

Linking Indigenous Peoples' Health-Related Decision Making to Information Communication Technology: Insights from an Emerging Economy

Md. Jahir Uddin Palas

Department of Banking and Insurance, University of Dhaka

Email: jahir@du.ac.bd

Mahfuz Ashraf

School of Public Health and Community Medicine, University of New South Wales

Ali Quazi

School of Management, Faculty of Business, Government & Law, University of Canberra

Helena Grunfeld

Victoria Institute of Strategic Economic Studies, Victoria University

Najmul Hasan

MRC Bangladesh Limited

Abstract

Indigenous peoples are being marginalised globally from a socioeconomic perspective and are often excluded from mainstream communities for social and/or geographic reasons. Historically, they tend to have lower living standards, including poor health conditions as compared to the rest of the population. Literature suggests that information and communication technologies (ICTs) have the potential to improve awareness about how to improve health and wellbeing. In order to both deepen and broaden the understanding of how ICTs can influence Indigenous peoples' health-related decision-making, this study has developed a conceptual framework based on the capability approach, focusing on the five dimensions of freedoms suggested by Amartya Sen. Data collected from a sample of members of an Indigenous community in Bangladesh, using a purposive sampling method, were analysed through qualitative techniques to identify ways in which a mobile-based health system have influenced the lives of indigenous people. The findings revealed that the mobile healthcare system explored in this study addressed a number of factors pertaining to indigenous peoples' quality of life. These findings are useful for policy formulation related to the design and implementation of healthcare strategies in Bangladesh. The conceptual framework, following further validation, could serve as a platform for the advancement of research towards understanding how mobile healthcare systems can improve the wellbeing of individuals in indigenous communities.

Keywords: Information Communication Technology (ICT), Mobile Based Healthcare, Indigenous people, Amartya Sen's Five Freedoms, Qualitative approach, Bangladesh.

1. Introduction

Of the estimated 370 million indigenous people residing in at least 70 countries^{1, 2}, many live in poverty and suffer from health related problems such as malnutrition, overcrowding, poor hygiene, environmental contamination and inadequate health care. They also have lower levels of education,

employment, and often experience human rights violations.^{3,4} Common illnesses in Indigenous communities include cancer, cardiovascular disease, eye problems, ear diseases and Type 2 diabetes which are growing at an alarming rate.⁵ Lack of health knowledge leads to sick people feeling vulnerable, often questioning their own health decisions.⁶ Research reveals that disadvantaged groups, both from the social and economic perspectives

experience such vulnerabilities more frequently and that medical service providers' interactions contribute to the entrenchment of their marginalisation.⁷

Prior studies have provided important insights into attitudes, information processing and decision-making mechanisms of these people on their health related issues.^{8, 9, 10, 11} From the early days of the Internet, the role of information and communication technologies (ICTs) in providing health-related information to users has been of interest to researchers and usage statistics show considerable growth in the search of such information.^{12, 13, 14} Research shows that availability of health-related information contributed to the improvement of peoples' understanding of health-related issues, better self-care, reduced anxiety and ambulatory care needs^{15, 16, 17}. Furthermore, access to health information can enhance convenience and anonymity, improve social links and challenge lay-expert relationships.¹⁸

Researchers have increasingly considered patients' psychological states, social conditions and other relevant factors on which their living standard and efficient control over their health depend.⁷ They have also considered the capability of healthcare services to transform the way of life.⁷ However, there are not sufficient studies incorporating holistic approaches to healthcare, societal circles and sociocultural contexts.⁶ In addition, there is a significant knowledge lacuna associated with impacts of healthcare services on different stages of patients' wellbeing.⁶

The purpose of the research is to explore whether and the extent to which a mobile-based healthcare service project contributed to any change in the functionings, i.e. "beings and doings", such as being healthy and having self-respect, among people living in an Indigenous community in rural Bangladesh. The functionings are assessed within the framework of five freedoms framework developed by Sen,¹⁹ which were operationalised in this research. In addition, we also explore whether Sen's five freedoms are appropriate for evaluating the impact of ICT interventions in an Indigenous community in a remote area of Bangladesh?

2. Literature Review and Theoretical Framework

Lack of diseases does not essentially constitute good health. Rather, good health encompasses all-round wellbeing of physical, mental and social states of a person. According to the constitution of World Health Organization,²⁰ good health refers to:

"... a state of complete physical, social and mental well-being, and not merely the absence of disease or infirmity. Health is a resource for everyday life, not the object of living, and is a positive concept emphasizing social and personal resources as well as physical capabilities."

The term "wellbeing" is becoming widely accepted and increasingly adopted in relation to health to reflect that the meaning of good health encompasses conditions beyond the absence of diagnosed illness or physical diseases.²¹ It includes being motivated for physical activities, taking part in psychologically stimulating activities, refraining from negative behaviour, having a sense of self-esteem, and belonging. For the purpose of this study, health encompasses all relevant facets of the indigenous population's quality of life and wellbeing.

Enhancement of indigenous peoples' wellbeing and standard of living (particularly those living in remote areas under disadvantageous situations) can be facilitated through improved health access.²¹ Modern healthcare facilities are rarely accessible to Indigenous populations, particularly those lagging behind in educational qualifications, socioeconomic conditions, and residing in geographically isolated locations. Therefore, poor health condition, often linked with other forms of deprivation, is a regular phenomenon among them.²²

As ICTs can more easily reach remote areas, subject to availability of adequate infrastructure, than modern health facilities, it is important to understand whether and how healthcare and health information can become available through ICTs. As shown in Table 1, research concerning ICTs and well-being among indigenous communities, has included health and other wellbeing issues.

Table 1. A summary of research pertaining to ICTs and indigenous wellbeing

Author (Year)	Country	Target Group	Research Approach	Interventions and Well-being Outcomes
Suk (2016) ²³	Thailand-Myanmar border	Karen and Mon communities	Community-based participatory research (CBPR)	<ul style="list-style-type: none"> • Developing skillset in vegetable gardening and raising livestock • Increasing awareness in child nutrition • Improving sanitation for community
Parker <i>et al.</i> , (2016) ²⁴	Australia	Rural-dwelling Indigenous adults	Exploratory research with oral health impact profile, OHIP-14	<ul style="list-style-type: none"> • High-level improvements of oral health • Eliminating health disadvantages and social discrepancies of marginalized Indigenous people
Whiteside <i>et al.</i> , (2016) ²⁵	Malawi, Africa	Young Aboriginal men	Exploratory research with Social and Emotional Wellbeing (SEWB) with Kessler Psychological Distress Scale	<ul style="list-style-type: none"> • Significant development in relationship management capacity • Enhancing engagement in employment and education • Improved physical and mental health
Ashraf <i>et al.</i> , (2015) ²⁶	Bangladesh	Indigenous population of village Ruma	Exploratory research with Capability Approach (CA), Development as Freedom (DaF) in particular	<ul style="list-style-type: none"> • Creating new opportunities in fields of basic needs as health and education as well as increasing income, disaster management, and transparency • Eliminating discriminatory practices and developing awareness through information access • Resolving issues that influence Indigenous people's quality of life
Suresh and Nath (2014) ²⁷	India	Aboriginal population of Uttarakhand	Exploratory research with grounded theory	<ul style="list-style-type: none"> • Public-private partnership boosted the healthcare service through the use of public expertise and facilities by private organisations • Reduction in hospital visits and hospitalisations through timely healthcare adjustments by telemedicine
Foley and Houston (2014) ²⁸	Australia	Urban Aboriginal and Torres Strait Islander people	Exploratory research with grounded theory	<ul style="list-style-type: none"> • Enhanced access to dietetic care for Indigenous people • Improved cultural awareness for dietitians • Developing trust among the members of Aboriginal communities • Ensuring culturally safe and expanded dietetic service

				<ul style="list-style-type: none"> Identifying appropriate, available and acceptable dietary service for Aborigines
Walker <i>et al.</i> , (2013) ²⁹	Australia	Indigenous Health Worker of Northern Australia	Exploratory study	<ul style="list-style-type: none"> Creating awareness of oral disease among community members and providing health resources Observed high impact, relating to strong support of Indigenous Health Workers' role in oral health, on clinical practice of healthcare providers in remote areas
Payne (2013) ³⁰	Australia	Community support group for Nywaigi women	Exploratory study with pre and post intervention assessment	<ul style="list-style-type: none"> Learning strategies for self-management through understanding grief and loss Taking control of health Enhanced practices of shared knowledge Education of regular exercise and diet
Chang <i>et al.</i> , (2010) ³¹		Aboriginal and Torres Strait Islander health workers	Explanatory research with randomised controlled trial	<ul style="list-style-type: none"> Asthma exacerbation frequency was reduced significantly through the involvement of indigenous healthcare worker (IHW) Improved quality of life (QoL) score Enhanced index of functional index
Bramley <i>et al.</i> , (2005) ³²		Maori	Explanatory research with single-blind randomised controlled trial	<ul style="list-style-type: none"> The mobile phone based model for smoking successfully attracted Maori young people into the program and increased awareness about smoking cessation The program was successful as smoking quit rates were increasing according to self-reports of participants

Several frameworks have adopted indicators for measuring the impact of ICTs on disadvantaged communities, including those informed by the capability approach (CA).^{33, 34} In this approach, development is defined as freedom, which relates to the expansion of capabilities of individuals to enable them to do what they value and have reason to value.¹⁹ Many studies have shown that agency is important in achieving capabilities.^{35, 36}

2.1 Functionings through the Capability approach

The CA has been applied in various ways in diverse disciplines. When using this approach in the

evaluative space, to measure the quality of life, the emphasis is often on the various functionings (doings and beings) that make up a person's life. Capabilities, which are opportunities to function,³⁷ can range from elementary to complex, such as from being adequately nourished to actively participating in politics.³⁸

The expansion of freedom is also central to the CA and Sen¹⁹ categorised the freedoms into five distinctive categories, which are complementary and essential in developing individuals and communities' quality of life. These five freedoms are economic

freedoms, political freedoms, social opportunities, protective security and transparency guarantees.¹⁹

As noted by Stiglitz *et al.*, (2009), p. 42,³⁸ the CA also emphasises the complementarities between different capabilities:

The foundations of the capability approach, which has strong roots in philosophical notions of social justice, reflect a focus on human ends and on respecting the individual's ability to pursue and realise the goals that he or she values; a rejection of the economic model of individuals acting to maximise their self-interest heedless of relationships and emotions; an emphasis on the complementarities between various capabilities; and a recognition of human diversity, which draws attention to the role played by ethical principles in the design of the "good" society.

CA scholars differ in their views with respect to prioritising capabilities. While Sen¹⁹ has emphasised the importance of them being subject to participatory deliberations by a wide range of stakeholders, Nussbaum³⁹ has proposed a tentative list of ten central, minimum universal and normative human capabilities required to respect human dignity. These would form the basis for constitutional principles that should be respected and implemented by the governments while acknowledging they must be reviewed over time and in different contexts.

Several health economics researchers have applied the CA.^{40, 41, 42, 43, 44, 45, 46, 47, 48} Ruger^{49, 50} and Venkatapuram⁵¹ focussed on health justice in their application of this framework. Coast⁵¹ noted that when the CA has been applied in health economics, the emphasis has been on broad assessment of capabilities instead of considering health as a utility.⁵² The CA has also been conceptualised in different decision rules^{50, 53} and healthcare experiences of patients.^{54, 55} Simon⁴⁶ studied the capability domains that are most affected by mental illness. Elderly people, aged between 63 and 93, considered capabilities to be of high importance, but noted that social and material circumstances often limit capabilities.⁵⁶

Using the CA, Brall⁵⁸ assessed ethical aspects of trade-offs in health policies resulting from austerity measures after the economic crisis in Europe. Another study found that socioeconomic and societal capabilities affected the cancer screening participation.⁵⁷

The application of the CA within health economics enables a broader measurement of wellbeing than most other approaches.⁵³ A major challenge in applying this approach to health is to develop research instruments that can capture capability for use in health interventions.^{45, 59, 36, 60, 61, 62, 46}

As this paper deals with the application of ICTs to health, it is critical to be aware of the large volume of work associated with the CA and technology in general and ICTs in particular. Studies in the first category include Oosterlaken's^{63, 64, 65} research linking technology design issues with the CA, Johnstone's⁶⁶ work on impacts of technology on human capabilities, the role of technology in human enhancement⁶⁷ and technologies for freedom.⁶⁸ Several studies dealing with ICT for development (ICT4D) have found that individuals' relative capabilities exert influence on their capacity of accessing and using information⁶⁹ and that in turn, ICTs can contribute to the expansion of capabilities. Importantly for this study, the CA offers an ethical approach to understanding and addressing inequality and provides a conceptual framework for evaluating health interventions.

3. Setting to the Context

As shown in table 2, there are different estimates of the number of indigenous ethnic groups and individuals in Bangladesh, as well as the proportion of the total population they represent. These differences may be due to the lack of any serious attempt to identify the exact number of indigenous people and the ethnic groups they belong to. There are even discrepancies in the information provided by the Bangladesh Bureau of Statistics (BBS), the official government statistics agency.

Table 2. Estimates of the number of Indigenous population

Sources	Number of Indigenous groups	Total indigenous population
Barman <i>et al.</i> , (2013) ⁷⁰	35	N/A
Pact (2007) ⁷¹	45	N/A
Bangladesh Adivasi Forum, Solidarity (2002)	45	2.5 million
Durnnian (2007) ⁷²	27	1.8 million (approx.)
Borchgrevink and McNeish (2007) ⁷³	N/A	2.5 to 3 million (approx.)
World Bank (2008) ⁷⁴	N/A	2 million (approx.)
BBS (2001) ⁷⁵	27	1.4 million (approx.)
BBS (2011) ⁷⁶	27	1.59 million (approx.) 1.1% of the total population

3.1 Socio-economic conditions of indigenous communities in Bangladesh

Chakma and Chakma⁷⁷ reported a number of issues pertaining to indigenous communities residing in the northern region of Bangladesh, including the crisis of identity, religious persecution, economic discrimination in employment and wages, deprivation of basic needs e.g. education and health. In a study of 374 indigenous women of Bangladesh, Islam⁷⁸ found considerable problems with water and sanitation, e.g. 57.2% of households resorted to open defecation, as they lacked access to latrines and 36.9% used open latrines. The study also found that 97% of the women had no education, their monthly income ranged between BDT 3500-7000 (USD 45-90). Furthermore, it was difficult for them to access formal healthcare, as healthcare facilities were located at a distance of 8-16 km from the homes of 36% of the population and over 16 km for 28%. 95% of the population did not have any media access. Atiquel⁷⁹ found low environmental awareness and little knowledge of family planning among indigenous communities in Bangladesh.

3.2 Present condition of healthcare in Indigenous communities in Bangladesh

Even though the number of indigenous people in Bangladesh is substantial, relatively few studies have focused specifically on their health seeking behaviour or explored whether and how ICTs have been used for this purpose and the extent to which ICT usage

has contributed to their wellbeing. Many of the remote groups are highly dependent on their traditional approaches to healthcare and have little awareness of the use of ICTs for healthcare. The number of clinics is not sufficient to offer adequate healthcare in the Chittagong hill tract area, which has a high proportion of indigenous communities.⁷⁶ Individuals in these communities suffer from numerous health-related issues, including diarrhoea, acute respiratory infection, malaria, food and nutrition problems, and HIV/AIDS and have inadequate maternal and child health facilities.^{80, 81}

3.3 Healthcare initiative of Grameenphone

In an attempt to improve the healthcare among the indigenous peoples, Grameenphone introduced a mobile phone-based healthcare service. This paper explores the extent to which and how that service has contributed to capabilities, with emphasis on the five freedoms identified by Sen¹⁹. Grameenphone, the leading mobile network operator in Bangladesh with over 56 million subscribers, introduced its "Healthline" in November 2006. The health service is a collaborative project between Grameenphone and the Telemedicine Reference Center Limited (TRCL). In May 2016, Grameenphone rebranded this service to "Tonic". Grameenphone customers can avail themselves of medical consultations and some selected medical services 24/7 by dialling 789 from their mobile phones. The services offered through "Tonic" are categorised into three different types: core service, supplementary service, and Tonic

Agent. The core service covers medical advice from and/or consultation with registered physicians and the supplementary services offer information about medical practitioners and facilities, drugs, interpretation of laboratory test reports and emergency contact numbers of medical practitioners.⁸² Tonic Agent enables callers to talk with Tonic Customer Service for any instructions, information, issues etc. The call fees for the healthcare services are BDT 5.00 per minute (USD 0.06) for core and supplementary services and BDT 0.50 per minute for Tonic Agent services. Over 24 million people had access to this services.^{83, 84, 85} In a comprehensive review of mobile-based health (mHealth) services available in developing countries, Ivatury⁸⁴ identified the Grameenphone's initiative as a significant commercial mHealth success story. The service has been widely accepted⁸⁴ within a very short time span, with nearly 10,000 calls responded to per day.⁸³

4. Research Methodology

This interpretative research uses a qualitative methodology in the form of in-depth interviews with respondents. The interpretative approach is used to understand human processes within social contexts.^{86, 87} A semi-structured questionnaire was used for capturing the perspectives of respondents within their settings. In-depth interviews were conducted among indigenous people who had used a healthcare service available over the mobile network in Lama, a sub-district of Bandarban district in the Chittagong Hill Tract region. Lama has 22,447 households and a total area of 671.83 km² and a population of 108,995. Lama had an average literacy rate of 34% (7+ years), against the national average of 62%. There is a government health complex with only 31 beds, 4 doctors, and 10 nurses as well as 10 community clinics, but no diagnostic centre.

4.1 Study population

The respondents for this research comprised indigenous people suffering from diseases such as malaria, diarrhoea, and acute respiratory infections and who had used the Grameenphone m-health service at least twice within three months prior to the

interviews. The interviews were conducted between July and September 2015. Forty respondents, aged between 15 and 45, were selected through a purposive sampling method, taking into account the criteria such as income level (low- <8000 BDT, medium- 9000-15000 BDT, high- 15000+ BDT), educational qualification (minimum secondary school level) and socioeconomic status (must be in possession of a mobile phone). Additionally, 11 respondents were selected from remote (hard to reach) locations, based on the distance between the respondents' homes and the Upazila (sub-district) health complex. The conditions of road transport were also considered limiting the respondents to those who lived in areas that could reasonably be reached by vehicles,

4.2 Data Collection

Pregnant women and new mothers were interviewed in their homes and rest of the respondents were interviewed in convenient places. A male field research officer, experienced in qualitative research methods and fluent in the local language, was recruited for data collection. His ability to explain the questions to the respondents was taken into account in the recruitment process. The research officer briefed the respondents on the research purpose and their right to privacy, prior to the interviews. Respondents consented to the interviews by signing or putting their thumb print on the consent forms. In interview sessions, a flexible approach was used, keeping in mind the objectives of the research. Each interview was 20-25 minutes. Discussions covered different aspects of respondents' use of ICT for health related issues and impact of ICT usage on their overall wellbeing. During the interview sessions, the participants shared their experiences and attitudes relating to the mHealth service. The interviews were audio recorded and then transcribed. The researcher also took notes of key issues during the interviews and extracted "stories" from the transcripts. Data is presented in the form of, "stories", focussing on how the use of the mHealth service affected the lives of the indigenous respondents. Table 3 summarises basic characteristics of the interview participants.

Table 3 - Respondent's Profile

	Number	Percentage	Mean	Standard Deviation
Gender				
Male	23	57.5%		
Female	17	42.5%		
Age				
15-25 years	9	22.5%	19	14.05
25-35 years	15	37.5%	31	11.29
35-45 years	16	40%	39	9.07
Income Level				
Low (< BDT 8000)	15	37.5%	6000	9.27
Medium (BDT 9000 – BDT 15000)	14	35%	11000	18.13
High (> BDT 15000)	11	27.5%	20000	13.87
Educational Qualification				
No formal education	12	30%		
Primary	10	25%		
Secondary	9	22.5%		
Higher Secondary	6	15%		
Graduate	3	7.5%		
Marital Status				
Married	22	55%		
Separated	1	2.5%		
Divorced	3	7.5%		
Widower	6	15%		
Unmarried	8	20%		
Children				
No child	2	6.25%		
One	7	21.88%		
Two	10	31.25%		
More than two	13	40.62%		
Place of Residence				
Rural	18	45%		
Semi-urban	13	32.5%		
Urban	9	22.5%		

5. Results and Discussion

The results of the field survey are presented in this section as a combination of stories from respondents and discussions with reference to the framework informed by Sen's five freedoms¹⁹, into which this section is structured. The statements and comments made by the respondents act as

illustrations to support the study findings and such statements reinforce the reliability of the authors' interpretations. As the interviews were conducted prior to the name change of the service from "Healthline" to "Tonic", respondents referred to the service by its initial name, "Healthline", in the discussions.

5.1 Political Freedom

Health is influenced by the political context of a country.⁸⁸ The mHealth system is different from the face-to-face system where the patients visit clinics.⁸⁹ Those who can afford, have the option of visiting a doctor in a private healthcare facility. In the mHealth system covered in this study, the service provider selects the doctor for the relevant patient, who gains access to a doctor without bribing anyone. This increases the patient's political freedoms, in the form of right to healthcare⁹⁰ and overcomes some of the discrimination to which women, girls, and elders in the indigenous study area are subjected.^{91, 92}

A young female respondent, who graduated from the National University of Bangladesh, took part in an information technology program organised by the university where she learnt about the Internet. While browsing a government website, she learnt that every human being has the inherent right to live and governments must take all necessary measures to ensure such rights are enjoyed on an equal basis for all. A few days before being interviewed, her family was harassed and placed in an uncomfortable situation at the community clinic in her area. Her young nephew was very ill, suffering from diarrhoea, and consulting a doctor was deemed urgent as it was an emergency situation. It is very difficult to get health services in the remote areas of the hill tracts where the number of health centres is very limited considering the large area and population size [one district (Lama) hospital in Sadar (comparatively developed part of the area), 7 Upazila (subdivision of district) health complexes and 27 Union (subdivision of union) health and family planning centres].⁷⁶ Her nephew did not get priority treatment, as some local politically powerful persons were treated ahead of him despite the severity of his illness. She then decided to take help from the Healthline service and called 789. The doctor diagnosed the symptoms over the phone, suggested some medicines and advised them to wait for 24 hours for the medicine to work. He also suggested that the patient needed to be taken to the main hospital for treatment if the problem persisted. However, after taking the prescribed medicine, available through Healthline, the patient recovered quickly.

She described her experience in the following fashion:

"We were going through a very difficult time when my nephew was suffering from severe diarrhoea and nobody was there to help us. My father is elderly and he was unable to deal with the situation. We did not have enough time to consult a doctor because the private clinic was very far from our place. Finally, I found out from peers the existence of mobile-based health service "Healthline" and called the 789 number. The doctor over the phone was very helpful and acted professionally by offering us a very effective solution at that crisis moment and I was impressed. My experience with the hospital was bad as I was harassed by the political people while asking for services from the hospital. They did not care about a child who was in danger. The mobile-based health service overcame the political harassment and provided us with quality service. We are grateful for the service provided by Grameen Phone Healthline."

5.2 Economic Freedom

Healthcare is one of the most difficult challenges for policymakers⁹³, as its costs have been increasing at a higher rate than other social goods.⁹⁴ Public healthcare centres are often distributed unevenly and comparatively costly private health services funded by health insurance have been regulated in an inefficient manner.⁹⁵ Reduction of barriers to purchasing healthcare from the market through using ICTs has resulted in an increasing range of choice, leading to enhancement of economic freedom.^{96, 97} especially for marginalised groups, such as the indigenous peoples of Bangladesh,

A young and poor farmer in the Bandarban district suffered from stomach problems for a long time. Bandarban is predominantly an agricultural area where more than 70 percent of the population is smallholder farmers. The traditional treatment the farmer received from a local quack on few occasions was expensive, but he could not afford to consult a registered doctor. There are only five diagnostic centres in Bandarban Sadar, the district capital, with only four doctors working for those centres.⁷⁶ These centres are crowded, fully booked and charge high

fees. Paying such a high cost would be a nightmare for a poor young man struggling to afford even one meal per day. The farmer met a student, working as a field investigator for a private research firm in Bandarban, who informed him about the Healthline service and taught him how to access it.

The doctor at the Healthline listened to his medical history of the past two years and prescribed medication for the next seven days. The doctor also suggested that the farmer call back in a week to report the outcome, which he did, informing the doctor that he was still having some pain in his stomach. The doctor then changed the medication. Two months after taking the prescribed medication and following the dietary instructions suggested by the doctor, the farmer felt much better and eventually his abdominal pain was relieved. He described his experience as follows:

“I don't have much education and I do not understand technology. I have been suffering from a disease for many years but was unable to get good consultation due to lack of money. I went to the Sadar hospital on a number of occasions but the doctor asked me to go to Dhaka or Chittagong for better treatment. It was good advice but how can a poor person like me who cannot even afford food three times a day bear the high costs of getting treatment from a divisional hospital. One day I met a gentleman visiting our village who suggested that I get treatment over the mobile phone by calling 789. I followed his advice and received good treatment from a doctor and now I feel better.”

The above story indicates that the Healthline service contributed to the enhancement of economic freedom of the young farmer, who could not afford to attend the private or the divisional hospitals. However, the young man could afford a medical consultation with registered doctors using his mobile phone, which was easily accessible and reasonably priced.

5.3 Social Opportunities:

Inequalities in healthcare is a reflection of inequalities in society, which result in discrimination against people in terms of access to healthcare.²² The overall healthcare facilities for indigenous people of

Bangladesh are yet to reach a minimum standard. Improved living conditions, easy access to medical services and diagnostic technologies contribute to an improved health system.⁹⁸ Indigenous communities across many regions strive for holistic health care approaches, which can complement western medicine.⁹⁹

The importance of information for the proper healthcare of indigenous people is illustrated by the story of a secondary school girl when she experienced her period for the first time. She felt so uneasy with this new experience that she did not feel free to share this matter with the members of her family and friends. When noticing that her periods had started, her grandmother suggested that she adopt traditional protection for her menstrual cycle, but she recollected from reading her home economics book that the traditional method is unhealthy and a health hazard that can cause urinary cancer. Her worries continued as she felt continuous pain during her periods. After a few months, she decided to share this health issue with her female teacher who suggested that she should contact Healthline to seek advice on the matter. The next month, when she suffered the same problem, she called 789 and described her situation. The doctor suggested that she use sanitary napkins during her menstrual period and prescribed some medicine. She followed the doctor's instructions and felt much better. After talking with the doctors over the phone, she developed a better understanding of the problem in that such pain is common for women and should not be kept confidential. She further understood that sharing her experiences about female sanitation would create awareness and change perceptions, thereby helping girls like her to better cope with the situation. She now acknowledges the role of Healthline in overcoming the problem and is happy to share her story. She narrated her experience in the following manner:

“The first experience of my period was very challenging and I was too shy and confused as to what to do. I was not sure as to how to share this experience with the members of my family and peers as I had a feeling of embarrassment as I continued to suffer from this unusual health issue. One day I

decided to share this experience with one of my female teachers at the school with whom I was very close. She listened to me patiently and suggested that there is a health service line that I should call to seek remedy for my problem. This is how I came to know about the magic number 789. I picked up my mobile phone, called the number, and had the opportunity to explain over the phone my problem. The lady doctor was so kind and co-operative that I did not hesitate to discuss my problem with her which I could not discuss with anyone else before”.

The above story illustrates how an indigenous teenager has overcome a health related issue with the active help from Healthline, opening up social opportunities for her, thereby improving her well-being. Some readers may find it strange that a young woman would share the story of her period with a male interviewer, but the guidelines from Healthline helped her to learn that this is something women should talk openly about.

Another example of improvements in social opportunities associated with the use of Healthline is a pregnant wife with higher secondary level of education. She was unable to consult a medical practitioner during her pregnancy, as she was living in a remote area and had no easy access to medical facilities. The woman, who is the head of the household, initially relied on advice provided by a traditional elderly female healer but was not satisfied with the quality of service. As she was looking for an alternative service provider, she was informed about Healthline from one of her college friends and immediately started communicating with doctors on 789 on a regular basis. She followed all the advice given by the doctors and eventually gave birth to a healthy baby through a safe delivery. Both she and her baby were healthy after the birth. She was very excited with the quality of the service provided by Healthline.

“I am very much grateful to the almighty and also to the health care service over the mobile phone. The doctors were very helpful, cordial and all the time they offered me positive suggestion which was good for me and my newborn baby”.

5.4 Transparency Guarantees in Health Care for Indigenous Communities

Shopping around for healthcare involves identifying choices and alternative options that usually involves comparisons of price and quality. In most cases, information on price and quality of service is not transparent which makes it difficult to choose. Thus, many patients and consumers are disadvantaged. Transparency in health care services can be defined from many perspectives, such as between consumers and physicians, between payers and providers, as well as within a healthcare organisation.^{100, 101} Since a minimum level of education is usually necessary to benefit from transparency, it would be difficult for most indigenous people in Bandarban to do so, as many of them are illiterate.⁷⁶ There is also inadequate knowledge about certain health risks such as smoking which is more common among indigenous than non-Indigenous people.¹⁰² Furthermore, malnutrition is an acute problem in developing countries especially among indigenous communities, which causes indigenous people suffer from various diseases.¹⁰³

As most people in the district lack information about reasonable prices for medicine and healthcare services, they trust the available information when choosing amongst alternatives. In addition, the poor in indigenous communities are not aware of the quality of medications and might buy low-quality medicines at high prices. Unethical practices are reported to be widespread amongst local pharmacists who frequently sell unregistered and unbranded medicines to indigenous buyers taking advantage of their low literacy levels and ignorance about medicines. On one occasion, a local high school student rang the 789 number for information about the quality of a medicine he was suspicious about. The doctor was very cooperative and professional and provided the student with appropriate brand names of the registered pharmaceuticals and an indication of the appropriate price. The student described his experience as follow as:

“It was a great experience for me. I went to the pharmacy to buy some good quality registered brand of medicine to reduce the malnutrition of my younger brother who is only two years old. The pharmacy

tried selling an unregistered medicine manufactured locally by misleadingly portraying the quality of the medicine to be good. I attended an information session organised by an NGO and learnt about the effectiveness of original medicines and harmful effects of the counterfeit drugs. I called 789 to verify that the medicine was genuine. The doctor provided me with a clear idea as to which drugs are really of good quality. He also indicated the price range for the medicine. At last, with the help from the doctor, I was able to identify the original medicine at a proper price and was much relieved”.

Thus, the help that the student received from the Healthline service was instrumental in obtaining genuine medication in terms of price and quality, thereby avoiding the possible deception by dishonest pharmacists. This illustrates the importance of the Healthline service providers in providing health information, including advice on the right choice of medicine.

5.5 Protective Security in Health Care for Indigenous Communities

A key aspect of protective security in the context of health relates to emergency healthcare. Usually, indigenous women are reluctant to attend hospitals, as they do not feel comfortable to do so. According to the interviews in this study, the main reason for this is that they are very shy; hence feel uneasy in meeting the mainstream population. This could be because of invisible polarisation between the indigenous and non-indigenous population. A nurse of the Upazila (sub-district) Health Complex claimed that only four to five pregnant women per year use the health service provided by the complex. The indigenous women are used to the traditional child delivery system managed by the local elderly women who are inexperienced in and have very limited knowledge of modern healthcare practices for pregnant women and newborn children. Their practices can be harmful. The Healthline system offers comprehensive routine-based health information and guidelines during the pregnancy period, helping pregnant women overcome many problems arising during their pregnancy. However,

the service provided is not always enough. A woman described the issue in the following manner:

“When the problem arose when we called the 789 number to seek help but they failed to give us a proper solution. Although they provided us with suggestions on how to overcome the issue, including recommended medicines and processes to be followed, the overall service quality was not that helpful. They also urged us to take the patient to the hospital but we could not do so because the hospital is very far from our place and the communication systems are also not good. Finally, she gave birth to a baby and experienced some postnatal problems that continued for quite some time”.

Another indigenous pregnant woman had a different experience, which she described as follows:

“From the beginning of my pregnancy, I communicated with expert doctors over the mobile phone 789 on a regular basis. Each time the doctors asked me about the present condition of my health and informed me about the possible issues that might arise in future in connection with my pregnancy. Doctors advised alternative measures to protect myself from those possible problems and I fully followed all the instruction I received over the phone from time to time. Ultimately, I did not face any major problem during my pregnancy. I was very pleased with the quality of the Healthline.

6. Discussion

The field data offer important insights into how indigenous people in the Chittagong Hill Tracts of Bangladesh adopted and benefitted in different ways from the mHealth service. These benefits were categorised into Sen's five freedoms. As other factors could have contributed to an extension of freedoms, no relationship can be drawn between the service and such extension. Table 4 summarises how this mHealth project contributed to each of Sen's five domains.

6.1 Research outcomes

Despite the value gained from using the Healthline, the service seems to have faced a variety of challenges in terms of delivering effective healthcare to its users, as illustrated in the case study

of a pregnant woman. There is also the issue of system capacity. The major constraint of mHealth services is not the technical capability to handle increasing number of calls, but the limited number of physicians and medical personnel for staffing the call centres.⁷⁹ Particularly in Bangladesh, the prime challenges of mHealth management reside in identifying, recruiting, training, and retaining adequate numbers of qualified doctors.⁷⁹ Furthermore, the service has been used as a substitute

for government provided healthcare, which should be an entitlement and the indigenous population should not have to rely on privately provided mHealth services. Such services are useful for complementing the state's responsibility to provide healthcare for all its citizens, but the indigenous people should not have to rely on it as a last resort when the public health care system fails to deliver a critical service to its citizens.

Table 4: Mapping of contributions to five freedom domains by the mHealth service

Sen' freedom domain	Contributions
Political freedoms	<ul style="list-style-type: none"> Ensuring quality services bypassing corruption that prevents marginalised people exercising their rights to healthcare services.
Economic freedoms	<ul style="list-style-type: none"> Providing an alternative, reasonably priced, source of health information, thereby reducing high medical charges for consultation in private or division-based public hospitals Reducing time and travel costs to obtain quality healthcare services
Social opportunities	<ul style="list-style-type: none"> Providing a source of information for women, who are often reluctant to use other health services Maintenance of patient confidentiality benefiting women, especially those who do not want local doctors to know about their confidential health data. Facilitating improved control over health issues and increasing awareness about health and related issues such as sanitation involving women.
Transparency Guarantees	<ul style="list-style-type: none"> Easing the process of accessing accurate information about diseases, quality drugs, and their price Facilitating transparency in the quality of health services, health supplements, medicines and related products and accessories.
Protective securities	<ul style="list-style-type: none"> Providing knowledge about how to manage emergency health situations Identifying and helping with early symptoms of health related issues for individuals Facilitating preventive measures to secure better health care for disadvantaged people.

6.2 Contribution to literature

Exploring how a mHealth service has affected the health and well-being of individuals in indigenous communities in Bangladesh from a capability approach perspective, this paper contributes to the body of knowledge in a number of fields, including ICT for Development (ICT4D), the capability

approach and eHealth. Dealing with the use of ICTs in healthcare, the study found that the mHealth service contributed to increased awareness among the indigenous population in the Hill Tracts of Bangladesh who have been the victim of marginalisation with respect to the five freedoms identified by Sen as being critical for development.

Respondents overwhelmingly held the view that the mHealth service addressed several aspects of quality of life of indigenous people of Bangladesh.

Factors other than the mHealth service may have influenced the contribution towards the five freedoms of this study's target population. The study has laid the groundwork for triggering thought on how policymakers can use and promote mHealth as an alternative medium that can complement reliance on traditional physical visits to medical practitioners, particularly in remote areas.

6.3 Practical Implications

The research findings can offer valuable guidelines for policymakers to design and implement ICT-based policies for the delivery of medical services to marginalised indigenous populations. The findings offer insights that are useful for Healthline (789) and other health information providers in their development and improvement of services to help indigenous communities with quality and prompt health care services. For example, to assist patients with critical health conditions, health information providers can keep a directory of ambulatory service (e.g. transportation) or emergency units of hospitals in the locality and offer contact numbers for patients needing immediate medical service. Such a service can be useful where there is no equivalent to the emergency numbers, such as 911 in the US and 000 in Australia. The mobile health service providers can also inform the health service stations about critically ill patients, nearest to the patients' destination, to take urgent action for saving lives

6.4 Limitations

Despite its contributions to knowledge, this research has limitations. As the sample size of this study was limited and the data were collected from only one area within one country and were analysed using the qualitative methodology, the findings cannot be generalised. The study was conducted at a single point in time limiting the conclusions drawn. While describing male and female users of the system, the general findings do not differentiate between genders.

6.5 Future Research Directions

Towards overcoming these limitations, future research should include broad-based samples drawn from indigenous populations of several developing countries and adopt mixed methodology comprising both qualitative and quantitative approaches. For addressing the issue of attribution, i.e. the extent to which other factors contributed to the outcome, future research might use randomised controlled trials. Future research should use a longitudinal timeframe to capture the influence of ICT based health interventions on the wellbeing across a longer period to capture the variability of findings over time. Future studies should explore this issue to see if gender and other factors have any impact on the mHealth usage behaviour of indigenous people across nations. In addition, future studies can broaden the understanding of the influence of mHealth interventions on Indigenous populations' well-being by integrating Sen's five freedoms framework with wellbeing theories.

7. Conclusion

The mHealth service created awareness about multifarious health issues among the indigenous population and improved the health seeking behaviour of those who used the service. It provides easy access for them to updated health information, including medical consultations at low cost. Although, the service is available to all citizens and many indigenous people are already using it effectively, word of mouth communication would be instrumental in increasing the usage level of such a vital service. The study found that the mHealth services can positively influence diverse aspects of the five freedoms, by creating awareness, improving access to health information, making information and advice more affordable, improving control over health, maintaining confidentiality and offering preventive measures to reduce vulnerability to future emergencies. By making quality information and advice more accessible to the indigenous peoples, the mHealth service has enhanced their overall well-being. Finally, this research has made useful and distinctive contributions to the growing body of mHealth knowledge by using Sen's five freedoms

framework to explore how the Healthline service influenced outcomes in the five categories among Indigenous people in a remote region of Bangladesh. The findings of this research can be used to further

test the Sen's five freedoms model by developing a set of indicators to quantify the contribution of mHealth services in indigenous communities in different countries.

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