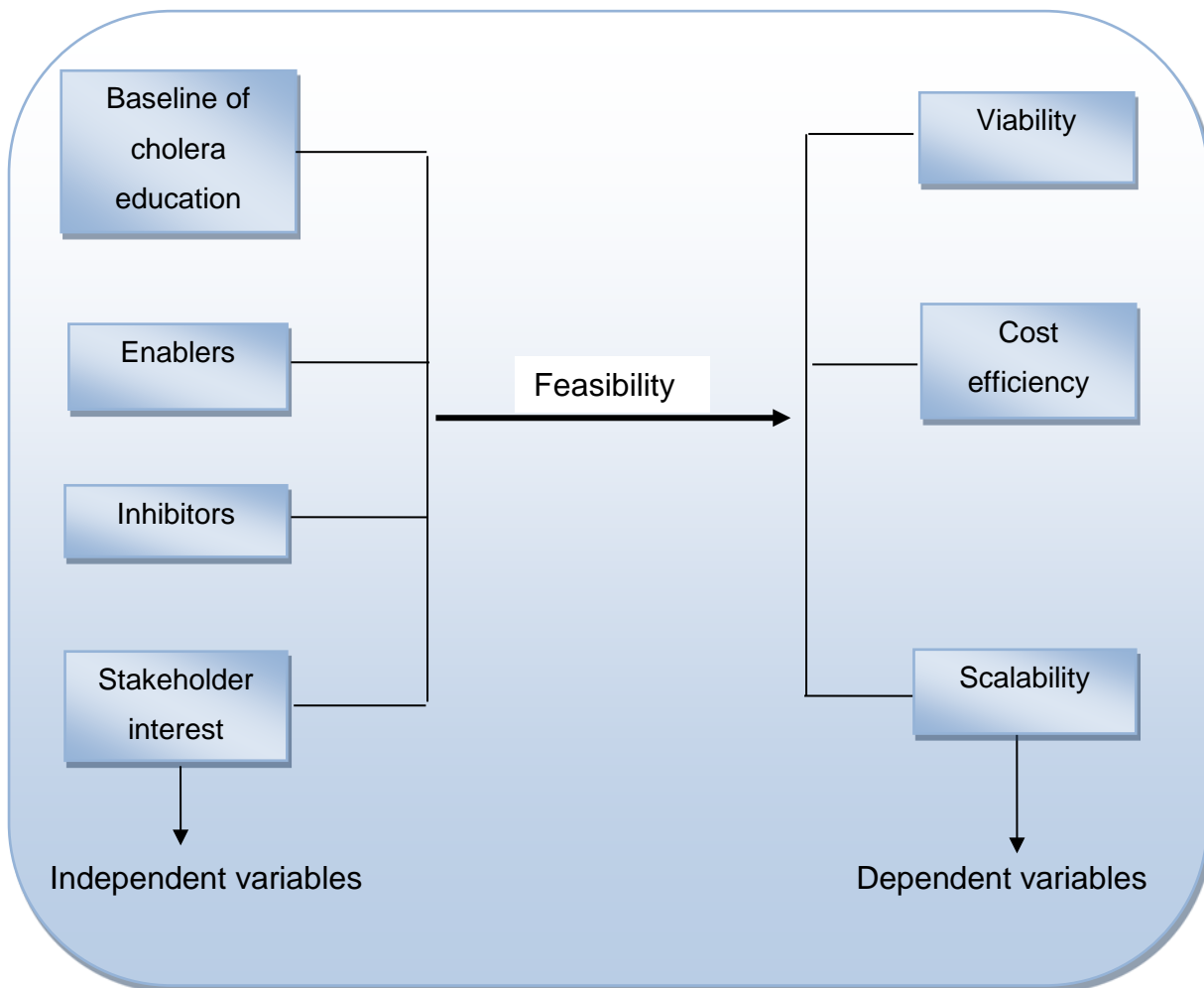
Figure 1.1   Conceptual framework of variable relations

Developed by Researcher (2011)

1.10   RESEARCH DESIGN AND METHOD

1.10.1   Study design

The research design used in this study was cross-sectional. The choice of this study design was informed by the nature of the information required for the feasibility study which, can be collected from individuals and institutions at a point in time (Johnson & Christtensen 2004:28).

1.10.2   Study methods

Quantitative research methods were used for both the household survey as well as gathering views from other stakeholders comprising humanitarian public health actors and mobile phone providers in Mogadishu.

1.10.3   Data collection and analysis

Data collection was done from two study population sets. The first set comprised household survey that involved face to face administration of questionnaires to house hold heads by trained research assistants. Data recording from this category was entered on phones and sent direct to a central database hosted by mobile data provider called data dyne.

The second set comprised self-response questionnaires sent to technical heads of both the mobile phone companies as well as the humanitarian organisations. Data analysis was done using Statistical Package for Social Sciences (SPSS) version 14.0 with the support of a professional statistician.

1.10.4   Validity and reliability

Reliability is the degree to which a research instrument produces stable and consistent results while validity refers to how well the instrument measures what it is purported to measure (Bless & Higson-Smith 1995:10). The research instruments were designed and tested to ensure both validity (internal and external validity) as well as reliability. This ensured that the findings of the study provided a true reflection of reality, rather than being the result of extraneous variables. The selection of the study sample was done to ensure that it was representative of the broader population and that the study setting was representative of other environments.

1.11 STUDY SETTING

The study was conducted in Mogadishu, the capital of Somalia which is one of the largest complex emergencies of our time. Mogadishu is plagued by cyclic cholera outbreaks often resulting to an emergency within a complex emergency and further complicating humanitarian response. The setting of this study therefore revolved around the cholera theme (see annexure 7).

1.12 LIMITATIONS OF THE STUDY

This is a descriptive study. As such its findings are based on views from respondents and can only present norms not standards. The main limitation of the study is that the research method used can only determine practices rather than causes, reasons, meanings or possibilities. The other key limitation was that data collection was managed remotely. Although measures had been put in place to safeguard data quality, remote data collection may guarantee that all the views given were accurate.

1.13 ETHICAL CONSIDERATIONS

There are several reasons why it is important to adhere to ethical norms in research. Ethical norms promote the aims of research, such as knowledge, truth, and avoidance of error. Since research often involves a great deal of cooperation and coordination among many different people in different disciplines and institutions, ethical standards promote the values that are essential to collaborative work, such as trust, accountability, mutual respect, and fairness (Resnik 2011:2).

The following ethical considerations were adhered to during this study:

- Informed consent − This is a process by which the researcher discloses appropriate information to a respondent to enable them make a voluntary choice to accept or refuse participation in the interview process.
- Confidentiality − Refers to the need to safeguard personal information revealed to the researcher. This shall serve to build a relationship of trust and respect between the researcher and the respondent.

- Privacy − Refers to the right of a respondent to refuse to give certain information that they are uncomfortable with. Respondents cannot be forced to reveal information that they do not wish to reveal.

Ethical clearance from both the UNISA (see annexure 2) and the Somalia WASH cluster was sought and granted (see annexure 3).

1.14   STRUCTURE OF THE DISSERTATION

Chapter 1: Introduction and background

This chapter introduces the purpose of the research, the problem statement, research questions and the objective of the research. It also states the importance of the study and why it was undertaken; lastly, it highlights the limitations and shortcomings of the study.

Chapter 2: Literature review

This chapter reviews the theoretical literature to determine the wider perspective of the topic and problem complexity that are external and gathered through the experience and knowledge of experts in the field. The focus of this chapter is the creation of the academic case with regards to the research study.

Chapter 3: Research design and methodology

In this chapter, the information and understanding gained in the literature review and problem analysis were used to design the research approach and instrument used in the survey.

Chapter 4: Research results and discussion

The research results and study findings have been interpreted and discussed to determine whether the problem statement is disproved.

Chapter 5: Conclusion and recommendations

In this chapter, conclusions have been drawn from the data analysis and findings of the research. A number of recommendations have been made as well.

1.15   CONCLUSION

The results from the study indicated that it is feasible to establish an innovative, transformative, low cost SMS based mobile phone platform to carry out health education in Somalia. It is envisaged that successful development of a scalable mobile phone based integrated public health promotion will enable actors to collect data quickly, engage communities within and outside of Mogadishu and provide an interactive communication medium to educate communities on disease prevention, particularly cholera. Also it will help humanitarian actors to monitor and evaluate programmes delivered remotely

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In chapter 1 an orientation of the study detailing out the background, purpose and objectives of the study were presented. The diffusion of innovations (DOI) theory and the conceptual framework of variable relations upon which the foundation of the study is built were discussed.

This literature review chapter presents and discusses available literature relating to humanitarian challenges in Somalia and the use of mobile phone technology in public health. The chapter is presented in 6 key sections, which are the following:

- Section 2.2 presents the socio political situation in Somalia and the challenges that the country has faced after 22 years of protracted conflict.
- Section 2.3 discusses the uniqueness of humanitarian needs in Somalia and the shrinking humanitarian space and how this is impacting on humanitarian responses.
- Section 2.4 discusses remote programming as an alternative approach to providing humanitarian assistance in Somalia and the inherent challenges that hamper it.
- Section 2.5 discusses the potential of mobile phone technology as a bridge to remote programming challenges.
- Section 2.6 summarises the humanitarian dilemma in Somalia and the inadequacy of the existing mobile phone based health applications to solve the challenges facing humanitarian work, thus justifying the need for a search for a more integrated and scalable mobile phone based public health promotion system that can operate in challenging contexts like Somalia.

2.2   SOMALIA'S SOCIO POLITICAL CONTEXT

The year 2014 will not only mark 22 years of conflict in Somalia, but will also herald the first generation of Somali children who come of age without ever having lived through a single year of peace. Protracted conflict, economic collapse, and drought conditions continue to drive the humanitarian crisis in Somalia resulting in increased population displacement, greater urban vulnerability and widespread acute malnutrition. This is set in a backdrop of irregular and shrinking humanitarian access to the communities at risk.

By the end of October 2014, the number of internally displaced persons (IDPs) in Somalia was estimated to be 1.6 million out of a population of about 8 million in south-central Somalia. Among them, one million Somalis fled Mogadishu in 2007 and 2008, following an outbreak of violence between the Transitional Federal Government (TFG) and insurgents starting in February 2007. Over 366,000 of them now live in makeshift shelters along the road linking Mogadishu to a town called Afgooye, some 30 Kilometres to the west of the capital. Over half a million others live in neighbouring countries as refugees (UNHCR 2012:1).

Recent developments though, point to a more promising outlook of Somalia's social political situation. In September 2012 a new government was established upon expiry of the transitional federal government's mandate. The country now has a new president Hassan Sheikh Mohamud, an academic and civil rights activist with little political experience. Since the beginning of November 2012 the first central government in 20 years was established. Optimism is high but it will take many years to put in place proper and adequately functioning government structures in the entire country.

2.2.1 Health and state of public health infrastructure in Somalia

Civil strife in Somalia has had a debilitating effect on social services, infrastructure and health provision. Increasing life-threatening gaps in the coverage of essential and life-saving health services are compounded by inadequate access to safe water and sanitation, increasingly eroded livelihoods, and mass displacement. The frequency of communicable disease outbreaks such as cholera and measles, rising rates of severe acute malnutrition, decreasing immunisation rates have seriously exposed the health of risk groups, particularly women and children (UNOCHA 2011:5).

With the increased population in humanitarian need in Somalia, the burden on and demand for basic health services has increased, within the context of an already dilapidated health system with very low levels of service coverage and poor health indicators.

According to the August 2012 Food Security and Nutrition Analysis Unit (FSNAU) report (FSNAU 2013:6), the risk of communicable diseases/outbreaks, including cholera and measles, is likely to increase due to unhygienic living conditions, inadequate sanitation coverage, weakened immune systems due to poor nutrition and lack of adequate livelihoods, stress, and limited access to safe drinking water. Acute respiratory infections and diarrhoeal diseases remain the main causes of morbidity and mortality that can be easily treated or prevented (FSNAU 2013:7). The tabulated summary in table 2.1 depicts the humanitarian situation in Somalia.

Table 2.1 Tabulated summary of basic humanitarian and development indicators for Somalia

Basic humanitarian and development indicators for Somalia

		Most recent data	Previous data or pre-crisis baseline	Trend *
Economic status	Gross domestic product per capita	$220 (UN Statistics Division 2009)	$298 (UN Statistics Division 2008)	↓
	Percentage of population living on less than $1 per day	43.20% (Somalia MDG Report 2007)	not available	N/A
Health	Maternal mortality	1,200/100,000 live births (UNICEF: Childinfo Statistics 2010)	1,400/100,000 live births (World Health Statistics 2010)	↑
	Life expectancy	51 years (UNDP – HDR 2011)	51 years (WHO: Global Health Observatory,2009)	↔
	Number of health workforce (medical doctor, nurse, midwife) per 10,000 population	1/10,000 (WHO World Health Statistics 2010)	not available	N/A
	Measles vaccination rate (six months-15 years)	24% (UNICEF Statistics 2009)	not available	N/A
	Number of cases of AWD, measles and malaria	- 54,000 AWD cases including 39,000 children U5 years - 11,000 measles cases including 8,530 children U5 years - 24,000 malaria cases including 10,000 U5 years (Health Cluster 2011)	- 5,060 AWD cases including 3,680 children U5 years - 126 measles cases including 112 children U5 years - 2,146 malaria cases including 922 U5 years (Health Cluster 2010)	↓
Food Security	Other relevant food security indicator	Four million people are in Acute Crisis, including 1.8 million in HE and 250,000 live in famine conditions (FSNAU/FEWSNET): August 11)	2.85 million people in Acute Crisis (FSNAU/FEWSNET: May 2011)	↓
WASH	Proportion of the population using improved drinking water sources, total	30% (UNICEF Statistics 2008)	not available	N/A
	Percentage of population with access to protected water sources	Less than 20% of the majority of the population have access to protected water sources (2010-2011, FSNAU/ SWALIM)	not available	N/A
Other vulnerability indices	ECHO Vulnerability and Crisis Index score	3/3(ECHO Global Needs Assessment 2011-2012)	3/3 (ECHO Global Needs Assessment 2010-2011)	↔
	HCT Early Warning - Early Action rating	Red		
Also	Annual population growth 2010-2015: 2.6%; urban population growth 2011: 37.9%. (UN Statistics Division) 1.46 million IDPs within Somalia and more than 930,000 Somali refugees in the region – Kenya, Ethiopia, Yemen, Djibouti (UNHCR, November 2011) Four million people or 53% of the population are in humanitarian crisis, three million are in the southern regions (FSNAU)			

(UNOCHA 2012:7)

From the tabulated summary, the trend of key humanitarian indicators point towards deterioration. Over half (53%) of the total population in Somalia is in humanitarian crisis while the ECHO vulnerability and crisis index score has remained high at 3/3. On Water, Sanitation and Hygiene (WASH) indicators, access to safe water and safe sanitation is less than 20% and 40% respectively. Cholera is endemic with acute watery diarrhoea outbreaks occurring regularly following rainy seasons (CAP 2012:10). Following the start of the military operation in the Afgooye corridor by the African Union Mission in Somalia (AMISOM) in mid May 2012, thousands of people were displaced from the Afgooye corridor, leading to even greater pressure on limited sanitation facilities and access to clean water in Mogadishu. The WHO warned that further population displacement could accelerate the spread of suspected cholera in Banadir (WHO 2012:3).

2.3   UNIQUENESS OF HUMANITARIAN SITUATION IN SOMALIA

2.3.1 Humanitarian needs

By the end of 2012, an estimated four million people were in need of emergency food and medical assistance, of whom only 2.2 million were being reached (UNOCHA 2012:2). The operating environment presents significant risks to aid workers and communication and coordination between humanitarian organisations and conflict actors is limited. The lack of access to people in need is not only an obstacle to alleviating the extreme food shortages in southern and central Somalia, it contributed directly to causing the worst food crisis in Somalia's history. The ongoing violence has been compounded every few years by floods and droughts; this combination of natural and human made disasters has led to severe food insecurity. From 2009, poor rains, rising food prices and conflict resulted in a worsening of vulnerability, peaking in September 2011 with approximately 4 million people, or 53% of the total Somali population, in need of humanitarian assistance; the majority of those in need (3 million) were in South and Central Somalia (UNOCHA 2012:8).

In the second half of 2012, the UN declared six regions in Southern Somalia to be famine areas, affecting an estimated 750,000 people. By February 2012 the situation had reportedly improved, with famine conditions alleviated in all regions.

However, according to Famine Early Warning Systems Network (FEWSNET) 2.34 million people were said to remain in crisis, 73% of whom were in southern regions (FEWSNET 2013:3). Data from the Integrated Regional Information Network (IRIN), the crisis led to massive internal displacement, currently estimated at 1.5 million people, while the population in the Dadaab refugee camps in north-eastern Kenya has grown from approximately 150,000 in mid-2006 to over 500,000 registered refugees in 2014, making Dadaab the world's largest refugee camp (IRIN 2014:7). New camps have also been established across the border in Ethiopia in response to the crisis and the influx of refugees. The refugee camps at Dolo Odo are currently home to approximately 127,000 people (FEWSNET 2013:4).

According to the Somalia health cluster Worst Case Scenario in the Acute Watery Diarrhoea (AWD)/Cholera Preparedness and Response Plan Feb 2013; 5.6 million people were at risk of cholera in the whole of Somalia. The severity of the challenge was best portrayed in Mogadishu where twice as many cholera cases were reported in 2012 compared to 2011 over the same reporting period. In 2012, during week 20 (19-25 May), there were 333 cases compared to 140 cases in 2011. The number of deaths was also higher during 2012, raising concern over the disease's severity and effective case management. Of the 333 confirmed cases, 220 were children under 5 years of age while 130 were women and girls (UNHCR 2012:4). The WASH and health clusters aim to reach 100% reach of the populations in high and medium risk areas during cholera outbreaks with safe water (through chlorination of unprotected sources and household water treatment and safe storage) and hand washing (education and soap distribution). This is a big challenge given that only 34% of WASH targets for 2012 were reached due to lack of access and logistical challenges (CAP 2013:12).

It is evident from this analysis that the humanitarian challenge in Somalia is monumental and it is growing big in scale and complexity. Undoubtedly, humanitarian actors, particularly those working in the health sectors, will be required to devise ways and means to cover the growing needs in a cost effective way.

2.3.2 Access challenges

The humanitarian problems in Somalia are as a result protracted conflicts, economic crises and cyclic droughts. Humanitarian agencies in Somalia face numerous obstacles making it almost impossible to deliver the humanitarian aid, where it is most needed. There is now virtually no "humanitarian space" in which aid can safely be delivered. Until recently, the Al Shabaab militias were mainly responsible for most obstacles. In particular, the South/Central geographic areas of Somalia have had significant and on-going power struggles, which directly and indirectly impact humanitarian workers and activities. Figure 2.1 shows the access coefficient in various regions of Somalia.
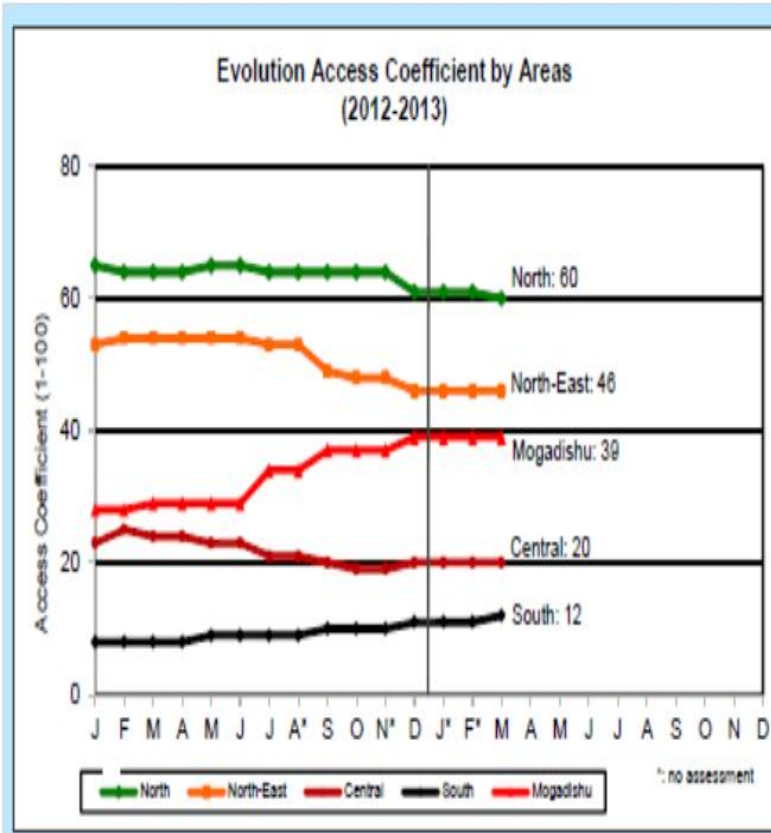
The "Access Coefficient" is based on eight indicators: International staff presence (UN and INGOs), UN staff movements, security assessments, humanitarian flights, check-points, security incidents (last six months), and stability of the area. For each district each of these indicators is evaluated and receives a notation from 1 (extremely negative) to 5 (positive), based on standardised assessments.

(UNOCHA 2013:1)

Figure 2.1 A graph of access coefficients in different regions in Somalia

Another important indicator of hindrances to humanitarian space is the number of aggressive incidents involving humanitarian personnel and assets. High levels of violence against humanitarian operations caused international humanitarian agencies to significantly restrict their operations and withdraw international staff from the south central region, where the violence predominantly occurs.

All but three of the 60 major attacks against aid workers in Somalia between 2011 and 2013 took place in the Southern and Central provinces (Aid workers security database 2013:2).

Bureaucratic impediments and restrictions to humanitarian agencies is another challenge. In the absence of a proper governance system to enforce regulatory frameworks, clan chiefs enforce new regulatory procedures in their zones of control. As a result, an increasing accumulation of *ad hoc* demands is issued by local authorities, which inevitably impact humanitarian activities. These bureaucratic procedures and imposed constraints often are unevenly and inconsistently applied. The most commonly used impediments include check-points and roadblocks. They tend to be onerous and time consuming, and coupled with the uncertainty and seemingly arbitrary nature of the requests, cause delays in the provision of aid (UNOCHA 2013:5).

Despite all efforts made by the humanitarian actors to negotiate access and communicate, violence towards personnel and assets often force humanitarian organisations to withdraw or temporarily suspend activities in certain areas. Ongoing hostilities and military operations, generally prevent long-term programming, and in some areas cause suspensions of assistance and service delivery (UNHCR 2012:7).

2.3.3 Shrinking humanitarian space and impact on aid delivery

While the humanitarian community is still able to maintain programmes primarily through national staff and Somali NGO partners, it increasingly finds itself having to provide assistance where it can, rather than where the needs are highest. The ability to move in an unrestricted manner outside established compounds remains a challenge. As a result, there is very limited capacity for humanitarian agencies to manage and monitor the provision of humanitarian aid or to determine the actual impact assistance and service delivery has on the beneficiaries.

Operational realities, such as irregular access to populations in need, implementation of projects through local partners, higher fuel, food and operating costs and frequent changes in leadership in South/Central will require constant analysis and adjustment to strategies. Coordination and leadership through the Inter Agency Standing committee (IASC) and cluster partners will continue to be essential to ensure quality delivery of emergency assistance and basic services.

Building on the successes of the last years, monitoring and evaluation will continue to be strengthened at all levels through a three-tiered approach (project, cluster and strategic); improving accountability and transparency of humanitarian operations (CAP 2012:4).

The need to deal with these competing factors has prompted, as one of the possible mitigating measures, the increased involvement of local Somali actors, both institutions and individuals, in the delivery of assistance. This approach often referred to as "remote control", raises issues of overall capacity of the local partners, both in terms of effective delivery of assistance and in terms of the skills needed for proper monitoring, accountability and transparency. In this context, the need for an innovative approach to support national actors, improve delivery of assistance, accountability and preparedness for future crisis, as well as to ensure a successful implementation of the Common Humanitarian Action Plan (CHAP) is necessary and urgent (UNOCHA 2012:32).

2.4 ALTERNATIVE APPROACH – REMOTE PROGRAMMING IN AID DELIVERY

2.4.1 How remote programming works

As attacks against aid workers continue to rise, international humanitarian agencies have increasingly adopted remote management arrangements as a way to continue assisting civilian populations while removing portions of their staff from harm's way. Remote programme implementation is about managing team or programme activities from a distance. It is generally an operational response to insecurity or weather related challenge. It involves withdrawing or drastically reducing international and sometimes national personnel from the field, transferring greater programme responsibility to local staff or local partner organisations, and overseeing activities from a different location.

According to the Active Learning Network for Accountability and Performance (ALNAP), remote implementation and management is sometimes the only option at one time of the programme or at times throughout some protracted emergencies (ALNAP 2011:7). Agencies see remote management as a temporary and makeshift adaptation, yet in some contexts it has been a standard operating procedure for years.

Despite the prevalence of remote management programming in humanitarian assistance, little policy guidance exists within the international aid community on how to effectively plan for and implement it (Laura & Hannah 2012:10).

The decision to undertake remote management − as opposed to suspending aid operations completely − involves a number of considerations, including the critical nature of the programme (whether it involves life-saving work), the amenability of the activities/sector to weaker levels of technical oversight and expertise, and the availability of current or potential local partners (UNOCHA 2012:32). In some settings, the resort to remote management is tantamount to an acknowledgment that the humanitarian principles of independence and neutrality have lost acceptance. In certain highly contested environments, the majority of aid agencies cannot rely on the perception of their neutrality and impartiality as aid providers, independent of political agendas, to keep them safe.

For some, shifting to remote management programming recognises this challenge while continuing to serve the humanitarian imperative principle: getting aid to those in need as the first priority - even if it must be done from a distance. In highly unstable or generally lawless contexts criminal opportunists may threaten any actors with resources, regardless of the principles they espouse, which can cause aid agencies to decide that it is too insecure an area in which to operate directly (Laura & Hannah 2012:10). While there are a number of different ways to implement remote management programmes, including using different types of implementing agents, methods of monitoring, and levels of direct oversight, they all share the common, important objective of maintaining some level of humanitarian assistance that would otherwise stop if aid agencies should withdrew from Somalia.

According to the 2013 CAP proposal (2013:5), the rapidly changing operational environment in Somalia, response strategies and geographic programming will need to remain flexible, to best meet the needs of the most vulnerable, especially women and children. Humanitarian access and insecurity will likely continue to change quickly causing displacement and unseen obstacles for aid delivery.

2.4.2 Challenges with remote programme implementation

According to the Delage 2009 report on evaluation of remote control management in Somalia, difficulties with logistics, communications, monitoring, and interagency coordination are all heightened in remote management situations. In terms of reporting and accountability, agencies continue to focus mostly on 'upwards' accountability to their donors, with even less than usual accountability to beneficiaries (Delage 2009:2).

Most importantly is the fact that even if programme activities are reduced in remote management mode, this does not result to automatic cost-savings. Agencies face different, but often high, expenses to operate remote programmes, particularly for communications equipment, and often for air travel and additional security cover. As one NGO manager put it, in remote management it often costs more to implement activities on ground (Delage 2009:16).

Evidently the options currently being employed to address access issues in Somalia are not adequate and cannot match the growing need and complexity. There is therefore need to explore other options that can complement existing approaches to increase beneficiary reach.

2.5 MOBILE TELEPHONE TECHNOLOGY AS A BRIDGE TO REMOTE PROGRAMME IMPLEMENTATION CHALLENGES

2.5.1 Role of technology in programme implementation

UNOCHA report (2011:31) saw flexibility, innovativeness and employment of technology as the most important characteristics of humanitarian action in the future. Due to limited access to many parts of South/Central Somalia life-saving assistance would be delivered through small windows of opportunity. There was therefore a need to explore how available technology can support remote programme implementation to meet all the necessary humanitarian principles especially those relating to humanitarian imperative, accountability and participation of affected women and children.

Technology is evolving at an extraordinary pace, changing the way people live and work. Technology has the capability to enable programme implementation to anyone, anytime and anywhere by removing location, time and other restraints (Ravi & Prasanna 2004:2673). Examples of where technology has been employed to beat geographical barriers and implement healthcare programmes include support for independent living and wellness, emergency medical care, mobile telemedicine, lifestyle incentive management, access to medical data, and computer assisted rehabilitation and therapy.

One technology that has had the biggest growth and uptake in developing countries in recent years is mobile telephones. Mobile phone based applications have the potential to detect needs earlier, enable greater scale and speed of responses, enhance specificity of resource transfers to match needs and increase accountability while reducing opportunities for corruption and diversion (Dolan 2010:9).

2.5.2 Growth of mobile telephones in developing countries

According to Fjeldsoe, Brianna and Alison (2009:165), mobile phones have made a recent and rapid entrance into many parts of the low- and middle-income world, with the global mobile phone penetration rate drastically increasing over the last decade. Improvements in telecommunications technology infrastructure, reduced costs of mobile handsets, and a general increase in non-food expenditure have influenced this trend. Low- and middle-income countries are utilising mobile phones as "leapfrog technology". That is, mobile phones have allowed many developing countries, even those with relatively poor infrastructure, to bypass 20th century fixed-line technology and jump to modern mobile technology (Fjeldsoe et al 2009:166). In some developing countries, mobile phones have transformed rural and urban life alike. For example in Kenya mobile phone applications are now being used to offer essential services like money transfers, banking and health education.

With low-cost handsets and the penetration of mobile phone networks globally, tens of millions of citizens that never had regular access to a fixed-line telephones or computers now use mobile devices as daily tools for communication and data transfer. According to Vital Wave Consulting (2009:8), 64% of all mobile phone users can now be found in the developing world. Furthermore, estimates show that by 2014, half of all individuals in remote areas of the world will have mobile phones.

This growing ubiquity of mobile phones is a central element in the promise of mobile technologies in supporting programme implementation in inaccessible areas. According to the International Telecommunications Union (ITU) database (2014:7), Somalia's mobile phones have increased seven fold from 0.9 million subscribers in 2011 to 5,138,000 subscribers in 2014 translating to 49.38% national mobile phone penetration rate.

Figure 2.2 below illustrates that developing world citizens have adequate access to mobile phones, even while other technologies and health infrastructure are scarce. This explosion of mobile phone usage has the potential to improve health service delivery on a massive scale.

For example, mobile technology can support increasingly inclusive health systems by enabling health workers to provide real-time health information and diagnoses in rural and marginalised areas where health services are often scarce or absent altogether.
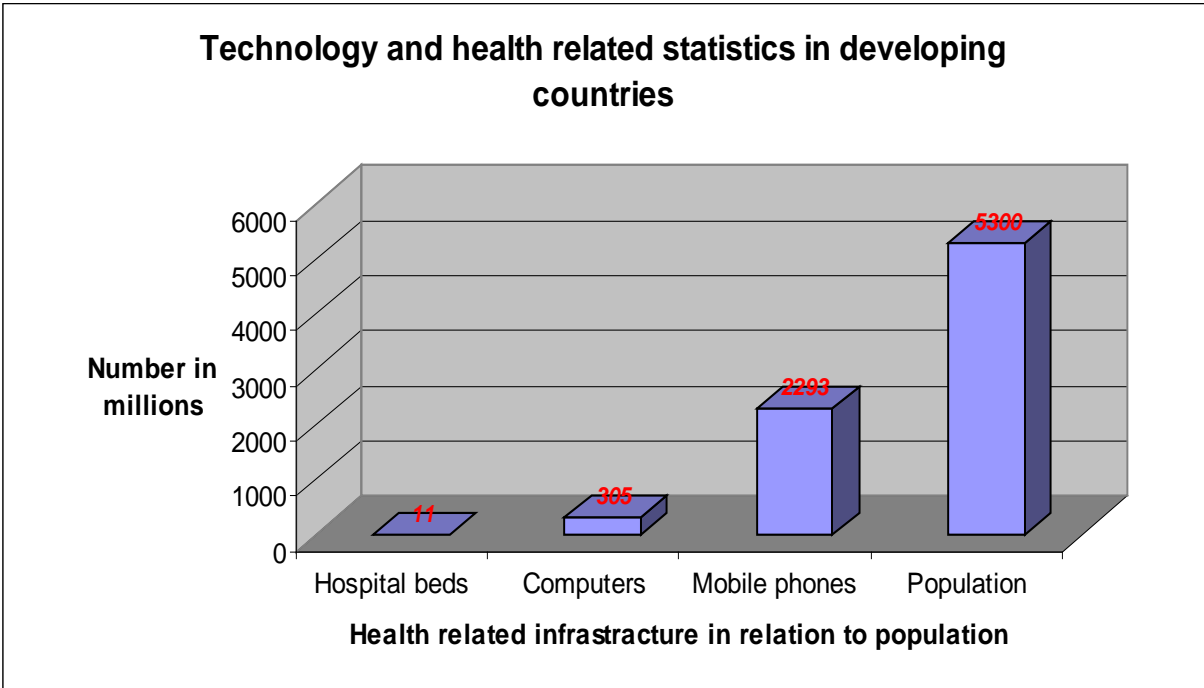
Figure 2.2   Technology and health-related statistics in developing countries
(Vital Wave Consulting 2009:10)

2.5.3 Past and current mobile phone based health applications

Mobile phone based health systems (mHealth) are a rapidly growing area and have great potential to promote health equity. mHealth innovations have been developed that address an array of issues such as improving the convenience, speed, and accuracy of diagnostic tests; monitoring chronic conditions, medication adherence, appointment keeping, and medical test result delivery; and improving patient-provider communication, health information communication, remote diagnosis, data collection, disease and emergency tracking, and access to health records (Vital Wave Consulting 2009:3).

For example, in South Africa, Project Masiluleke uses text messaging to increase rates of testing for tuberculosis and human immunodeficiency virus (HIV) and to provide counselling to patients (PopTech 2009:5).

The CelloPhone Project, developed in the United States, creates an optical imaging platform that allows body fluids to be analysed with a mobile phone (cellophone 2009:2). In Uganda, EpiHandy − a mobile-phone-based data collection and records access tool - was found to reduce data entry errors and improve cost-efficiency when compared with traditional paper surveys (Vital Wave Consulting 2009:6).

The increasing interest in how mobile phones can play a role in disease prevention activities is reflected in the systematic review performed by Krishna et al (2009:231). This review covered literature addressing the use of mobile phones and text messaging in health care provision and disease management support. A total of 25 studies covering 13 different countries (mostly high income) were identified based on inclusion criteria. Twenty of these studies were randomised controlled trials and 5 were controlled studies; 19 assessed outcomes, and the remaining assessed processes. Most of these studies used what the review termed "push" technology where messages delivered to phones were tailored to personal needs. The messages were sent at a frequency between once per week to once per day. For those studies that included outcomes, significant findings involved improvements in treatment compliance, symptoms, stress levels, smoking cessation, and self-efficacy because of either voice or text-based communication over cellular phones.

According to Krishna et al (2009:232) seven studies that examined processes recorded improvements in clients making scheduled appointments, and enabled healthcare providers to diagnose and treat patients faster. One process study found improvements in performance and satisfaction after teaching. Roura (2009:310) demonstrated that equipping patients with appropriate preventive information alongside treatment has transformed HIV into a manageable condition in a rural ward of Tanzania. Mobile phones have become a medium for relaying these types of information, as well as providing contact information for hotlines, counselling, and educators. In India an intervention called mDhil offers text messages, in 40 characters or less, with information on various health topics not commonly discussed in India, such as diabetes, H1N1, maternal health, and human reproduction, on a for profit business model (Dolan 2010:2).

Research by Lemaire (2011:12) identifies three main uses of mobile phones for programme communication during recent humanitarian emergencies: providing information to households and communities; enabling two-way communications with recipients; and improving the effectiveness of programme communications between head offices and field workers, all of which have potential to improve aid effectiveness and accountability. The research also looked at the main benefits experienced and issues faced with the use of mobile phone communications in terms of partnerships, effectiveness and impact, scalability, uptake by staff, and accessibility to communities.

Another example is the Frontlinesms paper that looks at how to use text messaging as an effective behaviour change campaigning tool (Frontlinesms 2012:3). This paper shows that SMS can be an effective campaigning tool, helping to drive positive social change by increasing awareness of key issues and giving people the information they need. The paper depicts SMS as ideal for these types of campaigns in many ways. It describes SMS technology as immediate, intimate, works even in when there is no network and if received at the right time, can provide an incredibly meaningful intervention (Frontlinesms 2012:3). Similarly, a study by Lemaire (2011:13) on how to scale mobile health developing-countries looked at nine case studies on successful mobile health projects.

It covered a wide array of health issues, including maternal and early childhood health (ChildCount, Pesinet, Project Mwana, Tele Salud), medication stocking and verification (mPedigree, SMS for Life), disease outbreak monitoring (mTRAC), and HIV/AIDS awareness (SMS for Health, Txt Alert). The report details how the projects deal with issues like local buy-in, scale, and sustainability.

2.5.4 Short messaging service (SMS) in mobile phone based applications

Text messaging is the least advanced, but most widely adopted and least expensive technological feature of mHealth (Ebad 2013:2288). Text messaging is a short form of communication transmitted between mobile phones on a bandwidth lower than that of a phone call, and it is usually limited to 160 characters. An estimated 98% of cell phones worldwide have text message capabilities, but text messaging usage rates vary by age, culture, and country (Terry 2008:522).

For instance, 58% of US mobile users send text messages, and 30% of US teens send messages daily (Lenhart 2009:5). However, rates of text messaging vary by region and country. Even among countries with the highest usage, rates vary from as high as 89% in Mexico to 48% in India (Stewart & Quick 2009:12). Furthermore, users of this technology tend to be high-frequency users, optimising its use as a way to initiate behaviour change. For example, 30% of South Korean teens send an average of 100 messages per day (Vital Wave Consulting 2009:13). In the United States, where 89% of teens use text messaging, the monthly average number of text messages sent and received per teen is 2,899 (Stewart & Quick 2009:12).

Text messaging demonstrates strong potential as a tool for health care improvement for several reasons; it is available on almost every model of mobile phone, the cost is relatively low, its use is widespread, it does not require great technological expertise, and it is widely applicable to a variety of health behaviours and conditions (Roura 2009:6). Text messaging also has the advantage of being asynchronous because it can be accessed at any time that is personally convenient. Furthermore, even if a phone has been turned off, messages will be delivered when the phone is turned back on. Additionally, text messaging is an mHealth innovation for which utility remains even in resource-poor settings in which people may not have access to expensive technology (Fjeldsoe, Brianna & Alison 2009: 167).

Text messaging is suitable for behaviour change interventions because it allows for in-the-moment, personally tailored health communication and reinforcement.

In addition text messaging can be used as a way to deliver prevention components based on theoretical models such as the theory of planned behaviour and the health belief model (Fry & Neff 2009:11). Therefore, it can be viewed as an alternative approach to programme delivery instead of personal- or group-delivered programs. However, the process of text messaging itself may tap important constructs (such as cues to action, reinforcement, social support) central to many behavioural theories even when the developer of the programme did not explicitly base the content of the message on a theory. Studies have found that periodic prompts and reminders are an effective method to encourage and reinforce healthy behaviours (Fry & Neff 2009:11).

2.5.5 Mobile phone technology in humanitarian public health response

Using mobile technologies to more rapidly and accurately assess and modify behaviour, biological states and contextual variables has great potential to transform health provision. Recent advances in mobile technologies and the ubiquitous nature of these technologies in daily life, including smart phones and sensors, have created opportunities for behavioural and social sciences research applications that were not previously possible such as simultaneously assessing behavioural, physiological, and psychological states in the real world and in real-time (mHealth summit 2011:1).

The use of mobile technology affords numerous methodological advantages over traditional methods, including reduced memory bias, the ability to capture time-intensive longitudinal data, date- and time-stamped data, and the potential for personalising information in real-time (De Tolly & Alexander 2009:6). This makes mobile phone technology a viable means of bringing healthcare services to deserving populations in hard to reach and resource constrained places. In humanitarian and particularly in water, sanitation and hygiene (WASH) interventions, mobile phone application is a new entrant and not very well developed. The most widely used mobile phone application is the Ushahidi platform which is used for map and time-based visualisations of text reports and has been used most prominently in incident mapping during disasters. It has been used in Kenya, South Africa and recently in Haiti (Ushahidi 2013:1).

Another application used for data collection during first phase disasters is magpi/episurveyor, which enables users to create a case-specific questionnaire, collect data, take photographs of specific Points of Interest (PoIs) and upload it to a database directly from the mobile phone (Magpi 2014:1).

Noticeably, mobile phone technology offers great potential in addressing the humanitarian dilemma in Somalia but distinctly there is a gap in terms of mobile phone applications in humanitarian settings, particularly, in integrated WASH programme implementation. This, therefore, calls for efforts towards development of a mobile phone applications that can address humanitarian needs holistically.

2.6   CONCLUSION

The health system in Somalia is poorly resourced and unevenly distributed. The public health system struggles to provide services to a limited number of Somalis against crushing constraints: insecurity; geographical challenges and nomadic populations; an unstructured and limited workforce constrained by lack of motivation. This coupled with limited access renders delivery of assistance in Somalia by external actors difficult. In addition, conflict and the consequent conditions of insecurity contribute significantly to increased needs, exacerbated by a broader and multi-faceted crisis. As a result, external humanitarian actors are challenged to scale up the delivery of assistance while being progressively limited by access.

This deteriorating situation requires that the humanitarian actors change tact and employ alternative approaches. The new approach must be innovative, transformative, low cost and based on what is at the country's disposal. The approach should also foster participation of the affected communities in emergency public health programme delivery.

Mobile telephones provide one technology that can be used to increase community reach remotely. However, promising mobile phone based applications are new entrants in disaster response. The few current applications are mainly used for data collection and incident mapping. None of the existing applications have been developed and used to implement integrated water, sanitation and hygiene (WASH) programs, particularly in hard to reach/insecure settings.

There is therefore need to develop a mobile phone platform that integrates incident mapping, data collection, interactive community education interface and mobile phone supported WASH related Non Food Items (NFI) distribution.

The next chapter on research design and methods lays the foundation for a study to identify requirements and the feasibility of developing an integrated public health promotion mobile phone based application in Mogadishu, Somalia.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1   INTRODUCTION

In chapter 2 available literature, relating to humanitarian challenges in Somalia, was presented and discussed. This included the socio-political situation in Somalia and the challenges that the country has faced during 20 years of protracted conflict, the uniqueness of humanitarian needs in Somalia and the shrinking humanitarian space and how this is impacting on humanitarian responses.

Remote programming was also discussed as an alternative approach to providing humanitarian assistance in Somalia and the inherent challenges that hamper effective implementation. The chapter then discussed the potential utilisation of mobile phone technology, remote programming challenges and the inadequacy of the existing mobile phone-based health applications to address the challenges facing humanitarian work. This chapter presents and discusses the research design and methodology used in conducting a feasibility study. The chapter is presented in 6 key sections as follows:

- Section 3.2: The study's research design
- Section 3.3: Research methodology
- Section 3.4: Research instruments used in the data collection
- Section 3.5: Data collection process
- Section 3.6: Data management and analysis
- Section 3.7: Internal and external validity of the study
- Section 3.8: Ethical considerations that guided the study

3.2   RESEARCH DESIGN

The research design used in this study was a descriptive cross-sectional design. The choice of this study design was informed by the nature of the information required for the feasibility study which, could be collected from individuals and institutions at a specific point in time (Johnson & Christtensen 2004:28).

Quantitative research methods were used for both the household survey, as well as for gathering views from other stakeholders, comprising humanitarian public health actors and mobile phone providers, in Mogadishu, Somalia.

3.3 RESEARCH METHODOLOGY

3.3.1 Study setting

The study was conducted in Mogadishu, the capital city of Somalia which is home to one of the largest complex emergency situations of our time. Mogadishu is plagued by cyclic cholera outbreaks, often resulting in emergency situations, further complicating humanitarian responses. The setting of this study therefore revolved around the cholera theme (see Annexure 7).

3.3.2 Study population

Study population comprised of two population sets. One set comprised five internally displaced persons (IDP) camps with a total IDP population of 78,000. The IDP camps are located within five districts of Waldajiir, Hodan, Harmar Jabab, Wagberi and Dharkenyley. The five IDP camps were selected purposively from 25 IDP camps where Hijira, Oxfam's partner in Mogadishu, works. The selected camps host the second highest IDP density nationally. Hijra is a resident organisation in Mogadishu and has been implementing humanitarian public health within and around Mogadishu for the past 10 years. Actual respondents within the camps comprised of house hold heads and were selected randomly.

The second study population set comprised of five mobile phone providers operational in Somalia and five humanitarian organisations including major UN, international and national NGO's implementing water, sanitation, hygiene (WASH) and health services in Mogadishu. In this population set data was collected from technical specialists.

3.3.3 Inclusion and exclusion criteria

Study participants were selected as per the following inclusion and exclusion criteria.

3.3.3.1 Inclusion criteria

All households in the sampling cluster were sampled and picked as per the sampling frame. In households where there was phone ownership, any one 18 years or older and owning a phone qualified as a respondent. The default, however, was to interview the head of household if s/he had a phone. If both the man and wife did not own phone then the available members of the household were asked to select one person who was 18 years or older and who owned a phone to answer the questions.

In households where no one owned a phone, any adult, implying a person 18 years or older, in the household was picked as a respondent.

The default was to interview the head of household present at the time of the visit. If both the man and wife were absent then the available members of the household were asked to select one person 18 years or older to answer the questions. If no one in the household was within this age bracket then the household was skipped and the next one was selected.

Mobile phone companies operational in Somalia with at least 200 000 active users and with coverage in all five target districts in Mogadishu were included. Humanitarian actors implementing public health in any of the five targeted districts in Mogadishu were included as well.

3.3.3.2 Exclusion criteria

The following exclusion criteria were used to determine the respondents who did not qualify for the study:

- Persons younger than 18 years of age.
- All respondents who did not consent to participate.
- Newly launched mobile phone providers who had been operational for less than one year at the time of the assessment.
- Humanitarian organisations that were not implementing a completely integrated WASH package.

3.3.4 Sample size

The sample size for the household survey was calculated using the sample size calculation formula as specified in Johnson and Christtensen (2004:28). The confidence level used was 95%. The expected mobile phone penetration was 7.02 per 100 inhabitants (ITU 2012:2). The expected margin of error was 0.05. This was based on a 95% confidence interval.

$$n = \frac{Z^2 \times p \times q \times N}{E^2(N-1) + Z^2 \times p \times q}$$

n = required sample size

Z = 95% CI = 1.96

p = 0.7 (expected prevalence in population)

q = 0.3 (1-p)

N = population = 78,000

E = acceptable margin of error = 0.05

Using the above formula, the required sample size was computed as 321 respondents. This was adjusted to 400 respondents to make up for non-responsive cases. The figure of 400 respondents was arrived at by adjusting the computed and weighted camp sample population to the nearest tenth.

3.3.5 Sampling procedure

A multi-stage sampling technique, combining purposive, random and stratified sampling was used to obtain the study sample. This was done in four steps as follows:

3.3.5.1 *Stage 1: Purposive sampling of IDP camps and phone companies*

There were 25 camps – based on the camps where Hijra, the Somali partner in Mogadishu was operating. These 25 IDP camps were distributed in five districts in Mogadishu. The biggest camp in each of the five districts was selected, resulting to five IDP camps.

During this stage, five mobile phone provide companies and five humanitarian organisations were also selected.

The numbers of companies and humanitarian organisation to be selected was arrived at based on the practicality of administering self-completed questionnaires and conducting follow up phone interviews in cases of delayed response. The five phone companies selected had network coverage in all the districts selected as well as meet the inclusion criteria (see details of inclusion and exclusion criteria in section 3.3.3). The selected companies were Golis Telecom Group, Hormuud Telecom, Somafone,Nationlink and Telcom.

Humanitarian organisations selected had active integrated WASH programme in any of the five districts. The five organisations that were selected were International Rescue Committee (IRC), Cooperative for Assistance and Relief Everywhere (CARE), Oxford Committee for Famine Relief (Oxfam), United Nations International Children's Emergency Fund (UNICEF) and Norwegian Refugee Council (NRC).

3.3.5.2   *Stage 2: Stratified sampling of households in the selected IDP camps*

To ensure an equal chance of selection of all households in all five camps, weighted camp samples were calculated by weighting the total sample size by a fraction of each camp in relation to the total IDP population. This way every household in the six camps had the same probability of selection to participate in the household structured interviews. Table 3.1 indicates calculated weighted sample sizes in relation to the camp populations.

Table 3.1   Sampling of households in IDP camps

Name of camp	Camp population	Weighted sample size
Badbado	10 000	100
Silga	10 000	100
Wabari	10 000	100
Hamar Jabab	5 000	50
Shangani	5 000	50
Total	**40 000**	**400**

3.3.5.3 Stage 3: Systematic sampling of households

The researcher assistants moved to the centre of the camp and tossed a pen. The direction in which the head of the pen faced determined the direction of households to be sampled. The house in closest proximity, in the selected direction formed household number one. After collecting data in household no. 1, every 5th household was then systematically selected until the required number of households for that camp had been reached. If a research assistant reached the edge of the camp before reaching the allocated sample size for that camp, then they would throw the pen again and follow the new direction. If any of the households did not meet the inclusion criteria the next house, the house in closest proximity in the direction of the pen's head, was selected instead.

3.3.5.4 Stage 4: Selection of respondents in the selected households

Respondents at household level were picked as per the selection and exclusion criteria detailed in section 3.3.3.

3.4   RESEARCH INSTRUMENT

3.4.1 Structure and content of the research instrument

The research instrument comprised a household questionnaire and a self-response questionnaire for the humanitarian organisations and the mobile phone companies. The household questionnaire (see Annexure 1.1) had four sections namely socio - demographic information, a Likert scale on existing knowledge and on cholera prevention and control, information about cell phones access and use and access to health information and social cultural issues relating to phone messaging. In total the household questionnaire had 39 pre coded closed questions.

The self-response questionnaires for the humanitarian organisations (See Annexure 1.2) comprised a mix of ten closed and open ended questions. The self-response questionnaires for the mobile phone companies (see Annexure 1.3) comprised a set of seven open ended questions.

3.4.2 Pre-testing data collection instrument

The household questionnaire was translated from English to Somali by a professional translator who understands the specific Somali dialect spoken in Mogadishu. The translated questionnaire was cross checked by a Somali speaking public health promotion expert to ensure conformity (see translator's annexure on Annexure 4). The questionnaire was then pre-tested in 20 (5% of main sample size) households who were selected from two camps in two of the five districts forming the study location. The pre-test was done on 29 August 2013. The two camps used in the pre-test were excluded from the main study.

The humanitarian organisations' and phone companies' tools were discussed with one technical person from one WASH organisation and one mobile phone company as part of the pre-testing phase. Adjustments based on feedback from the pre-test and comments from the organisation/company were made to the data collection tools on 30th August 2013. Key adjustments made included the addition of response options to some of the questions as well as changing the open ended questions to closed ended ones to make it easier to pre-code the possible responses.

3.5 DATA COLLECTION

3.5.1 Data collection schedule

Overall field data collection was undertaken from 1−20 September 2013. Four hundred household questionnaires were administered from 1−10 September 2013 by 12 research assistants who were overseen by staff from Hijra, a local organisation based in Mogadishu. Actual data collection was done by use of mobile phones, through a mobile data collection application called epi-surveyor that was pre-installed into the phones issued to the research assistants. Epi-surveyor was used to create handheld data entry form, collect data on a mobile device, and then transfer the data back to a desktop or laptop for analysis.

Ten self-response questionnaires (5 for mobile phone providers and 5 for the humanitarian organisations) were sent by e-mail to the technical persons on 1 September 2013 and responses given up to 15 September 2013.

For mobile phone providers and organisations that had not feedback by 15 September 2013, individual follow up telephone interviews were conducted from 16–20 September 2013.

3.5.2 Household survey process

3.5.2.1   Recruitment and training of research assistants

Recruitment of 12 research assistants was carried out between 20 and 22 August 2013 locally in Mogadishu with support from Hijra, a local based organisation. Recruitment was based on a long list of 20 enumerators provided by Hijra. These 20 research assistants comprised of university graduates that Hijra has used during past assessments. Selection of the 12 research assistants was based on longest experience conducting household interviews as well as gender balance. Out of the 12 research assistants picked, four were women. Although only 10 research assistants were needed, 12 were recruited to provide backup in case one fell ill or dropped out for any reason.

Training for all the 12 enumerators was done by the researcher in Hargeisa, the capital city of Somaliland. Somaliland is a breakaway republic of the former Somalia. It has a government as well as functional security systems; making it possible to go in and out. The training for the enumerators was conducted from 25−26 August 2013 and centred on how to use mobile phone based questionnaires as well as interviewing etiquette. It also involved how to select samples and ethical considerations. Also the research assistants were taken through the questionnaires and did role plays to practice the process. Finally they were all involved in a real life practical session in Albarako village outside Hargeisa town on 27 August 2013.

The researcher accompanied each research assistant to the household in turns to ensure they all had grasped all the salient aspects of sample selection as well interviewing and ethical etiquette. Where gaps were noted, the researcher corrected them on the spot and accompanied that particular research assistant to another household to ensure adherence. In total each research assistant visited at least 5 households.

Afterwards the research assistants were shown the data they had sent to the database and a post data collection discussion done to correct the errors and cement the understanding of the phone based interviewing method.

3.5.2.2 Data collection at household level

A total of 400 respondents were interviewed. This was done by the 10 research assistants, using the mobile phone based questionnaires. Each research assistant visited 40 households to interview the selected respondents and key in respondents' responses directly into the mobile phones. Before participation, each household was required to give oral consent (see Annexure 1.4). On completion of each household interview, the completed questionnaire was sent automatically to the web server and downloaded by the researcher for analysis. All the logistical support was provided by staff from Hijra.

3.5.2.3 Monitoring of the data collection process

Each research assistant was assigned a unique identity number. Also each data set sent from the phone to the data base had a real time date stamp. Using this, the researcher was able to monitor the data collection process remotely in real time and ask the research assistant through phone calls, to make corrections whenever any errors occurred. At the end of each day a post data collection review conference was held with all the research assistants on phone. During the review conference, the researcher raised issues they had noted with the quality of the data collected during that particular day and agreed on ways to improve the process. The research assistants also had a chance of raising issues that they encountered and a way forward was agreed.

3.5.3 Data collection from stakeholders (humanitarian organisations and mobile phone companies)

Data pertaining to capacity and interest of both mobile phone providers and humanitarian actors (comprising both local and international NGOs working in Somalia) were collected using e-mailed self-response questionnaires.

Written consent was sought from the technical leaders of the five key humanitarian organisations and five mobile phone providers before mailing the questionnaires to them (see Annexure 1.5 and 1.6).

Once consent was given, the questionnaires were e-mailed to them through their official mail addresses. Completed questionnaires were then mailed back to the researcher. In cases where there were delayed responses, the researcher made follow-ups through telephone calls.

3.6 DATA ANALYSIS

Data analysis was conducted in the 2nd week of October 2013. Since the household survey data were fed into the Episurveyor server from the survey phones automatically, no post coding or data entry was required. Stored data was downloaded every day into excel sheets. Quantitative data obtained from the questionnaires and Likert scales was analysed using the Statistical Package for Social Studies (SPSS version 14.0) software package. The survey data was stratified for age and gender and cross tabulated with other contextual variables.

Data from the stakeholders was post coded manually by the researcher and analysed quantitatively, identifying similarities and differences. These findings were compared and contrasted with the household findings.

Once the raw data had been summarised into tables and graphs it was shared with the XcelConsultancy statisticians to recheck the analysis and ensure that the required research rigour had been followed. The company also rechecked the discussions in the report to ensure that all the necessary deductions from the data had been made (See letter of attestation on Annexure 5)

3.7 INTERNAL AND EXTERNAL VALIDITY OF THE STUDY

Validity refers to whether there is evidence to support the assertion that the methods used are really measuring the concepts that they set out to measure. Another aspect of validity concerns the quality of the researcher's evidence regarding the effect of the independent variable on the dependent variable (Bynton & Greenhalgh 2005:215).

Both internal and external validity of the study were ensured as follows:

3.7.1 Internal validity

As noted by Bynton and Greenhalgh (2005:1314) internal validity refers to the extent to which the findings of a study provide a true reflection of reality, rather than being the result of extraneous variables.

The following approaches were employed to increase internal validity in the study process:

- The homogeneity of the study population − the study population comprised IDPs in specific districts in Mogadishu. The Somali community defines their way of life by a clan system. As such specific camps host people originally from the same geographical locations. For purposes of this study, this ensured that the population had many similar attributes.
- Analysing the impact of demographic variables (including socio-economic levels) on specific research findings.

3.7.2 External validity

According to Johnson and Christtensen (2004:32), external validity refers to the extent to which the results of the study can be generalised to other settings or groups. A study is externally valid to the extent that the sample is representative of the broader population and the study setting is representative of other environments.

This study restricted itself to complex emergency environments where access is limited. Data collection took place in the five largest IDP camps and systematic sampling of households was done in each camp. Consequently the data could be accepted as reflecting the situation inside the five participating IDP camps but might not be generalisable to other camps.

3.7.3 Reliability

Reliability is the degree to which a research instrument produces stable and consistent results (Bless & Higson-Smith 1995:10). During this study the following measures were undertaken to ensure consistency of results:

- **Test – retest of study instrument** – the study instrument was tested in 20 different households in two different IDP camps during the pre-test stage. Results from matched variables form the two camps were compared by calculating correlation coefficients to measure relationship. The results showed a strong relationship highlighting consistency between the two data sets. Based on this the research instrument was considered to be reliable. The instrument was therefore judged to be reliable enough to produce identical (or very similar) results from a similar sample under similar conditions in the real study.

- **Simultaneous measurement** – Data collection during pre-test of study instrument was done by 12 different research assistants. Data from each of them was assessed and compared with each other to see if there was researcher bias. In 3 cases where this was detected a retraining of the whole group was done to ensure that it was eliminated.

3.8 ETHICAL CONSIDERATIONS

3.8.1 Humanitarian imperative

This study observed all ethical considerations under the humanitarian imperative. In all the processes/activities, the study adopted the following humanitarian principles.

- Do no harm – interventional activities did not compound or exacerbate existing problems.
- The once off interventional messaging is a positive one aimed at educating participating communities on cholera prevention and control.
- Accountability – both to beneficiaries and stakeholders. The project ensured that the objectives of the study were explained and consent to participate was obtained from each respondent (see Annexure 1.4).
- Respect for culture and custom – tools and approaches used in the study were properly vetted to ensure that they conformed to the Somali culture and local religion.

3.8.2 Other ethical considerations outside the humanitarian imperative

- Respondents had a right to or not to take part in the study – verbal consent during the household data collection and written consent for both mobile phone companies and humanitarian organisations were sought (see Annexure 1.4 for household verbal consent, Annexure 1.5 the humanitarian organisations for written consent and Annexure 1.6 for mobile phone providers written consent).

- The study design and approach ensured no risk to the respondents. The respondents were provided with information about the study before data collection commenced (see Annexure 1.4).

- Anonymity and confidentiality were ensured by making the interview anonymous. Each completed interview was despatched from the data phone to the data dyne server automatically upon completion.

- Scientific accountability was observed through proper referencing and by listing all sources used during the study.

- Permission to conduct the study was granted by the Higher Degrees Committee of the Department of Health Studies, University of South Africa (see Annexure 2) and from the Somalia interagency WASH cluster (see Annexure 3).

3.9 CONCLUSION

This chapter on the research design and methodology has laid the foundation upon which the study was based to identify the requirements for and the feasibility of developing an integrated public health promotion mobile phone-based application in Mogadishu, Somalia. The next chapter presents an analysis and discussion of the research findings.

CHAPTER 4

ANALYSIS, PRESENTATION AND DESCRIPTION OF RESEARCH FINDINGS

4.1   INTRODUCTION

In chapter 3 the research design and methodology used in this study were presented and discussed. This included the research design, study methodology, research instrument, data collection and analysis, internal and external validity of the study as well as ethical considerations.

This chapter presents and discusses the study findings with the aid of percentages, tables and graphs. The chapter is presented in 4 key sections as follows:

- Section 4.1: Introduction
- Section 4.2: Data management and analysis
- Section 4.3: Research results
- Section 4.4: Conclusion

4.2   DATA MANAGEMENT AND ANALYSIS

The household survey data from 400 phone based household questionnaires was fed automatically into the server from the survey phones. Therefore, no post coding or data entry was required. Stored data was downloaded every day into excel sheets. Quantitative data obtained from the questionnaires and Likert scales was analysed using the SPSS version 14.0 software package. The survey data was stratified for age, gender and socio-economic status. Cross tabulations with other contextual variables was also done to determine relationships.

Information collected from 5 Water Sanitation and Hygiene (WASH) actors and 5 mobile phone providers was post coded manually by the researcher and entered into an excel sheet for tabulations and analysis.

The quantitative analysis centred on identifying similarities and differences between the variables. The resultant findings were then compared and contrasted with the household findings.

4.3 RESEARCH RESULTS

4.3.1 Socio demographic characteristics

This section presents the socio-demographic data of the respondents that participated in the household survey. It covers the respondents' age, literacy levels, gender as well as their main sources of income.

4.3.1.1 *Distribution of respondents by camp*
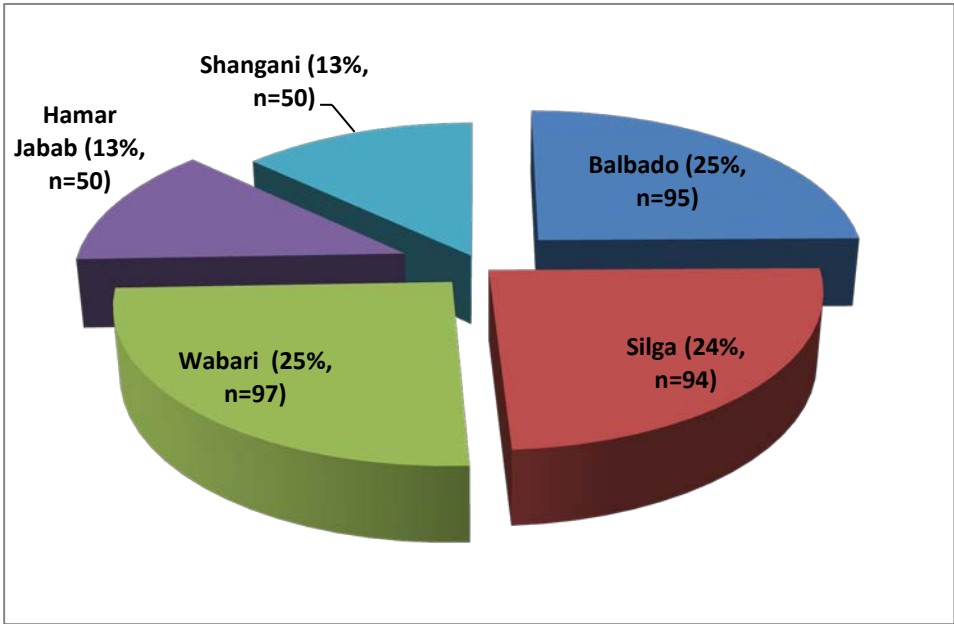
Figure 4.1   Distribution of respondents by camp (N=383)

The total study sample population comprised 400 respondents in five Internally Displaced Persons camps in Mogadishu. However during clean up, 17 questionnaire entries were found to have discrepancies and were therefore discarded leaving a total valid sample of 383 respondents. Number of respondents per each of the 5 camps was computed on the basis of the weighted sample size based on the camp population. Balbado, Wabari and Silga camps contributed 74% (n=287) of the total sample.

The remainder of the respondents were distributed to Shangani and Hamar Jabab in equal numbers.

4.3.1.2   Gender of the respondents
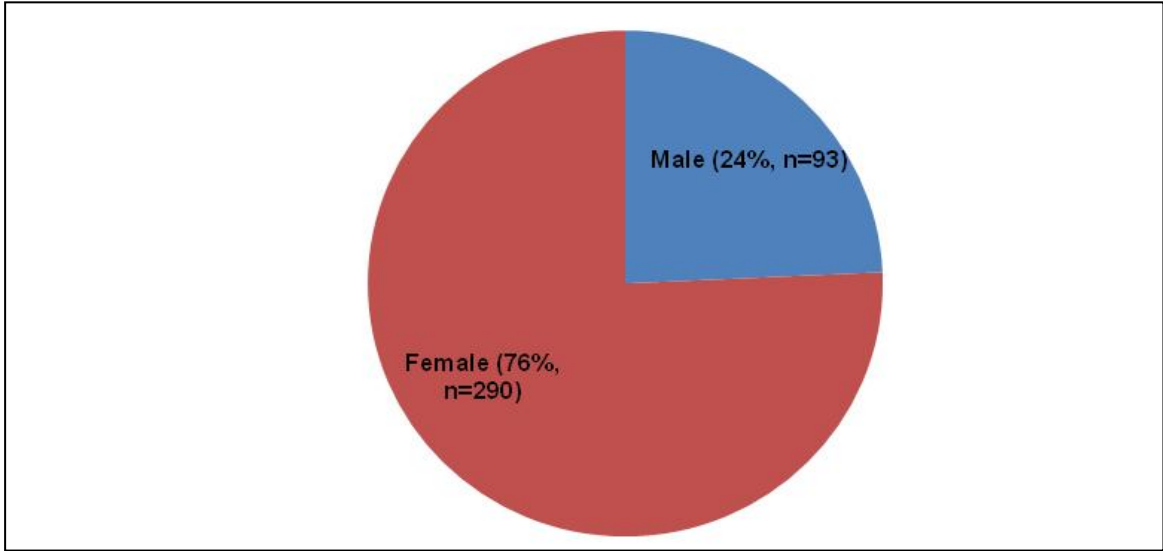
Figure 4.2   Gender of the respondents (N=383)

The findings indicate that 76% (n=290) of the respondents were females while 24% (n=93) were males. These findings tally with the United High Commissioner for Refugees Report (UNHCR 2012:1) which had indicated that the majority of the IDPs in Mogadishu camps were women and children. Women play a pivotal role in household health and any successful public health promotion in such a setting requires to be built around women's participation. As such it is instructive that the findings during the study largely represented the views of women. These views have informed the conclusions and recommendations of the feasibility study to a greater extent.

4.3.1.3   Age distribution (N=383)

The average age of respondents was 38.4 years. The mode of the age distribution was 32 years, meaning most of the respondents were in the 30-40 years age bracket. The youngest respondent was 19 years while the oldest was 90 years old. Since phone ownership was an inclusion criterion, it means that many of the youths did not own phones. It is also likely that most of the youths were not at home at the time when the household study was carried out.

According to Fjeldsoe, Brianna and Alison (2009:166), the youth play a key role in influencing adoption and uptake of community-based technology. It is important, therefore that youth targeted assessments are conducted to further understand their unique needs and inform the design of the eventual mobile phone application.

4.3.1.4 Literacy levels
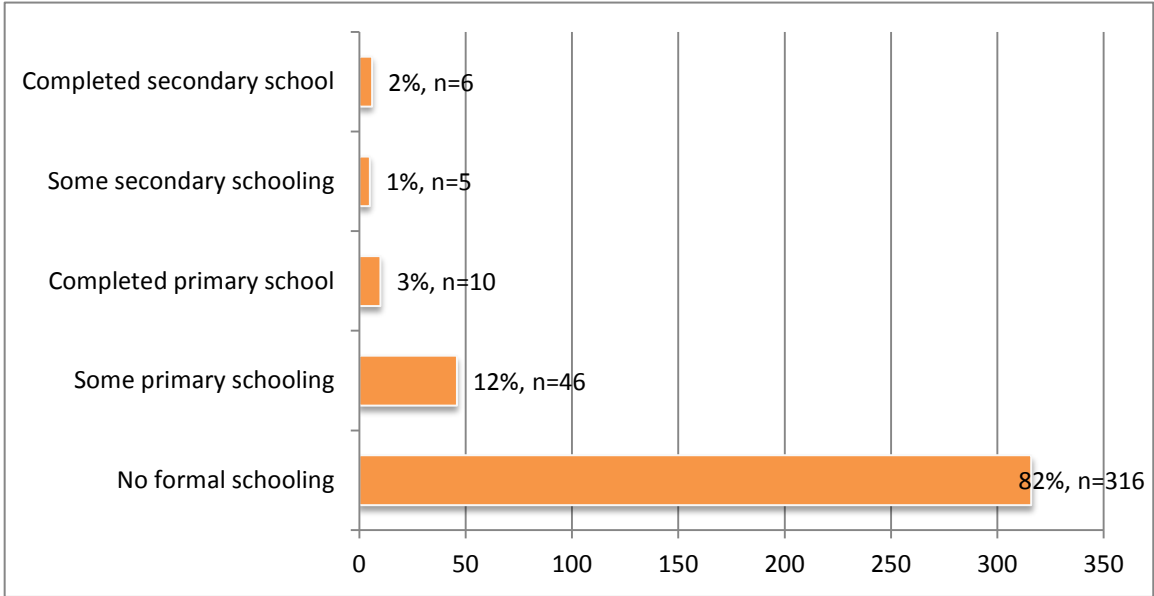
Figure 4.3   Respondents' education level (N=383)

The findings show that the majority 82.5% (n=316) of the respondents have no formal schooling. This is in line with other human development indicators in Somalia which are some of the lowest globally and would present a big challenge for a project that is based on people reading and responding to Short Messages (SMS) based text messages (FSNAU 2013:8).

4.3.1.5 Ability to interact with SMS messaging
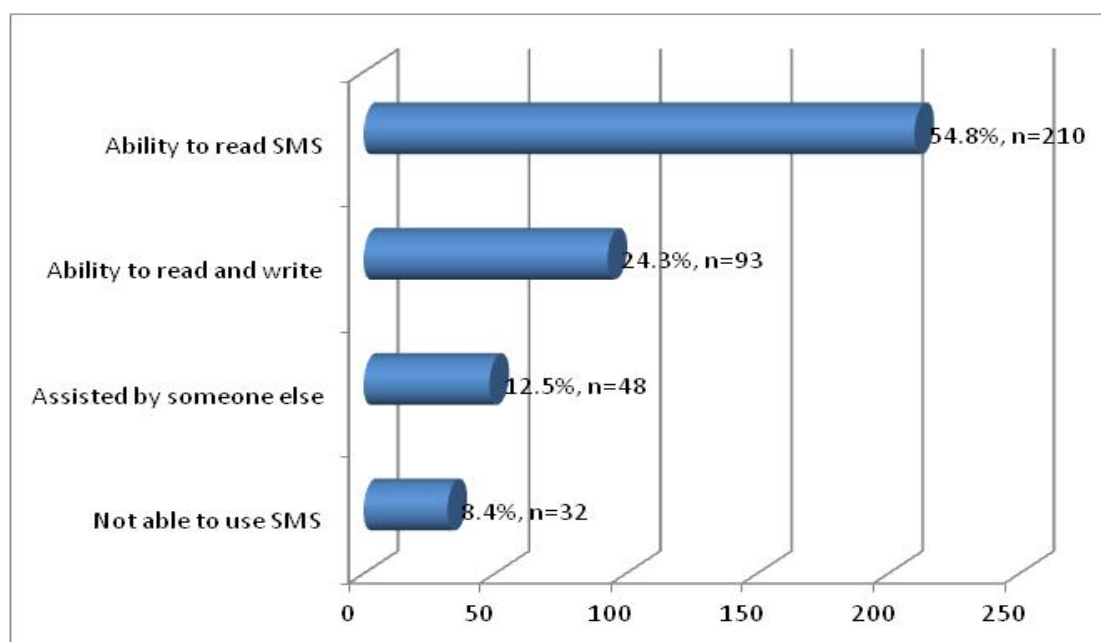
Figure 4.4   Respondents' interaction with SMS messaging (N=383)

A further question on whether respondents interacted with SMS messaging gave a conflicting result from what one would expect given the low levels of formal education. The majority 54.8% (n= 210) of the respondents indicated that they have the ability to read SMS while 24.3% (n=93) indicated that they were able to read and write SMS on phone. In-depth follow up telephone discussions with WASH technical specialists from WASH actors revealed that the SMS reading and writing skills had been acquired through informal schooling, mainly as part of religious training to read the Quran. The remaining 12.5%, (n=48) of the respondents relied on someone else (mainly their school going children) to read and write SMS for them. Only 8.4% (n=32) of the respondents said they could not use SMS as a means of communication.

This means that 91.6% of the population in Mogadishu is reachable by SMS – both through their own phones and also through phone sharing, making SMS communication a potential community engagement and educative medium.

4.3.1.6 Main source of household income

Table 4.1: Main source of household income (N=383)

Income source	Frequency	Percentage
Business	45	11.7
Support from aid agencies	257	67.1
Support from relatives abroad	10	2.6
Livestock	8	2.1
Farming	19	5.0
Support from relatives at home	44	11.5
Total	**383**	**100.0**

The findings show that many respondents 67.1% (n=257) indicated they were dependent on support from humanitarian agencies for their livelihood while 11.5% (n= 44) indicated they got support from relatives. In total only 18.8% (n=72) of the respondents generated their own income, mainly from business 11.7% (n=45), farming 5% (n=19) and livestock keeping 2.1% (n=8).

This conforms to the pattern indicated by the United nations Office for the Coordination of Humanitarian Affairs (UNOCHA 2013:8) that Somalia is highly dependent on aid and that approximately 4 million people, or 53% of the total Somali population, were in need of humanitarian assistance in 2013. Such a high dependency syndrome is not consistent with self-sustenance of community based projects. This shall come into sharp focus in the recommendations of the eventual project model to be adopted.

4.3.2 Mobile phone ownership
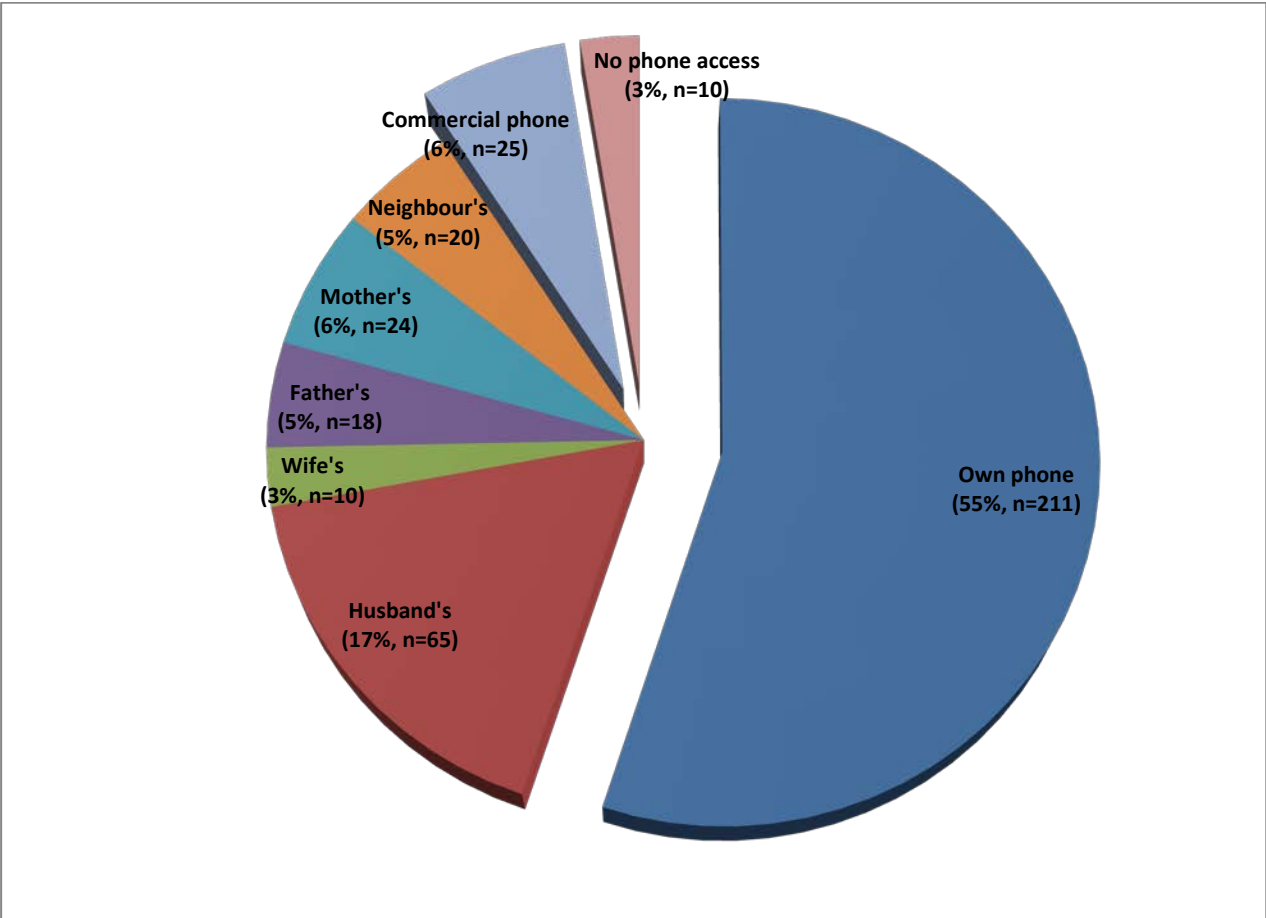
Figure 4.5   Mobile Phone that members of the household use (N=383)

Mobile phone ownership in Mogadishu stands at 55% (n=211) which is way above the 7.02% average national phone coverage (ITU 2012:7). Households who did not own a phone indicated they used their husband's 17% (n= 65), mother's 6% (n=24) father's 5% (n=18), wife's 3% (n=10), neighbour's 5% (n=20) or commercial phones 6% (n=25). Only 3% (n=10) of the respondents indicated that they did not have access to any phone. The above percentages add up to 97% phone reach in Mogadishu.

This extent of phone reach tallies well with Vital Wave Consulting (2009:8) findings that indicated that developing world citizens have plentiful access to mobile phones, even while other technologies and health infrastructure are scarce. This explosion of mobile phone usage has the potential to improve health service delivery on a massive scale. This includes supporting increasingly inclusive health systems by enabling health workers to provide real-time health information and diagnoses in rural and marginalised areas where health services are often scarce or absent (Vital Wave Consulting 2009:9).

Fjeldsoe et al (2009:166) sees the need to distribute phones as the greatest hindrance to scaling up past mobile phone based community health education projects. Fjeldsoe advises that future phone based community education projects should be designed to work on the type of phones that communities have. This finding on phone reach and the strong sharing culture exhibited by the Somali community is therefore a key building block to an eventual cost effective and scalable mobile phone based application.

The finding on availability and use of communal phones also provides a good opportunity for quicker scale up whenever necessary; as it would just involve distribution of communal phones to increase coverage during emergencies requiring quicker and broader coverage.

4.3.3 Mobile phone access

4.3.3.1 Most accessible mobile phone in the household
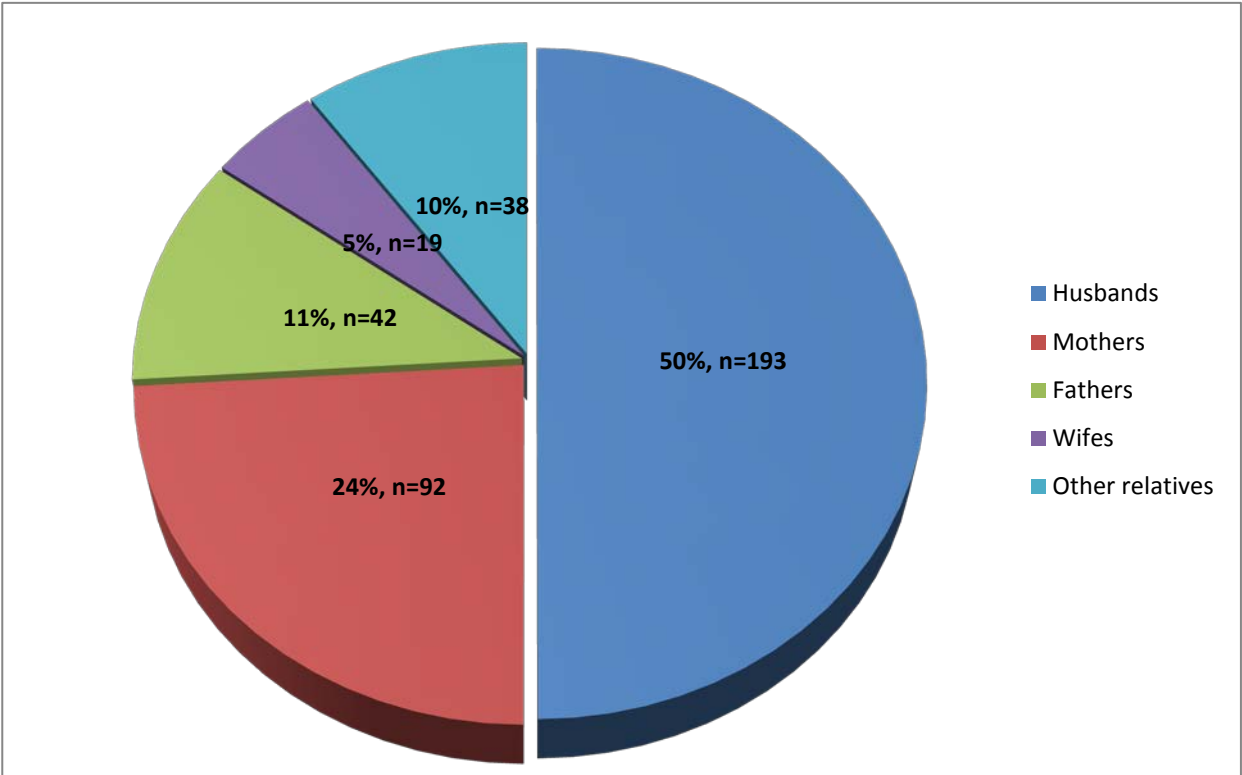
Figure 4.6   Most accessible mobile phone in the household (N=383)

As shown in Figure 4.6 above, the most accessible phone was indicated as the husband's 50% (n=193) while the wife's was indicated as at 5% (n=19).

This is attributable to the fact that majority of the respondents were women 76% (n=290) (see figure 4.2). For the youth the most accessible phones were indicated as the parent's (mother's at 24%, (n=92) and father's at 11% (n=42). Access to other relatives phones was indicated at 10% (n=38) (see figure 4.5)

Like other developing countries, family assets in Somalia are owned and controlled by men. In a recent report by Vital Wave Consulting (2009:10) on mobile phone gender gap in low and middle-income countries, women were indicated as being 21% less likely to own a mobile phone than a man. This figure increases to 23% if she lives in Africa, 24% if she lives in the Middle East, and 37% if she lives in South Asia. What is different in the Somalia study and perhaps most important is the fact that 61% (n=235); derived from husbands 50% (n=193) plus fathers 11% (n=42) indicated that they had access to the phones owned by men.

4.3.3.2 Time slot when most respondents have maximum access to available phone
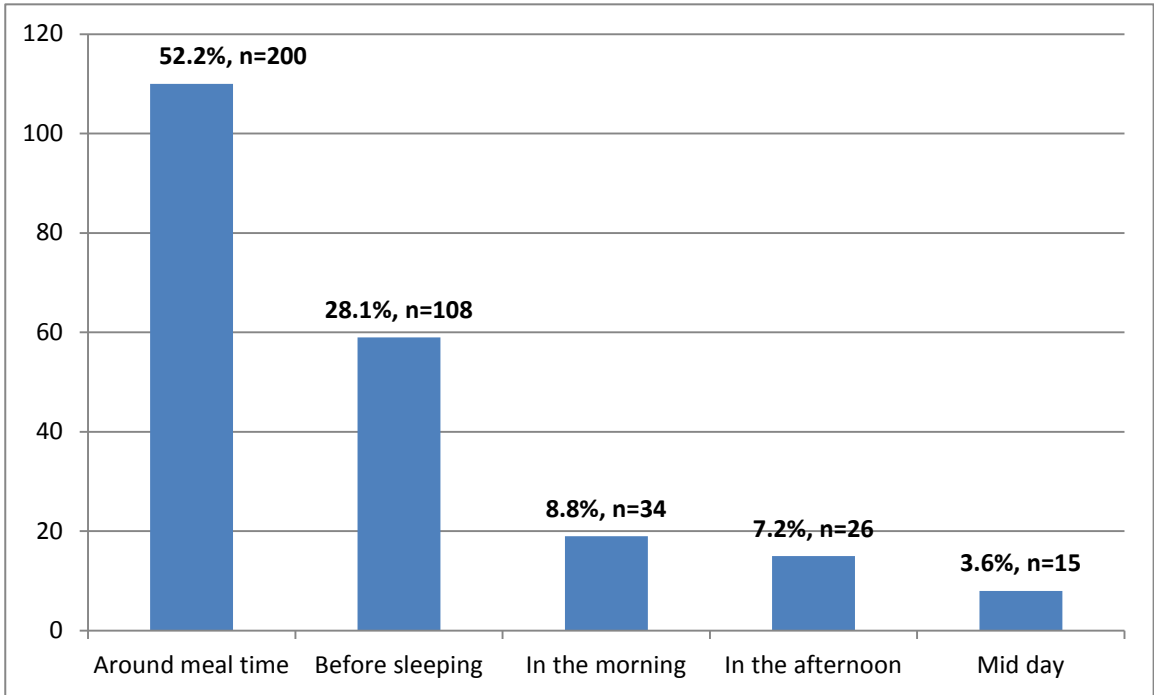
Figure 4.7   Time of the day when respondents have maximum access to available phone (N=383)

Figure 4.7 shows the best time of the day when family members have maximum access to the available shared phone in the household.

The findings revealed that during evening meal time is best time of the day 52.2% (n=200) when family members have access. This is attributable to the fact that this is the time when both parents are at home. This was well corroborated when respondents were asked about their most preferred time of the day to receive health information via mobile phones as depicted in figure 4.8.

4.3.3.3   Time slot when most respondents would prefer to get health messages
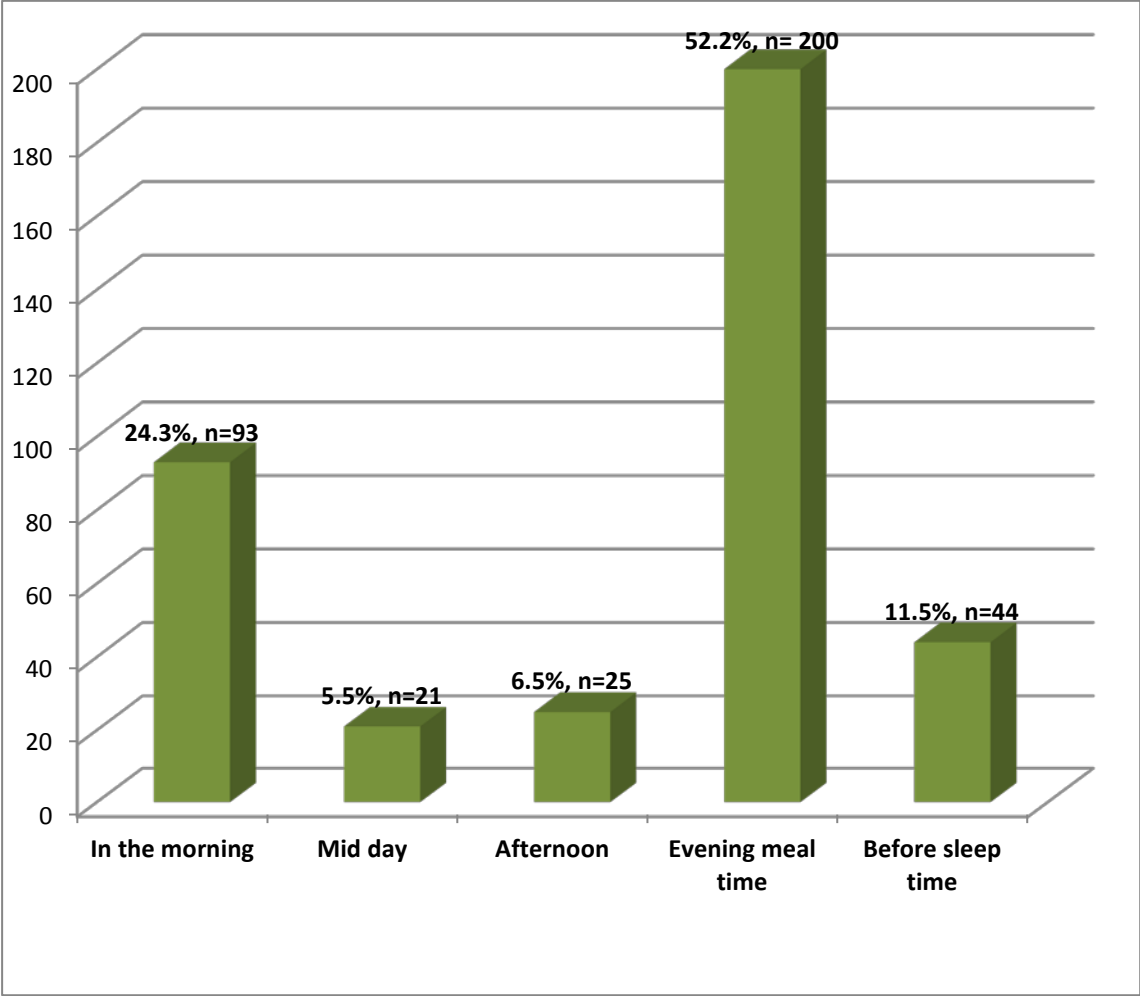
Figure 4.8   Time of the day when respondents would prefer to get health messages through mobile phones (N=383)

Figure 4.8 shows the time of the day when respondents would prefer to get mobile phone based health messaging. Many respondents 52.2% (n=200) would prefer getting mobile phone based health messages in the evening time during dinner. Another proportion 24.3% (n=93) said they would prefer getting the messages in the morning while 11.5% (n=44) indicated their preference would be before sleeping time.

4.3.3.4 Reasons why respondents prefer getting message during evening meal time
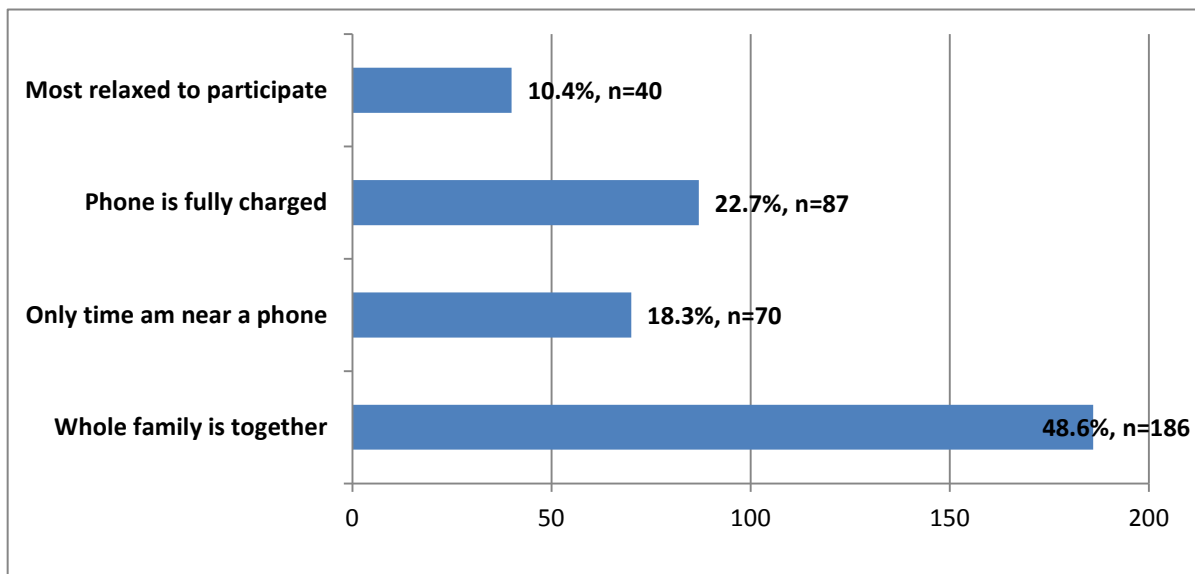
Figure 4.9   Reason why respondents would prefer to get health messages during evening meal time (N=383)

Figure 4.9 show reasons why respondents would prefer to get health messages during evening meal time. Some of the respondents 48.6% (n=186) indicated that this is the time the whole family is together while 22.7% (n=87) indicated that this is the time the phone is fully charged. Others 18.3% (n=70) indicated that this is the only time they are near a phone while 10.4% (n=40) indicated that this is the time they are most relaxed and able to participate in the interactive sessions. This correlates well with the Vital Wave Consulting findings (2009:26) that meal times are the best times to have discussions and take positions on matters affecting/likely to affect the family.

The Vital Wave Consulting report (2009:3) also recommends meal time as the best time for women to participate. This is attributed to the fact that women would have completed most of their household chores and because there are not many other options for women in poor backgrounds to relax with (for example watching television or reading novels), an educative interactive session on mobile phones would be a welcome interlude.

4.3.4 Access to health information

This was aimed at determining the level of access to health information by the inhabitants of Mogadishu IDP camps. The main purpose was to find out how communities accessed various types of health information as well as their perception on the conduits that supplied the information. This information would be useful in setting out the design parameters for an eventual mobile phone based community education platform.

4.3.4.1 Main sources of health information

Table 4.2 Main sources of health information (N=383)

Main sources of health information	Frequency	Percentage
Radio	235	61.4
Do not get any information	42	10.9
Community health workers	32	8.3
Community leaders	28	7.3
Community meetings	25	6.5
School children	1	0.2
Mosque	14	3.8
News papers	6	1.6
Mobile phones	0	0.0

Current access to health information is varied with many people indicating that they access health information from radio 61.4% (n=235) and from community health workers 8.3% (n=32). None of the respondents indicated that they receive health messages through mobile phones. A total of 10.9% (n=42) of the respondents indicated that they had not received any health information.

The fact that radio has come out as the main source of health information correlates well with other recent findings. For people who have an oral culture and are frequently on the move, audio programmes have proven extremely effective in providing a consistent form of education and information. Radio is also a prevalent communications channel in most of the country (SIRIP 2012:3). A Youth Business International (YBI) survey (2011:10) reported that almost 40 percent of rural and nomadic households in Somalia listen to radios and that radios are the second most prevalent household possession after a flashlight or lantern.

However, despite the receptiveness of audiences and the need to provide local level broadcasting to reach the diverse developmental, economic and demographic groups in Somali society, very little community based programming on radio has been developed (UNICEF 2013:2).

4.3.4.2   Types of information received from electronic media

Table 4.3   Types of information received from electronic media (N=383)

Types of information received	Frequency	Percentage
Cholera prevention	100	26.0
Malaria prevention	56	14.6
Childhood vaccinations/ immunisation	52	13.6
Safe drinking water	68	17.7
Hand washing	55	14.4
Measles	31	8.1
Health issues among children	10	2.6
Mother`s Health	11	2.9

The findings show that, some of the respondents receive information on cholera prevention 26% (n=100) while the rest received information on safe drinking water 17.7% (n=68), malaria prevention 14.6% (n=56), hand washing 14.4% (n=55) and childhood vaccinations/immunisation 13.6% (n=52). The finding that information on cholera prevention is the most frequently received conforms to the fact that cholera is the leading disease outbreak in Mogadishu and there has been efforts from both WASH and health actors to contain it.

According to the World Health Organisation (WHO) emergency health update of December 2012, a cumulative total of 9,839 cholera cases had been treated at Banadir Hospital, the main hospital in Mogadishu since April 2012. Out of these 6,957 (70%) cases were children under the age of five. There had been a total of 405 deaths resulting into a case fatality rate of 4.1%, which is four times, above the WHO acceptable rate of below 1% (WHO 2012:1).

4.3.4.3 Respondents view regarding information received from radio

I hear but ignore them	0.8%, n=3
I hardly ever hear them	1.6%, n=6
I understand them but I do not agree with them	7.0%, n=27
I understand them but cannot implement them	7.6%, n=29
I understand and implement them	15.1%, n=58
I hear them but do not understand them	67.9%, n=260
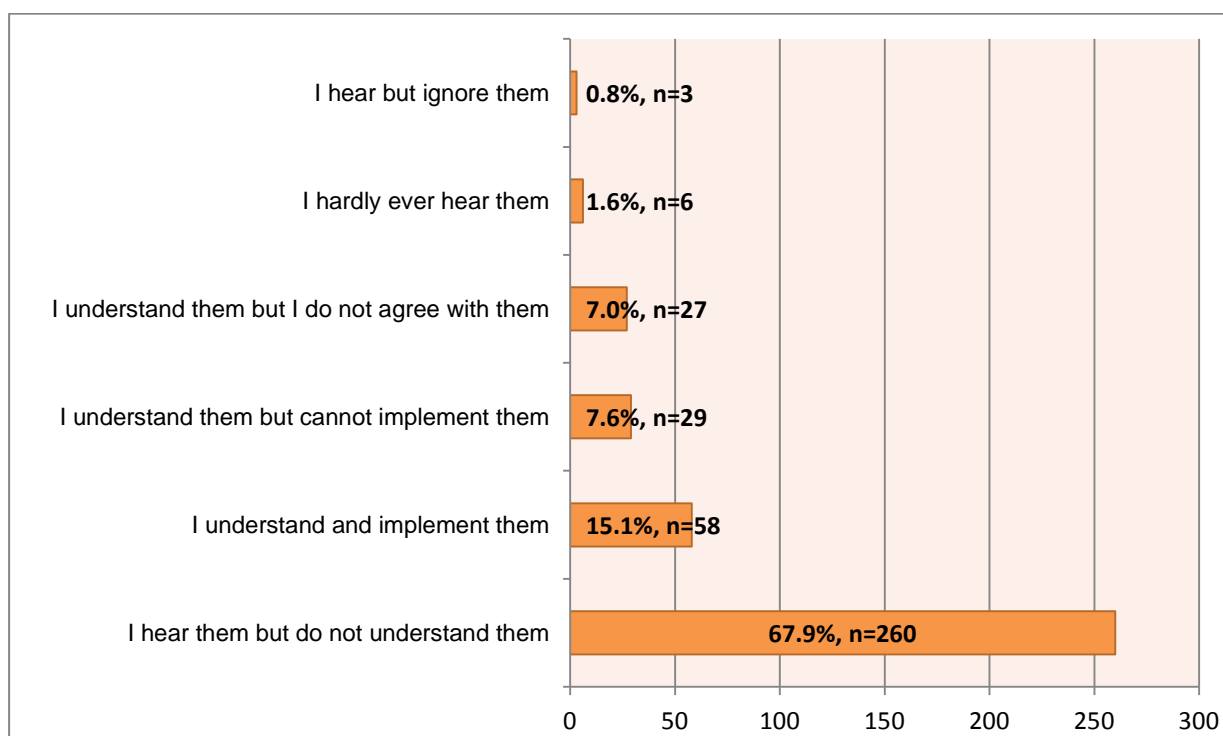
Figure 4.10 Respondent's view about messages received from Radio (N=383)

The findings revealed that 67.9% (n=260) of the respondents indicated that they had heard health education information but did not understand it. Only 15.1% (n=58) indicated that they understood the message from the electronic media and implemented it. This means that although many respondents 61.4% (n=225) as indicated in table 4.2, received information from radio, 84.9% (n=325) of the respondents did not understand it.

This correlates with other national health statistics in Somalia including adult mortality which stands at 381/1,000 (male 447/1,000, female 312/1,000), Maternal mortality is at 1,400/100,000 while under-five mortality is at 142/1,000 (male 140/1,000; female 144/1,000) (WHO 2012:7). In addition, the ongoing conflict and the consequent conditions of insecurity have had a debilitating effect on the social services infrastructure and particularly health provision. Increasingly gaps in the coverage of essential and life-saving health services are compounded by inadequate access to safe water and sanitation, and compounded by eroded livelihoods and mass displacement.

The frequency of communicable disease outbreaks such as cholera and measles, rising rates of severe acute malnutrition, decreasing immunisation rates have seriously impacted on the health of the most at risk groups, particularly women and children (UNOCHA 2012:5).

4.3.5   Mobile phone application as a health education platform

4.3.5.1   Future of health education messaging
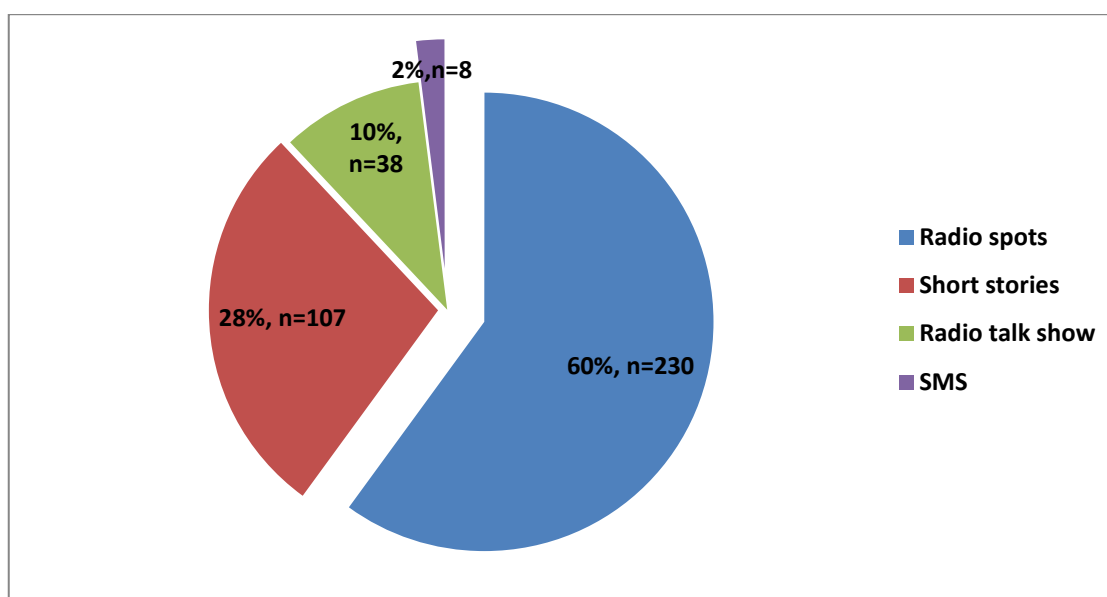
Figure 4.11   How respondents would prefer future health education messaging (N=383)

When respondents were asked how they would prefer to receive health information to be delivered in the future, the majority 60% (n=230), indicated radio spots short stories 28% (n=107) and radio talk shows 10% (n=38). Only 2% (n=8) indicated SMS as the preferred form of delivering health education. Radio again scores high. UNICEF's Youth Broadcasting Initiative YBI (2011:1) in Somalia report indicates that Somali's have radio as a reflection of their traditional reliance on oral culture based forms of expression that also includes poetry, drama, songs and debates to provide news and information across the expanse of the country. Using radio to deliver information and instruction is in complete harmony with Somali culture and movement patterns (UNICEF 2013: 4).

4.3.5.2   Views about SMS as a health education portal
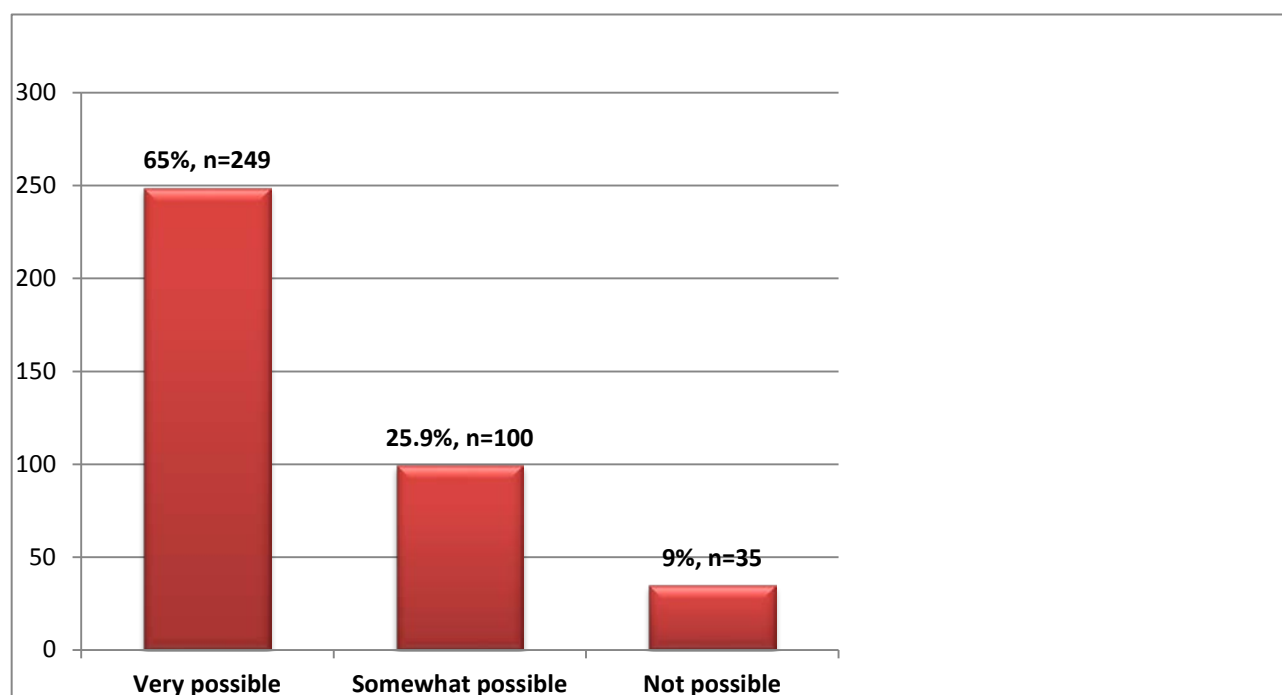
Figure 4.12   SMS as health education portal (N=383)

As shown in Figure 4.12 when respondents were asked their view about using mobile phones to conduct health education, an overwhelming 65.1% (n=249) indicated it was very possible while 25.9% (n=100) indicated it was somewhat possible. Only 9.1% (n=35) indicated it was not possible.

This result is well supported by the finding of Vital Wave Consulting's (2009:47) study on the mobile phone gender gap in low and middle-income countries that depicts mobile phones as well acknowledged empowerment tools developing countries. In most countries, Somalia included, there are many success stories of how mobile phones have transformed peoples' lives. It is therefore natural for communities to see additional social development possibilities that can be provided via mobile phones. Future projects should build on this already created momentum to advance social development initiatives (Vital Wave Consulting 2009:48).

4.3.5.3   *Interest in using mobile phone education platform*
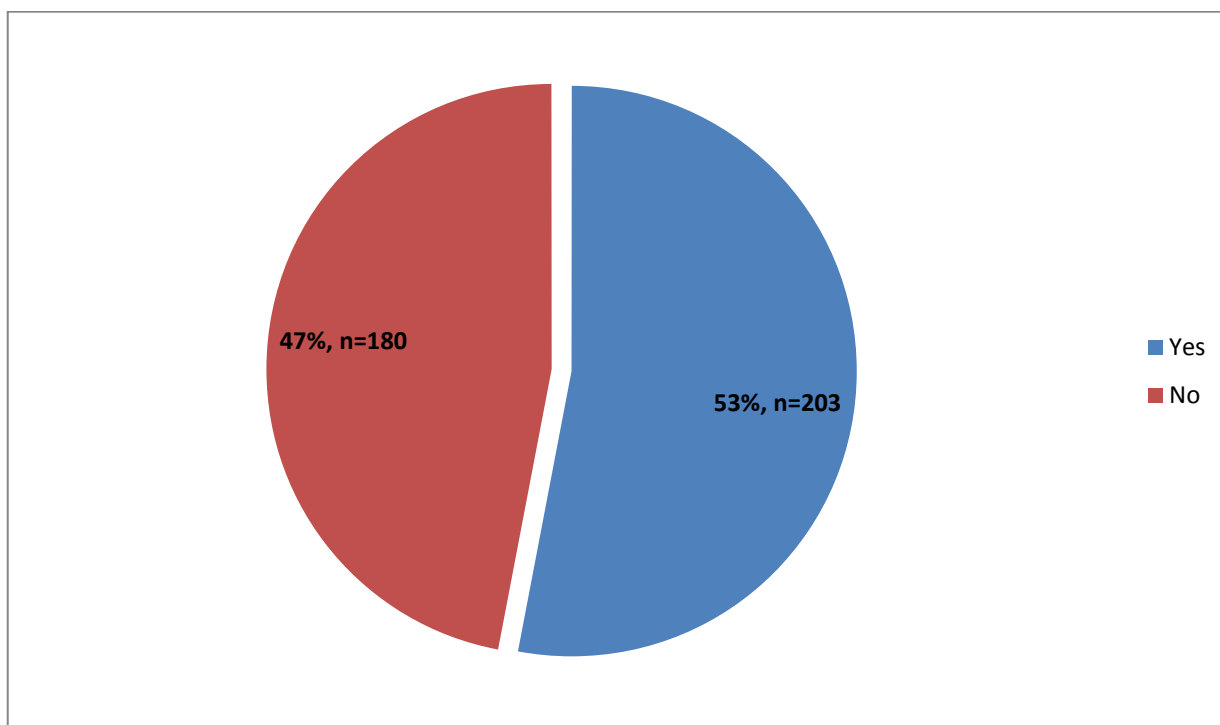
Figure 4.13   Whether respondents would pay for health SMS (N=383)

Interest in and acceptance of using mobile phone health education platform was generally positive. When asked whether they would reply to a question on an SMS relating to health education if they had to pay regular costs of sending text messages, over half 53% (n=203) of the respondents indicated they would pay.

Although all humanitarian services are normally provided free in Somalia, this was an important indication of willingness by the community to actively participate in a mobile phone- based health education service. Willingness to pay is a key ingredient that would inform project sustainability beyond the humanitarian period.

4.3.5.4 Key times when respondents would prefer to receive phone based health education messages

Table 4.4 Respondents' preference for receiving health messages on mobile phones (N=383)

Preferred frequency	Number of responses	Percentage
Only during disease outbreaks	111	29
Daily and during disease outbreaks	96	25
Once a week and during disease outbreaks	38	10
Once a month and during disease outbreaks	4	1
Once a year and during disease outbreaks	4	1
All the time	80	21
Never	50	13

As shown on table 4.4 when asked during which times they would prefer receiving health messages via their mobile phones 29% (n=111) of the respondents indicated they would prefer to receive educative messages only during disease outbreaks while 25% (n=96) indicated they would prefer to receive such messages daily as well as during outbreaks. A total of 10% (n=38) indicated they would prefer once a week and during outbreaks while 21% (n=80) indicated they were happy to receive health messages throughout.

This finding shows that a proportional increase in willingness to participate is directly related to perceived increase in threats. This is well supported by Edberg (2007:69), who sees heightened threat as a positive motivator to behaviour modification albeit temporary. Although the community did not have prior experience of using mobile-phone based health education platforms, indicating high interest to receiving mobile - phone based health education during critical times can, also, generally be considered as an indication of acceptance and willingness to receive health education messages via mobile phones.

4.3.5.5 Form in which respondents would prefer mobile phones to deliver health messages
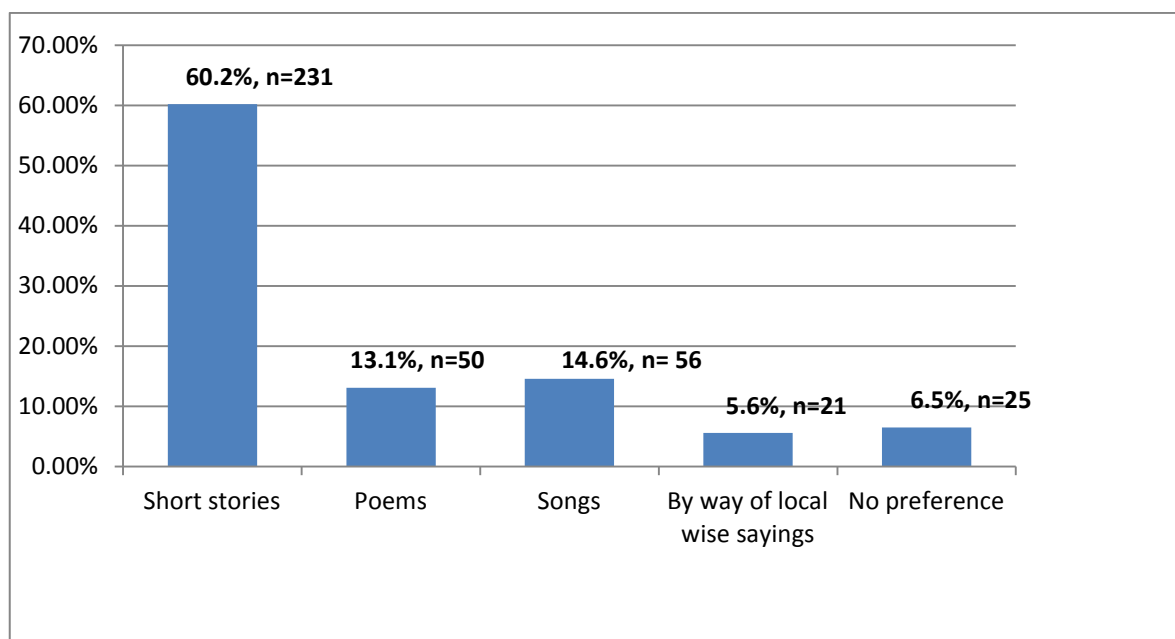
Figure 4.14 Preferred form of delivering mobile phone based messaging (N=383)

When asked how they would prefer mobile phones to deliver health messages, 60.2% (n=231) of the respondents indicated that they would prefer short stories while 14.6% (n=56) indicated they would prefer songs and 13.1% (n=50) by way of poems. The remaining 5.6% (n=21) preferred local wise sayings while 6.5% (n=25) did not indicate any preference.

In a society where skills of oratory are highly respected, speeches and verbal agreements can carry more weight than written peace accords. In Somali society storytelling, poetry, oratory, theatre and song are the dominant forms of cultural expression. In the dialogue-based, problem-solving interactive communication, poetry and oratorical eloquence can appeal to the participants' heart and mind (UNICEF 2013:5). In this context story telling is rated much higher, which is a key pointer on how the respondents envisioned interactive SMS platform working. In Somalia, storytelling is seen as a sensory union of image and idea as well as realistic use of images to describe the present to evoke and embody the substance of a culture's experience in a particular issue of interest (YBI 2011:2).

4.3.5.6 Importance of two way communication
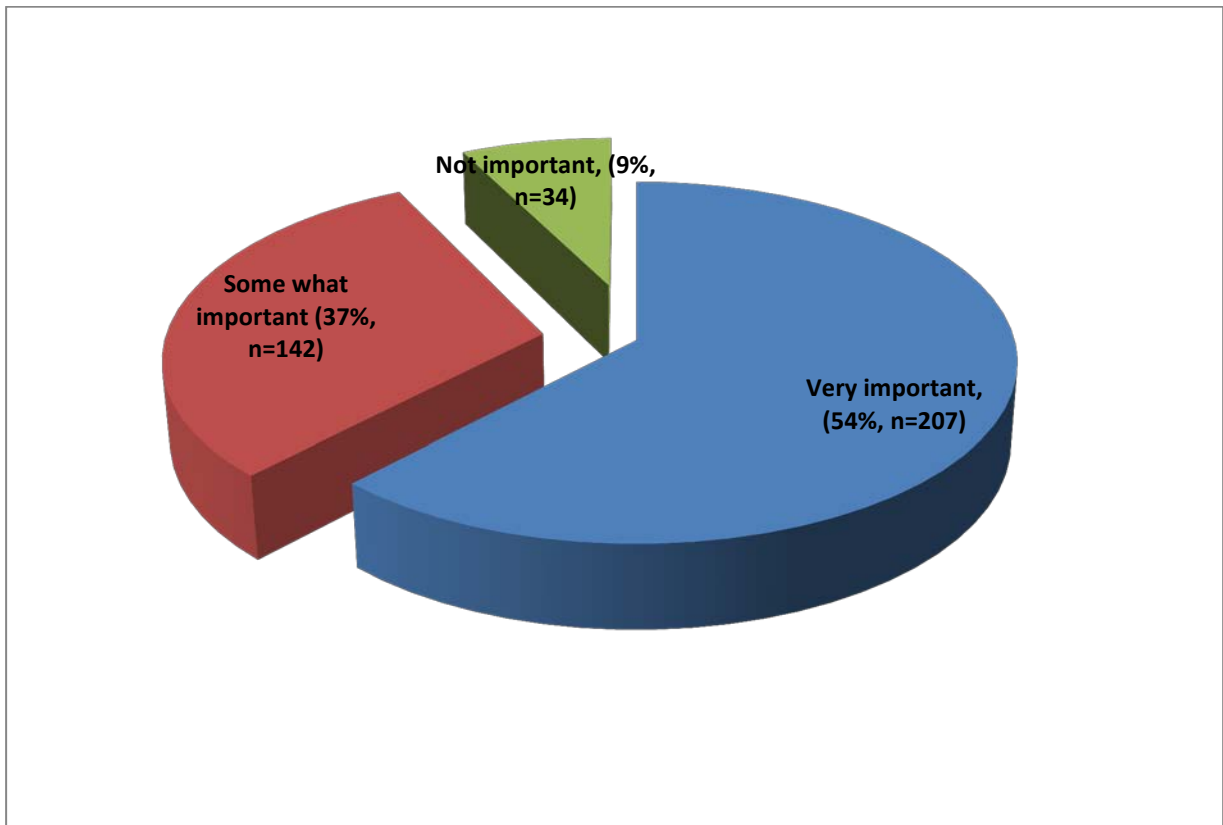
Figure 4.15 Respondents views regarding two way communication in health education (N=383)

As indicated in the figure 4.15; when asked about the importance of two way interactive communications in health education, 54% (n=207) of the respondents indicated it was very important while 37% (n=142) thought it was somewhat important. Only 9% (n=34) indicated it was not important. These are important indications on how the community would prefer the mobile phone platform to function.

As discussed under Figure 4.14 the Somalia community is very oratory natured and any programme that aims at educating them must engage them in a two way communication. This is an important aspect that shall inform the design and development as well as eventual success of a mobile phone-based health education platform.

4.3.6 Respondents' knowledge and perceptions regarding cholera prevention and control

Responses to a 10 statement Likert scale attempted to measure respondents knowledge, perceptions and practices on cholera prevention and control. The Likert scale contained both positive and negative statements relating to cholera prevention and control. Each statement has been analysed based on the percentage of responses under strongly agree, agree, undecided, disagree and strongly disagree response options. A strong affirmative response to a negative statement has been scored as negative one (-1) and vice versa. Conversely a strong negative responses to a positive statement has been scored as negative one (-1) and vice versa as well. Table 4.5 summarises the responses to the all 10 statements.

Table 4.5   Likert scale in respondents' knowledge and perceptions regarding cholera prevention and control (N=383)

Cholera statement – both positive and negative statements relating to cholera prevention and control	Strongly Agree	Agree	Undecided/ don't know	Disagree	Strongly disagree	Score (+ or -)
Cholera can be transmitted through faecal contaminated hands	6%	36%	8%	32%	18%	-1
When water is scarce hand washing is not important	24%	38%	4%	23%	11%	-1
Houseflies can transmit cholera germs	15%	21%	11%	48%	5%	-1
Children s' excreta is harmless	37%	33%	2%	15%	13%	-1
It is normal for children to have diarrhoea	29%	39%	9%	13%	10%	-1
Any water that is visibly clean is safe for drinking	17%	18%	5%	15%	45%	1
Loss of large amounts of fluid and salts through diarrhoea and vomiting can lead to severe dehydration and death	26%	33%	13%	10%	18%	1
Home- based oral rehydration is an important method of controlling dehydration	10%	18%	22%	20%	30%	-1
Adults can get cured of cholera naturally without treatment	34%	21%	5%	16%	24%	-1
We can take some measures at household level to prevent cholera	5%	17%	4%	48%	26%	-1
						-8

When the respondents were given a positive statement that cholera can be transmitted through faecal contaminated hands, only 42% agreed (6% strongly agreed and 36% agreed), 8% were undecided while 50% disagreed (32% disagreed and 18% strongly disagreed) with the statement. When given a negative statement on hand washing 62% agreed with it (24% strongly agreed and 38% agreed). 4% were undecided while 44% disagreed (23% strongly disagreed and 11% disagreed). When told that houseflies can transmit cholera germs only 36% agreed (15% strongly agreed and 21% agreed). 11% were undecided while 53% disagreed (48% disagreed while 5% strongly disagreed).

An overwhelming 70% agreed (37% strongly agreed and 33% agreed) that children' excreta is harmless. Another 2 % were undecided while only 28% indicated that they disagreed (15% disagreed and 13% strongly disagreed). Another 68% agreed (29% strongly agreed and 39% agreed) that it is normal for children to have diarrhoea while 9% were undecided. Only 23% disagreed (13% disagreed and 10% strongly disagreed).

When given a negative statement that any water that is visibly clean is safe for drinking; 35% agreed (17% strongly agreed and 18% agreed) while 5% were undecided. The remaining 60% disagreed (15% strongly disagreed and 45% disagreed). Although 59% agreed (26% strongly agreed and 33% agreed) that diarrhoea and vomiting can lead to dehydration. 13% were undecided while 28% disagreed (10% strongly disagreed and 18% disagreed). Only 28% agreed (10% strongly agreed and 18% agreed) that home based oral rehydration is a crucial intervention to control dehydration. Another 22% were undecided, while an overwhelming 50% disagreed (20% strongly disagreed and 30% disagreed) about the importance of home based oral rehydration.

When given a negative statement that adults can get cured of cholera naturally without treatment, a majority of 55% agreed (34% strongly agreed and 21% agreed) while 5% were undecided. Only 40% disagreed with this statement (16% strongly disagreed and 24% disagreed). When asked whether respondents agreed that communities can take some measures at household level to prevent cholera only 22% agreed (5% strongly agreed and 17% agreed) that while 4% were undecided.

A majority of 74% disagreed (48% strongly disagreed and 26% disagreed) with the statement. After analysing scores on both the positive and negative statements, the communities' knowledge on critical aspects of cholera prevention and control was rated at 2 out of 10 or just 20%. This is very low and critical given that cholera outbreaks are cyclic in Mogadishu.

The above score adds into the long list of poor humanitarian indicators in the WASH sector in Somalia. Access to safe water and safe sanitation is less than 20% and 40% respectively (FSNAU 2013:8). Cholera is endemic with acute watery diarrhoea outbreaks occurring regularly following rainy seasons (CAP 2012:10). Following the start of the military operation in the Afgooye corridor by the African Union Mission in Somalia (AMISOM) and TFG in mid May 2012, thousands of people were displaced from the Afgooye corridor, leading to even greater pressure on limited sanitation facilities and access to clean water in Mogadishu. WHO warned that further population displacement could accelerate the spread of suspected cholera in the city and its environs (WHO 2012:4).

According to the Somalia health cluster Worst Case Scenario in the AWD/Cholera Preparedness and Response Plan February 2012; 5.6 million people were at risk of cholera in 2012 in the whole of Somalia. The severity of the challenge is best portrayed in Mogadishu where twice as many cholera cases were reported in 2012 compared to 2011 over the same reporting period. In 2012, during week 20 (19-25 May), there were 333 cases compared to 140 cases in 2011 (WHO 2012:4). The number of deaths is also higher that year, raising concern over the disease's severity and effective case management. Of the 333 confirmed cases, 220 were children under 5 years of age while 130 were women and girls (WHO 2012:5). The WASH and health clusters aimed at 100% reach of populations in high and medium risk areas during cholera outbreaks with safe water (through chlorination of unprotected sources, household water treatment and safe storage) and hand washing (education and soap distribution) (CAP 2012:2) .
This is a big challenge given that only 34% of WASH targets for 2012 were reached due to lack of access and logistical challenges (CAP 2013:4)

4.3.7 WASH experts e-mail feedback

Table 4.6   Summary of WASH experts e-mail feedback (N=5)

Key parameters	Responses	Counts	%
WASH actors that implement public health promotion in Somalia	Yes	4	80
	No	1	20
Districts in Mogadishu where WASH actor works	Wadajir	5	100
	Hodhan	4	80
	Danile	5	100
	Hamar Jabab	5	100
	Dhakahniliye	4	80
Which rural areas outside Mogadishu do you work	Afgoye corridor	4	80
	Riverine villages	3	60
3 key challenges faced by WASH actors while implementing public health promotion, particularly in cholera outbreak situations	Hindered access	5	100
	Overwhelming need	4	80
	Lack of on ground capacity	3	60
	High cost of mounting a response	5	100
	Difficulties monitoring project implementation	4	80
	Delays in starting response	5	100
Measures that organisations are putting in place to address the above challenges	Engaging local actors	3	60
	Discussions with government	1	20
	Not much is being done	5	100
Whether a mobile phone based integrated public health application could address some of the challenges above	Yes	4	80
	No	1	20
Whether WASH actors would be interested in a collaborative effort to develop mobile phone based application	Yes	5	100
	No	0	0
The stage at which WASH actors would be interested in collaborating	Application development	1	20
	Field implementation	4	80
	Both	0	0
Whether WASH actors have capacity (time, personnel, budget) to enable them participate in the collaboration	Yes	1	20
	No	4	80
Key aspects that WASH actors would want included in a mobile phone based application	Community education	4	80
	Monitoring	5	100
	Data collection	5	100
	Mapping facility	3	60
	WASH NFI distribution	3	60

With reference to table 4.6 above, all the five WASH actors sampled had over 90% (n=4) presence in the internally displaced persons (IDP) camps in Mogadishu town and about 70% (n=3) in the rural areas neighbouring Mogadishu. This coverage is important as their views would be representative of the urban as well as the rural context.

Hindered access 100% (n=5), high cost of mounting a response 100% (n=5) and delayed response 100% (n=5) were indicated as among the key challenges faced by WASH actors while implementing public health promotion, with particular reference to cholera outbreak situations. Difficulties monitoring project implementation 80% (n=4) and lack of ground capacity to implement WASH programmes 60% (n=3) were also given as key challenges facing the WASH actors. In terms of what the actors are doing to address the above challenges 100% (n=5) felt that not much was being done while 60% (n=3) indicated working with local actors. Only 20% (n=2) indicated that they are engaging with the current government structures.

These findings tally well with other recent findings. According to Somalia consolidated appeals process, in 2012, humanitarian WASH needs increased dramatically. At the start of the year, two million people were reported to have a humanitarian emergency by FSNAU; this figure increased to 2.4 million in April and to 3.3 million in September 2012 (FSNAU 2013:4). Due to the access and logistical challenges, by the end of October 2012, WASH cluster members had reached only 1.19 million beneficiaries (UNOCHA 2012:8). This translates to 34% or one third reach of the total target; meaning that two thirds of the most in need beneficiaries were not reached due to access and logistical challenges. The total WASH budget for 2012 was USD 105,145,624 in Somalia, resulting to a cost per beneficiary of USD 31.9 (UNOCHA 2012:10). This compares very poorly with the global trends.

According to DFIDs Water, Sanitation and Hygiene portfolio review (2012:3) the global average actual cost to implement hygiene promotion alone is £1.56 (USD 2.49) per beneficiary and £4.30 (USD 6.9) for entire wash programmes – implementing integrated WASH costs about 3 times the cost of implementing hygiene promotion alone (DFID 2012:3). From this analysis it means that the cost of implementing wash programmes in Somalia is 4.6 times more expensive than the global average.

When asked whether a mobile phone based integrated public health application could address some of the challenges WASH actors were facing implementing interventions in Somalia 80% (n=4) indicated it would. All the five participating actors 100% (n=5) indicated interest in a collaborative effort to develop mobile phone based application.

In terms of the stage of collaboration, a majority of the actors 80% (n=4) indicated that they would be interested in roll out while only 20% (n=2) indicated interest to participate at the application development stage.

None of the actors was interested to participate in both application development and field roll out. However, though, good interest was indicated, only 20% (n=1) actor had the requisite capacity (time, personnel, budget) on the ready to enable them participate in the collaboration.

Monitoring 100% (n=5) and data collection 100% (n=5) were indicated as the key aspects that WASH actors would want included in a mobile phone based application. Other key aspects include community education 80% (n=4), mapping facility 60% (n=3) and WASH Non Food Items (NFI) distribution 60% (n=3). These views from WASH actors on ground are a good reality check on the feasibility of developing a mobile phone based health education platform. These findings will be core to the outcome of the study and shall form key building blocks of the eventual recommended platform.

4.3.8 Mobile phone companies e-mail feedback

All the five main mobile phone companies have got full network coverage in Mogadishu town. However, only Horrmuud and nationlink mobile phone companies have got coverage outside Mogadishu. Hormuud has got coverage in the whole country. There are about 3 million registered mobile phone users in Somalia with Hormuud controlling over 70% of these registered users (ITU 2014:7).

Four out of the five companies were keen to partner with humanitarian agencies to support implementation of a mobile phone based health promotion application. Hormuud and Nationalink were particularly interested as they saw this as an opportunity to add value to telephony and aid marketing of their services in the rural, hard to reach areas. Nationalink and Hormuud have got capacity to provide reverse messaging centre within their network.

Whenever capacity is unavailable in-house, they have collaborative arrangements with telecom engineers in Kenya, India and Dubai to provide back support. None of the five companies has been involved in setting up short code supported messaging centre in the past. However Hormuud and nationlink indicated that this was possible and that they would be keen to do it. Hormuud indicated that it would cost between USD 200 and 300 per month to run a short code while nationlink indicated that they would charge a monthly standing charge of USD 150. All companies indicated that they would charge a standard fee of USD 0.005 per SMS.

4.4   CONCLUSION

This chapter presented data collected from all the three research instruments used in the study. Figures, tables and percentages were used in the chapter to collate the raw data. The results indicated a generally high positive result on the feasibility of employing mobile phones as a health education platform. The results also gave very useful information on the structure and functional ability required for the education platform.

In-depth discussion and interpretation of this data to turn the numerically abstract information into tangible and practical realities in the field shall be done in the next chapter.

CHAPTER 5

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter briefly presents the entire findings addressing three research questions and then discusses the empirical findings in terms of theoretical significance, methodological rigor and practical contribution. It further discusses how the results fill the existing knowledge gaps and make significant contributions to the improvement of coverage and maximise reach of public health services to communities in hard to reach areas during emergencies. The limitations and suggestions for future research was also discussed.

This chapter is structured as follows:

- Section 5.2 presents a summary and interpretation of the research findings and discusses contributions of the study in terms of theory, method and practice.
- Section 5.3 presents recommendations emanating from the study and proposes the way forward.
- Section 5.4 summarises the contribution of the study to the wider public health promotion humanitarian settings as well as concluding remarks for the entire study.
- Section 5.5 discusses the limitations of the study.

5.2 SUMMARY OF THE RESEARCH FINDINGS AND CONCLUSIONS

The interpretation of the research findings has been divided and presented in the form of the three research questions. Under each research question, the findings of the study are synthesised, their implications discussed and conclusions deduced.

5.2.1 Level of access, delivery channels and utilisation of cholera prevention and control education by IDPs in Mogadishu

For a mobile engagement project to create real impact, affordable and scalable technology is a necessary starting point. Equally important are elements of culture, norms and social interaction of communities involved. In order to understand the prevailing context within the IDP camps in Mogadishu, the study carried out assessment of social demographic characteristics, understanding/perceptions on cholera as well as sources of educative information on cholera prevention and control.

5.2.1.1 *Socio-demographic characteristics of the respondents*

The study found out that the majority 75.7% (n=290) of the respondents were women (Figure 4.2). The average age was 38.4 years. This representation of the respondents is important to the study as it means that the views have been given by women who bear the greatest burden when it comes to disease management in households. Also the views are well anchored in terms of practicality and futuristic look as they have been given by a middle aged community segment.

The findings also indicated that the majority of the respondents were illiterate with 82.5% (n=316) having no formal schooling (figure 4.3). Despite the low literacy levels, the findings also show that 91.6% (n=350) of the population in Mogadishu is reachable by SMS – both through their own phones and also through phone sharing, making SMS communication a potential community engagement and educative medium (figure 4.4).

Another important finding is the lack of disposable income by the majority of the community. Only 18.8% {n=72 aggregated from business 11.7% (n=45), farming 5% (n=19) and livestock keeping 2.1% (n=8)} of the respondents indicated that they were able to sustain their livelihood needs from own income generation while 67.1% (n=257) indicated that they were wholly dependent on humanitarian aid (Table 4.1). This is an important indicator on the capacity of the community to participate in a health education programme that requires them to pay.

In terms of mobile phone ownership 55% (n=211) indicated that they owned mobile phones while 42.3% (n=162) indicated that they had access to a shared phone. Only 3% (n=10) indicated that they did not have access to any mobile phone at all, implying that 97% of the respondents had access to a phone in one way or another (figure 4.5). Within a household, phone access was quite good with 50% (n=193) being able to access the phones of the households' heads with ease (figure 4.6).

The social demographic stratum is indicative of a good potential for a mobile phone based application in Mogadishu. However the biggest challenge is the inability of the community to purchase services. Any new community based initiative needs to address this challenge adequately (UNOCHA 2013:8). In order for the phone based programme to gain acceptance and grow to scale, it should therefore be run on a toll free line. This can be achieved through a reverse billed short code or through a compensation scheme that refunds airtime used by participants.

5.2.1.2 Main sources of health information

Radio at 61.4% (n=235) came out as the main source of health information (table 4.2). Well-tailored local radio programmes can be an effective means to prompt wide discussion and engage audiences to change knowledge, attitude and practices. Where this approach has been used most successfully a specific target group has been identified, a common culture has been identified and the programme has been designed with substantial input from the target group/culture (Thukral & Ho 2009:6).

However from this survey it is evident that radio based health education in Somalia is mainly through radio spots at 60% (n=230) and talk shows at 10% (n=38) which are one way communication and not interactive (Figure 4.11). As a result, uptake has been very low with up to 67.9% (n=260) of the respondents indicating that they had heard health education information but did not understand it (figure 4.10).

This understanding is important as it will inform message positioning for future health education programmes including the mobile phone based health education platform and avoid repeating the same mistakes. Due to the wide listen ship of radio in Somalia, it can be used as an advertisement medium and play a pivotal role during roll out of the mobile phone based project.

5.2.1.3 The respondents' knowledge and perceptions regarding cholera prevention and control

The average Likert scale score of just 20% (n=2) on community knowledge regarding cholera prevention showed very low understanding on how cholera is spread as well as how it can be prevented (Table 4.5) This finding agrees with the previous response indicating that only 15.1% (n=58) understood and acted on health education instructions provided through radio (Figure 4.10).

Although knowledge is usually not a sufficient factor for changing individual or collective behaviour, it is the foundation of behaviour change. There are many theories that are applied in health education but the key one that impinges on knowledge acquisition is the rational model of health education. According to Bandura (2005:253) efforts to encourage people to adopt health practices rely heavily on persuasive communications in health education campaigns. Such health messages appeal to fear by depicting the ravages of disease as motivators, and recommended preventive practices are provided as guides for action.

People need enough knowledge about potential dangers to warrant action, but they do not have to be scared out of their wits to act. Rather, what people need is sound information on how disease is transmitted, guidance on how to regulate their behaviour, and a firm belief in their personal efficacy to turn concerns into effective preventive actions (Bandura 2005:254).

To have maximum benefit and to transform community education into sustained motivation for people to take action on their own also requires their active participation in every step. The mobile phone based health education project must espouse this. Also, it must engage and interest all segments of the community.

5.2.2 Enabling factors that would influence adoption and use of mobile phone based cholera prevention and control education

One of the key factors that would support investment in health education is the fact that Somalia has some of the worst health statistics in the word. Adult mortality stands at 381/1,000 (male 447/1,000, female 312/1,000), maternal mortality is at 1,400/100,000 while under-five mortality is at 142/1,000 (male 140/1,000; female 144/1,000) (WHO 2013:7).

In addition, the ongoing conflict and the consequent conditions of insecurity have had a debilitating effect on the social services infrastructure and particularly health provision. Increasingly gaps in the coverage of essential and life-saving health services are compounded by inadequate access to safe water and sanitation as well as eroded livelihoods and mass displacements. The frequency of communicable disease outbreaks such as cholera and measles, rising rates of severe acute malnutrition, decreasing immunisation rates have seriously impacted on the health of the most at risk groups, particularly women and children (UNOCHA 2013:5).

The other important factor is the lack of humanitarian access. There is little "humanitarian space" in which aid can safely be delivered. Bureaucratic impediments and restrictions to humanitarian aid that include check-points and roadblocks make access to communities onerous and time consuming. While the humanitarian community is still able to maintain programmes primarily through national staff and Somali non-governmental organisations, it increasingly finds itself having to provide assistance where it can, rather than where needs are highest.

The ability to move in an unrestricted manner outside established compounds remains a challenge. As a result, there is very limited capacity for humanitarian agencies to manage and monitor the provision of aid; or to determine the actual impact assistance and service delivery have on the beneficiaries (UNOCHA 2013:6).

In spite of all these challenges, Somalia has a well-functioning mobile phone network covering most of the country. According to the ITU World Telecommunication/ICT Indicators Database, Somalia's mobile phones have increased seven fold from 0.9 million subscribers in 2011 to 5,138,000 subscribers in 2014 translating to 49.38% national mobile phone penetration rate (ITU 2014:7). This is phenomenal growth given all the challenges and prevailing context in Somalia. One important factor is the fact that this growth has been spearheaded by the private sector. This points to strong resilience even in the worst of circumstances and shows good potential for self-sustenance. It therefore offers a firm foundation upon which future innovations can be built.

Mobile application in humanitarian programme implementation is an upcoming approach that is relatively new globally. In Somalia this is an entirely new idea. During this study when respondents were generally asked what form of future health education messaging that they would prefer only 2.1% (n=8) indicated SMS as an option (figure 4.11). Further, when specifically asked about their views on using SMS as a health education portal, over 90.9% (n=349) responded to the affirmative − aggregated from 65% (n=249) very possible and 25.9% (n=100) somewhat possible (figure 4.12). Fifty three percent (n=203) also indicated that they would be willing to pay for phone based health education if it was to be charged (figure 4.13). The above findings coupled with the fact that there is over 95.0% phone reach (including sharing) in Mogadishu makes SMS based programming a viable approach worth piloting.

5.2.3 Interest levels and capacities of the key public health humanitarian actors and mobile phone providers

WASH actors in Mogadishu expressed very high interest at 100% (n=5) in support of a mobile phone based integrated public health platform (table 4.6). All the five WASH actors 100% (n=5) interviewed indicated interest in a collaborative effort to develop mobile phone based application. In terms of the stage of collaboration, a majority of the actors 80% (n=4) indicated that they would be interested in roll out while only 20% (n=2) indicated interest to participate at the application development stage (table 4.6). None of the actors were interested to participate in both application development and field roll out. However, though, good interest was indicated, only 20% (n=1) of the actors had the requisite capacity that includes time, personnel, budget on the ready to enable them participate in the collaboration (table 4.6).

Monitoring 100% (n=5) and data collection 100% (n=5) were indicated as the key aspects that WASH actors would want to be included in a mobile phone based application. Other key aspects include community education 80% (n=4), mapping facility 60% (n=3) and WASH Non Food Items (NFI) distribution 60% (n=3) (table 4.6). These views from WASH actors on the ground are a good reality check on the feasibility of developing a mobile phone based health education platform.

Four out of the five companies were keen to partner with humanitarian agencies to support implementation of a mobile phone based health promotion application. Hormuud and Nationalink were particularly interested as they saw this as an opportunity to add value to telephony and aid marketing of their services in the rural, hard to reach areas. Hormuud and Nationalink have got capacity to provide reverse messaging centre within their network. Hormuud is the largest mobile phone provider in Somalia with 90% of all mobile phone users. Nationalink covers 5% and the rest is shared between the remaining three mobile phone providers. One big challenge though is that there is no interconnectivity between mobile phone providers. Meaning that there is no direct communication from one provider to the other. Because of this limitation it would be best to work with Hormuud since they have the largest coverage in Somalia.

5.3   RECOMMENDATIONS

5.3.1 Recommendations for practice

5.3.1.1   *SMS based Interactive platform*

Based on the findings above, it is recommended that an SMS based interactive platform would be the best solution to undertake mobile phone based health education campaigns in Somalia. The key advantages of choosing an interactive SMS platform are as follows.

5.3.1.2   *Cheapest option*

Sending and receiving (including question and answer replies for interactive education) text messages are less expensive than placing a regular phone call or video call.

5.3.1.3   *Record-keeping*

SMSs provide a good way of keeping records for reference. This is of particular importance in a context like Somalia where such an approach could be the only source of health education. Communities can refer back whenever they require. For example information on how to mix home based sugar salt solution to manage child diarrhea.

5.3.1.4 Signal economy/applicable on low level 2G network

Text messaging is more efficient in terms of managing service signals. Text messaging uses less amounts of service signals than phone calling, video calling and/or email, which may require the availability of at least 3G network. SMS platforms are basic services available on all mobile phone providers, including the 2G network operating in Somalia.

Despite the fact that text messaging is a widely used medium of communication, it has some limitations. Key ones include the following:

5.3.1.5 Limited storage

There is a limit to the number of text messages that can be stored in an ordinary mobile phone. If the inbox gets full, the phone can no longer receive any more messages unless some of them are deleted. For key information such as how to mix certain remedies, communities should be asked to note the information down on paper. Alternatively the proposed interactive SMS platform should enable retrieval of such important information via a code.

5.3.1.6 Length

SMS texting can only contain a maximum of 160 characters [including spaces]. This can be limiting where the content of information to be sent is big. However, this can be addressed by compacting the messages as well as using multiple SMS texts. A guide on how to develop SMS content should be developed to aid programme officers developing SMS based health messages.

5.3.1.7 Service integration

Access and timely delivery of humanitarian aid still remains a big challenge in Somalia. To be effective, the proposed platform should integrate all the key activities normally implemented in humanitarian public health in a context like Somalia. These activities include data collection (for assessments, research and routine monitoring), interactive community education as well as distribution of non-food items through mobile phone

based vouchers (mVouchers). Such integration shall ensure that all key public health programme deliverables are obtainable on a single mobile platform.

5.3.1.8 Two way Mobile Originated Reverse Billing (MORB)

Two way Mobile Originated Reverse Billing (MORB) means that the phone sending the message is charged for the cost of sending and receiving SMS to participating phone numbers. Majority of respondents indicated that they have no capacity to buy credit to enable them pay to participate in interactive sessions. To ensure attainment of required uptake, there is need for the SMS platform to offer the interactive education for free. This can be achieved through a MORB short code. It is therefore recommended that the proposed SMS platform be based on a MORB short code with Hormuud – the largest mobile phone provider in Somalia.

5.3.1.9 Participation based on voluntary subscription

One of the key issues voiced by the mobile telecom companies was the security challenge posed by mass broadcasting of messages to communities. They indicated that a broad cast approach could easily be sabotaged by terrorist groups like the Al Shabaab and use it to indoctrinate communities. For this reason, mass broadcast of text messages is strictly controlled in Somalia.

To address this challenge it is recommended that participation on the proposed platform be based on voluntary subscription. This can be done by providing information on how to register through radio, TV as well as through normal field community mobilisation that happens in public health programs. This shall ensure that only people who register voluntarily are engaged in the interactive health education sessions. This approach shall also prevent this initiative from getting into usual spamming fatigue that emanates from marketing information from mobile phone companies.

5.3.1.10 Partnership with telecom companies as well as WASH and Health actors

In order to reduce per capita cost and get best value for money, the agency implementing this platform should seek a public private partnership with Hormuud. Under such arrangement, the interactive SMS platform shall benefit from discounts as well as being part of the company's corporate social responsibility (CSR) initiatives.

Partnerships with other implementing actors shall aid in mobilising people to register for the platform's services. Every effort that leads to the reduction of per capita cost and increased coverage should be made.

5.3.1.11 *Phased progressive approach*

Somalia is a challenging context in many ways and will certainly present challenges during the implementation of the interactive SMS platform. It is recommended that the implementation be done in four phases as follows:

5.3.1.11.1 *First phase*

This shall aim at developing the interactive education component of the platform, develop requisite content and to establish partnership with the mobile phone company.

5.3.1.11.2 *Second phase*

This shall aim at piloting the interactive education component in at most 5 districts and documentation of lessons learnt.

5.3.1.11.3 *Third phase*

This shall involve redevelopment of the platform to make improvements on the interactive education component based in lessons learnt in phase two and incorporation of field data and mVoucher components.

5.3.1.11.4 *Fourth phase*

This shall comprise of a pilot for the field data and mVoucher components as well as scaled up implementation of the interactive education component. During all four phases, proper documentation of lessons learned including case studies should be carried out to inform future improvements. The findings should be shared with other actors as well to cultivate wider acceptance/uptake.

5.3.2 Recommendations for further research

5.3.2.1 *Further research in stable context*

This current study was carried out in an unstable social context. It is recommended that further research be conducted in a stable context that includes rural set ups to bring out the difference in both enabling factors as well as barriers that would inform development of a scalable SMS based health education platform. Findings from such a study could enhance the generalisability of SMS based health education to all contexts.

5.3.2.2 *Integrated voice response potential*

Further research is recommended to identify the feasibility of adding integrated voice response (IVR) functionality into the mobile phone platform. IVR functionality would be very useful for community segments whose literacy levels are low.

5.4 LIMITATIONS OF THE STUDY

This research was conducted in internally displaced persons (IDP) camps in Mogadishu. The IDP population in Mogadishu categorises several segments of the Somalia community including urban, rural migrants as well as displaced communities. The actual rural Somalia set up – that includes pure pastoralists and agro pastoralists is not represented. There are distinct contextual differences that include lifestyle and cultural orientation differences between the rural and urban communities. There is therefore a limitation regarding the generalisability of findings to the entire country.

The other limitation is methodological. Data for this study were collected under a cross-sectional design, so the study contains typical limitations associated with this kind of research methodology. For example, the findings represent respondents' views at a single point in time which is dependent on many factors. To gain deeper understanding, future studies should be longitudinal to evaluate users' perceptions of the feasibility of mobile phone based health education programme in a fragile context like Somalia.

5.5   CONCLUDING REMARKS

The implications of this research are highly relevant to finding alternative approaches to increase humanitarian access to the deserving communities in Somalia. The research findings shall contribute to the improvement of coverage and maximise reach of public health services to communities in hard to reach areas during emergencies. It is envisaged that successful development of a scalable mobile phone based integrated public health promotion will enable actors to collect data quickly, engage communities within and outside of Mogadishu and provide an interactive communication medium to educate communities on disease prevention, particularly cholera. Also it will help humanitarian actors to monitor and evaluate programmes delivered remotely.

The results indicated that it is feasible to establish an innovative, transformative, low cost SMS based mobile phone platform to carry out health education in Somalia. The platform can be employed to facilitate interactive community participation and ensure maximised reach and beneficiary accountability in the delivery of public health education to the unreachable communities. Mobile phone technology is one of the digital technologies with the widest reach to unreachable communities in developing countries like Somalia (Mechael 2009:154). The proposed technology has the capability to enable programme implementation to anyone, anytime and anywhere by removing location, time and other restraints (Ravi & Prasanna 2004:2673).

A number of mobile phone technologies are in use already. However, none of the existing applications have been used to engage and provide public health education to affected communities. Furthermore, all of the existing applications are stand-alone applications addressing only one aspect of public health promotion. None integrates all the critical aspects of public health promotion in humanitarian emergencies and have not been tried in hard to reach/insecure emergencies for example in a context like Somalia. As a result, there has been a gap for a mobile phone platform that integrates incident mapping, data collection and an interactive communication interface that supports public health education. The resultant platform should be contextualised to the unique needs and ground realities in Somalia (Zimic et al 2009:639).

The resultant application recommended from this research is aimed at increasing speed, access, spontaneity, coverage and reduced cost per capita, a combination of which form the hallmark of an emergency health response. Ultimately this effort could contribute to improved health, reduced suffering and reduced deaths from cholera in Somalia, and probably in other countries as well.

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ANNEXURE 1: RESEARCH INSTRUMENT

1.1 HOUSEHOLD SURVEY QUESTIONNAIRE – UPLOADED ON CELL PHONE

*(The enum*erator shall read the consent statement and obtain a verbal consent before starting the interview)*

1. Enumerators names_____

Socio-demographic information

2. Respondents gender

[ ] male   [ ] female

3. Respondents age   **(Ask the age and key in the number)** [ ]

4. What is the number of adults in the household **(ask total number of adults /persons of age 18+ and key in**

the total number of adults in HH)   [ ]

5. Respondents education level

[ ] No formal schooling   [ ] Some primary schooling

[ ] Completed primary school   [ ] Some secondary schooling

[ ] Completed secondary school   [ ] post secondary qualification

[ ] Postgraduate qualification

6. Source of household income **(Select as many responses as applicable)**

[ ] Business   [ ] Support from aid agencies

[ ] Support from relatives abroad   [ ] Livestock

[ ] Farming   [ ] Other (Specify)

Existing knowledge and attitude on cholera prevention and control – Likert scale

measurement (this was customized into a check box format on the Cell phone)

	Cholera statement – both positive and negative statements	Strongly agree	Agree	Undecided/ Don't know	Disagree	Strongly disagree
1	Cholera can be transmitted through faecally contaminated hands					
2	When water is scarce hand washing is not important					
2	Houseflies can transmit cholera germs					
4	Children excreta are harmless					
5	It is normal for children to have diarrhoea					
6	Any water that is visibly clean is safe for drinking					
7	Loss of large amounts of fluid and salts through diarrhoea and vomiting can lead to severe dehydration and death					
8	Home based oral rehydration is an important method of controlling dehydration					
9	Adults can get cured of cholera naturally without treatment					
10	We can take some measures at household level to prevent cholera					

Information about cell phones access and use

17. Do you own a mobile phone? (If no skip to question 19)

[ ] Yes   [ ] No

18. If yes how many phones do you own?

[ ] One   [ ] Two

[ ] More than two

19. Does anyone else in the household own a phone (s)? (If no skip to question 21)

[ ] Yes   [ ] No

20. In addition to you, who else in the household owns the phone(s? (Select as many responses as applicable)

[ ] Husband   [ ] Wife

[ ] Father   [ ] Mother

[ ] Son   [ ] Daughter

[ ] Other relative's in the household

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21. In total how many phones are in your household? (**Key in the total number** [   ]

22. Whose phone(s) do most people in your household have access to? (**Select as many responses as applicable**)

[ ] Husband's   [ ] Wife's

[ ] Father   [ ] Mother's

[ ] Son's   [ ] Daughter's

[ ] Other relative's in the household   [ ] None

23. What time of the day would the maximum household members get access to the available phone?

[ ] In the morning   [ ] Mid day

[ ] Afternoon   [ ] Evening meal time

[ ] Before sleep time   [ ] Do not have access to any

24. What do you mostly use your phone for? (**Select as many responses as applicable**)

[ ] Voice calls   [ ] SMS texting

[ ] Playing games   [ ] Sending multimedia messages

[ ] Taking photographs/videos   [ ] Listening to music

[ ] Money transfer   [ ] Internet

[ ] Other (Specify)   [ ] Do not use cell phone

25. What is your level of interaction with short messaging service [SMS] (%)
[ ] Able to read and write SMS
[ ] Able to read SMS only
[ ] Has someone who supports with writing/reading SMS
[ ] Cannot use SMS as a means for communication

26. If no one has a phone in your household how do you communicate? (**Select as many responses as applicable**)

[ ] Uses a neighbours phone   [ ] Uses a friend's phone

[ ] Sends/receives messages through relatives   [ ] I do not communicate

[ ] Uses a communal phone   [ ] Other (Specify)

Access to health information and social cultural issues relating to phone messaging (read the options to the respondents and tick the ones they choose)

27. Where do you mainly get information regarding health from? (Select as many responses as applicable)

[ ] Radio   [ ] Mosque
[ ] News papers   [ ] Phone – landline
[ ] Phone –cell phone   [ ] Internet
[ ] TV   [ ] Community meetings
[ ] Community leaders   [ ] Community health workers
[ ] Posters   [ ] School children
[ ] Do not get any information. (Skip to question 31)

28. What types of health information have you been receiving through the sources above (e.g. radio/Mosque/other electronic media? Select as many responses as applicable)

[ ] Cholera prevention
[ ] Malaria prevention
[ ] Diarrhoea
[ ] Childhood vaccinations/ immunization
[ ] Safe drinking water
[ ] Hand washing
[ ] Measles
[ ] Health issues among children
[ ] Mother's Health
[ ] None

29. How frequently do you get health information?
[ ] daily   [ ] at least once a week
[ ] at least once a month   [ ] at least once a year

30. What is your view about these messages from electronic media? (If respondent hears messages)
[ ] I hardly ever hear them.
[ ] I hear them but do not understand them.
[ ] I understand them but I cannot implement them.
[ ] I understand them but I do not agree with them.
[ ] I never hear them.

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31. What types of health information would you most prefer to receive from electronic media e.g. radio, TV, Mobile phone, internet? **(Select as many responses as applicable)**

[ ] Cholera prevention

[ ] Malaria prevention

[ ] Diarrhoea

[ ] Childhood vaccinations/ immunization

[ ] Safe drinking water

[ ] Hand washing

[ ] Measles

[ ] Health issues among children

[ ] Mother's Health

[ ] None

32. How would you want electronic media to deliver health information? **(Select as many responses as applicable)**

[ ] Radio spot	[ ] Television spot
[ ] Short stories	[ ] Songs
[ ] By phone – SMS	[ ] By phone – voice call
[ ] Radio plays/skits	[ ] Prefer to search on internet
[ ] Short stories	[ ] Somali wise sayings
[ ] Poems	

[ ] I do not think electronic media should be used to deliver such information.

33. Do you think it is possible to use mobile phones to pass on health information to people?

[ ] very possible	[ ] somewhat possible
[ ] not possible	[ ] Not sure

34. Would you reply to a question on a short message text (SMS) relating to health if you had to pay the regular cost of sending a text message?

[ ] yes	[ ] no

35. If you were to be sent health information via a mobile phone how often would you like to receive it?

[ ] only during disease outbreaks	[ ] daily & during disease outbreaks
[ ] once a week & during disease outbreaks	[ ] once a month & during disease outbreaks
[ ] once a year & during disease outbreaks	[ ] never

36. What would be the most preferred time of the day to receive health information via mobile phones?

[ ] In the morning   [ ] during lunch time

[ ] In the evening during dinner   [ ] Night-Just before going to sleep

[ ] any time of the day   [ ] wouldn't want to receive health information

37. Why is the time you have selected above the most preferred for you to receive health information via a mobile phone? (**Select as many responses as applicable)**

[ ] whole family is together   [ ] It's usual to get electronic messages at that time

[ ] we are more relaxed   [ ] It's the time I will be near a phone

[ ] Other reason (specify)   [ ] No particular reason

38. Which of these ways of conveying health information would you most connect with…information expressed …..**(Select as many responses as applicable)**

[ ] Through short stories   [ ] through visual aids

[ ] Through songs   [ ] through real life demonstrations

[ ] Through poems   [ ] by way of local wise sayings

[ ] No preference

39. How important is it for you to have a two way means of communicating heath questions and answers?

[ ] very important   [ ] somewhat important

[ ] not important

1.2 HUMANITARIAN WASH ORGANISATIONS SELF-RESPONSE QUESTIONNAIRE

Kindly refer to the accompanying consent form. The consent form has details regarding the mobile phone feasibility study in Mogadishu. Kindly study it and if you consent to participate in the study, please take 10 minutes to respond to the questions below and send back your reply to the lead researcher. You can type your answers in a word document or just respond in an e-mail format

1. Do you implement public health promotion in Somalia?
2. Which districts do you work in Mogadishu?
3. Which rural areas outside Mogadishu do you work in?
4. What are some of the 3 key challenges that you face in implementing public health promotion, particularly in outbreak situations like during the current cholera outbreak?

   a)

   b)

   c)

5. What are some of the ideas you are putting in place to address these challenges?

   a)

   b)

   c)

6. Do you think a mobile phone based integrated public health application would address some of these challenges?

   a) Yes [ ]

   b) No   [ ]

7. Would you be interested in a collaborative effort to develop such an application?

   a) Yes [ ]

   b) No   [ ]

8. What stage would you be interested in collaborating at?

   a) Application development

   b) Field implementation

   c) Both

9. What capacity (time, personnel, budget) do you have in place to enable you participate at the suggested level?
10. What are the key aspects you would want included in such an application?

1.3   MOBILE PHONE PROVIDERS SELF-RESPONSE QUESTIONNARE

Kindly refer to the accompanying consent form. The consent form has details regarding the mobile phone feasibility study in Mogadishu. Kindly study it and if you consent to participate in the study, please take 10 minutes to respond to the questions below and send back your reply to the lead researcher. You can type your answers in a word document or just respond in an e-mail format

1. Which districts does your network cover in Mogadishu?

2. Which rural areas outside Mogadishu do you also cover?

3. What is your client base in millions?

4. Would you be interested to partner with humanitarian agencies to support implementation of   a mobile phone based health promotion application?

5. What capacity do you have to support this –describe the capacity?

6. What would it involve in setting up a messaging center with your company ----are there any subscription fees involved?

7. What is the cost of running the service for a month?

1.4   ORAL CONSENT - FOR HOUSEHOLD QUESTIONNAIRE

(Adapted from Burns and Grove 2000:198)

You have been selected by chance to participate in a study to assess the viability of using mobile phone to pass health education messages in complex emergencies, particularly in situations where access is prohibited by insecurity. The study is being conducted by Jesee Kinyanjui through Hijira and Oxfam GB.

Although the study may not benefit you immediately, it will provide information that will inform the feasibility of developing of an effective, cost-efficient and scalable mobile application aided health promotion programme in Somalia and other similar settings. The study and its procedure have been approved by the relevant authorities. For you, these procedures involve responding to questions for about 20 minutes. You are free to ask any question about the study at any time if you need more clarification.

Your participation in this study is voluntary: you are under no obligation to participate. You have a right to withdrawal at any time. The information collected from you will be entered into a mobile phone and sent automatically into a server for analysis. All the information shall be coded so that they are not linked to your identity will not be revealed at any time during the study.

Please confirm that you are happy to participate in this study. If you do we will request that you give us about 30 minutes to answer a few questions.

1.5   WRITTEN CONSENT − FOR WASH HUMANITARIAN ORGANISATIONS

Your organisation is one of the key players in public health promotion in Somalia. You have been selected to participate in a study to assess the viability of using mobile phone to implement an integrated public health promotion programme in complex emergencies, particularly in situations where access is prohibited by insecurity like it is in Somalia. The study is being conducted in Mogadishu by Jesee Kinyanjui through Hijira and Oxfam GB.

Your participation in this study is voluntary: you are under no obligation to participate. You have a right to withdrawal at any time. Also you can make suggestions on how you want the information provided used/not used. Although the study may not benefit you immediately, it will provide information that will inform the feasibility of developing an effective, cost-efficient and scalable mobile application aided health promotion programme in Somalia and other similar settings. The study and its procedure have been approved by the relevant authorities. The information collected from you will be used solely for the purposes of this study.

It will take you about 10 minutes to answer the questions in the accompanying short questionnaire. Please confirm that you are happy to participate in this study by ticking the small box on the right and e-mailing back the consent form together with the filled questionnaire.

Yes am happy to participate in this study ☐

No am not happy/able to participate in this study ☐

1.6   WRITTEN CONSENT – FOR PHONE COMPANIES

Your company is one of the key players in provision of mobile phone services in Somalia. You have been selected to participate in a study to assess the viability of using mobile phone to implement an integrated public health promotion programme in complex emergencies, particularly in situations where access is prohibited by insecurity like it is in Somalia. The study is being conducted in Mogadishu by Jesee Kinyanjui through Hijra and Oxfam GB.

Your participation in this study is voluntary: you are under no obligation to participate. You have a right to withdrawal at any time. Also you can make suggestions on how you want the information provided used/not used. Although the study may not benefit you immediately, it will provide information that will inform the feasibility of developing an effective, cost-efficient and scalable mobile application aided health promotion programme in Somalia and other similar settings. The study and its procedure have been approved by the relevant authorities. The information collected from you will be used solely for the purposes of this study.

It will take you about 10 minutes to answer the questions in the accompanying short questionnaire. Please confirm that you are happy to participate in this study by ticking the small box on the right and e-mailing back the consent form together with the filled questionnaire.

Yes am happy to participate in this study

No am not happy/able to participate in this study

ANNEXURE 2: ETHICAL CLEARANCE FROM UNISA

UNISA | university of south africa

**UNIVERSITY OF SOUTH AFRICA
Health Studies Higher Degrees Committee
College of Human Sciences
ETHICAL CLEARANCE CERTIFICATE**

HSHDC/68/2012

Date of meeting: 27 June 2012   Student No: 4198-731-4

Project Title: Viability of mobile phone based applications in implementing cholera prevention and control education in complex humanitarian emergencies – a feasibility study in internally displaced camps in Mogadshu Somalia.

Researcher: Jesee Wainaina Kinyanjui

Degree: Masters in Public Health (MPH)   Code: DIS4953

Supervisor: Mrs KA Maboe
Qualification: MA in Health Studies
Joint Supervisor: -

DECISION OF COMMITTEE

Approved   [√]   **Conditionally Approved**   [   ]

**Prof D van der Wal
CHAIRPERSON: HEALTH STUDIES HIGHER DEGREES COMMITTEE**

**Dr MM Moleki
ACTING ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES**

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES

1

ANNEXURE 3: AUTHORITY TO CONDUCT STUDY FROM SOMALIA WASH CLUSTER

Oxfam

Shelter Afrique House,
Mamlaka Road,
P.O. Box 40680, GPO Nairobi
00100 KENYA
Tel: +254 - 20 - 2820000
Fax: +254 - 20 - 2820105/2820240

02/02/2012

Jesee W. Kinyanjui
Global Health Advisor
Oxford, UK

RE: Permission to conduct research on the feasibility of using mobile phones to implement community health education in Mogadishu

The above refers,

We are in receipt of your request for permission to conduct a feasibility study in the areas we work in, in Mogadishu. We have studied the objectives, scope and methodology of the study and are satisfied that the work meets all ethical and programmatic requirements. We also find the undertaking noble and will feed into our ongoing programmes. In particular we appreciate that this is designed on a cholera theme which is one of our biggest public health challenge in Mogadishu. Indeed we do have recurrent cholera outbreaks in these areas, at least twice annually.

This is therefore to confirm that permission has been granted to conduct the study in the five districts of Waldajiir, Hodan, Harmar Jabab, Wagberi and Dharkenyley. We will be interested in the results of this study, so share the findings as soon as they are ready.

Regards

02/02/2012

Medard Hakizamungu
Humanitarian Coordinator – Somalia Programme

ANNEXURE 4: LETTER FROM LANGUAGE TRANSLATOR

APPENDIX D. TRANSLATORS ANNEXURE

KULLAN Translators And Interpreters
P.O.BOX 22078-00100
NAIROBI KENYA
TEL: 254-720902506/254-722465981

1.0 About Kullan

Kullan is a language translation and interpretation agency. We specialize in translation and interpretation of Somali language.

2.0 Translation & interpretation manager

Name: Abdi Mohamed Dakane.
Nationality: Somali
Languages: English, Somali and Swahili.

2.1 Education

University education: University of Nairobi
Qualification: BA in linguistics
Year: 2012

Professional diploma: Advanced Diploma in Community Based Development from the Association of Business Managers and Administrators (ABMA) UK.
 Year: 2007

Professional diploma: Diploma in Community Based Development: Kenya Institute of Social Work and Community Development (KISWCD).
Year: 2005

Secondary Education: Lugh Secondary School, Gedo Region Somalia

Year Of Completion: 1990.

Primary Education: Hilo Mareer, Gedo Region Somalia

Year Of Completion: 1986

Professional experience: 5 years doing translations and interpretations

Professional experience:10 Years implementing public health programs in Dadaab refugee camps

3.0 Key organizations that we have translated for

UNICEF, Oxfam, IRC, UNDP

ANNEXURE 5: LETTER FROM STATISTICIAN

XcelConsultancy services

Specialists in Statistics and Research work support

Tel: +254713233619/+254713233622

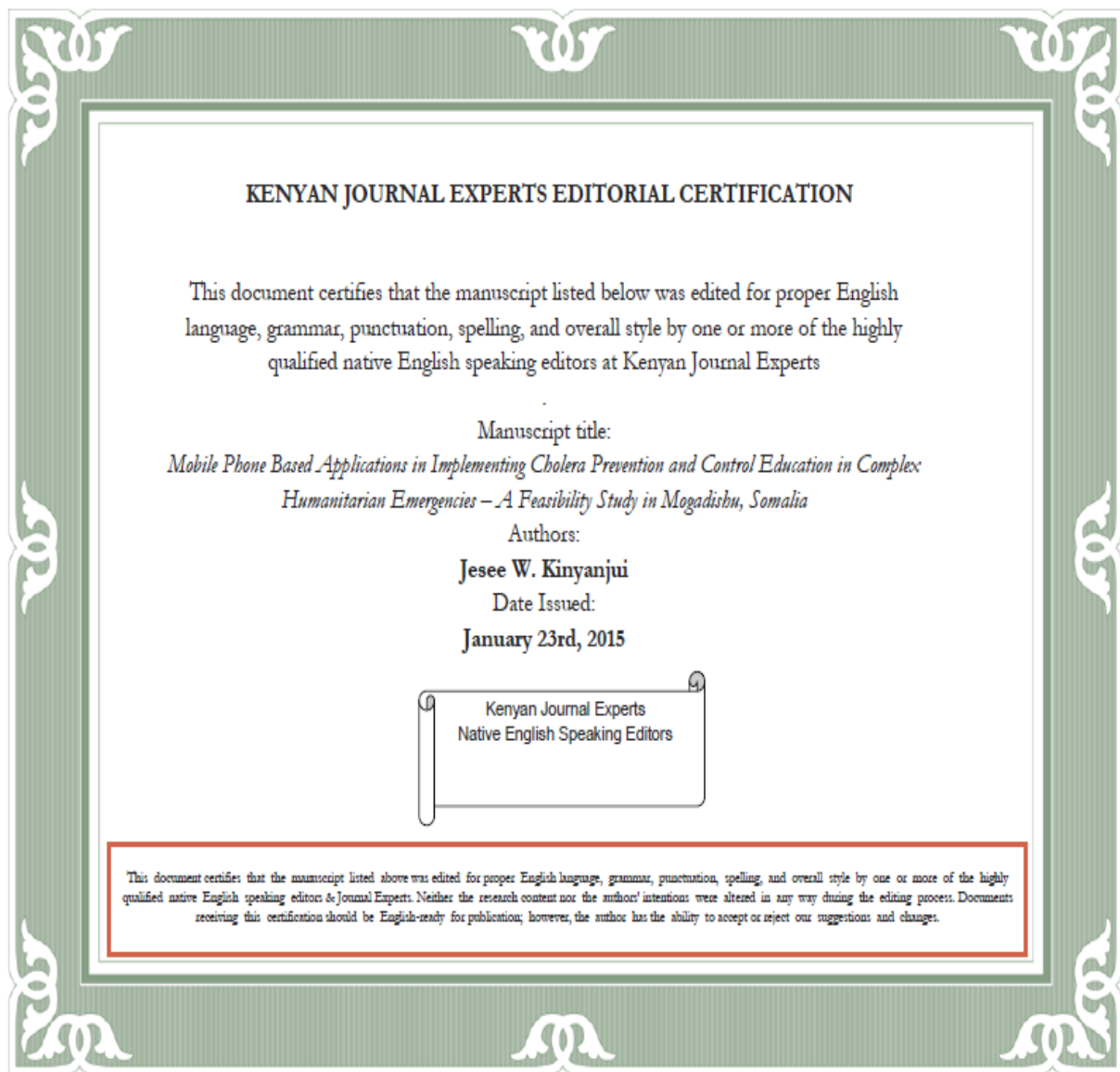This certificate attests that statistics used in the manuscript listed below were checked for accuracy and consistence by our statisticians.

Manuscript title: Mobile Phone Based Applications in Implementing Cholera Prevention and Control Education in Complex Humanitarian Emergencies – A Feasibility Study in Mogadishu, Somalia

Researcher: Jesee W. Kinyanjui

Date Issued: November 18th, 2014

ANNEXURE 6: LETTER FROM LANGUAGE EDITOR

KENYAN JOURNAL EXPERTS EDITORIAL CERTIFICATION

This document certifies that the manuscript listed below was edited for proper English language, grammar, punctuation, spelling, and overall style by one or more of the highly qualified native English speaking editors at Kenyan Journal Experts

.

Manuscript title:

Mobile Phone Based Applications in Implementing Cholera Prevention and Control Education in Complex Humanitarian Emergencies – A Feasibility Study in Mogadishu, Somalia

Authors:

Jesee W. Kinyanjui

Date Issued:

January 23rd, 2015

Kenyan Journal Experts
Native English Speaking Editors

This document certifies that the manuscript listed above was edited for proper English language, grammar, punctuation, spelling, and overall style by one or more of the highly qualified native English speaking editors & Journal Experts. Neither the research content nor the authors' intentions were altered in any way during the editing process. Documents receiving this certification should be English-ready for publication; however, the author has the ability to accept or reject our suggestions and changes.

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