Evaluating the Viability of a Mobile-Device-Based Intervention to Improve Maternal Health in Achham, Nepal

Senior Thesis

Presented to

The Faculty of the School of Arts and Sciences
Brandeis University

Undergraduate Program in International and Global Studies
Dr. Sarita Bhalotra, Advisor

In partial fulfillment of the requirements for the degree of Bachelor of Science

by
Sarah M. Van Buren

May 2013

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Sarah M. Van Buren

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Evaluating the Viability of a Mobile-Device-Based Intervention to Improve Maternal Health in Achham, Nepal

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Brandeis University
Senior Honors Thesis in International & Global Studies
Advisor, Dr. Sarita Bhalotra

May 6th 2013
Nyaya Health’s Bayalpata Hospital in the foothills of Achham District, Nepal
DEAR READER,

Curiosity is a peculiarity disregarded in most aspects of life, but lauded in academia. I thank you for acting on impulse and taking the time to peruse. The following publication is a senior honors thesis written under the Department of International and Global Studies at Brandeis University. This thesis represents the views of the author and not those of Brandeis University, Nyaya Health, or Phoebe and Dr. Donald Giddon.

The best part of writing a thesis is that one gets an allotted space to express gratitude. The following publication would not have been possible without the support of many.

I would like to express my deepest appreciation to Dr. Sarita Bhalotra. Dr. Bhalotra not only provided me hours of guidance on my thesis but the courses I took with her while at Brandeis provided me the foundations of an understanding of global health. Our conversations gave structure to my passion for women’s health and women’s empowerment. I am proud to have been able to study under her.

I am grateful to Phoebe and Dr. Donald Giddon whose gracious generosity sponsored my thesis research. Their endowment of the Phoebe and Dr. Donald Giddon Grant for Research on Women and Health continues to support young students like myself who are passionate about women’s health. I hope that this publication serves as evidence of the value of their commitment to the Women’s and Gender Studies program at Brandeis University.

My gratitude to Dr. Sara Shostak and Dr. Amanda Veile. Donations of their time and expertise gave strength to my arguments. Their presence on my thesis committee made certain that my writing was evaluated from a range of disciplines, reinforcing the importance of a multidisciplinary approach to this analysis.

I would be sorely amiss not to thank Dr. Duncan Maru, Dr. Ashma Baruwal, and the entire Nyaya Health team. Particularly to Dr. Maru, who took a risk in taking on an undergraduate student as a collaborator to Nyaya Health’s extremely important work. I was consistently met with great warmth by the whole of the Nyaya family. I feel extremely fortunate to have been mentored by such passionate and accomplished individuals.

I further extend my gratitude to the faculty and staff of the International & Global Studies, Biology, Women’s & Gender Studies, Peace, Conflict & Coexistence Studies Departments, and the Ethics Center at Brandeis University for their support. My appreciation specifically to Ms. Marci McPhee, Dr. Chandler Rosenberger, Ms. Shannon Hunt, Mr. Mangok Bol, Dr. ChaeRan Freeze, Dr. James Morris, and Dr. Gordie Fellman.

Finally, I extend my sincerest gratitude to my beloved mother, father, Rozi, Abby, and Jacob. To be able to count on one person is a gift. To have five is an immeasurable blessing. Thanks for all the love and snacks.

With gratitude and sincerity,

Sarah Van Buren
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# ABBREVIATIONS

The following is a list of abbreviations that are utilized in this publication. Readers should utilize this list as a reference while examining the text.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ANC</td>
<td>Antenatal Care</td>
</tr>
<tr>
<td>PPC</td>
<td>Postpartum Care</td>
</tr>
<tr>
<td>CHV</td>
<td>Community Health Volunteer</td>
</tr>
<tr>
<td>CHW</td>
<td>Community Health Worker</td>
</tr>
<tr>
<td>CHW/V</td>
<td>Community Health Worker/Community Health Volunteer</td>
</tr>
<tr>
<td>FCHV</td>
<td>Female Community Health Volunteer</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GNI</td>
<td>Gross National Income</td>
</tr>
<tr>
<td>GPI</td>
<td>Gender Parity Index</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>INGO</td>
<td>International Non-Governmental Organization</td>
</tr>
<tr>
<td>LMIC</td>
<td>Low-and-middle-income countries</td>
</tr>
<tr>
<td>MCHV</td>
<td>Male Community Health Volunteer</td>
</tr>
<tr>
<td>MDG</td>
<td>Millennium Development Goals</td>
</tr>
<tr>
<td>mHealth</td>
<td>Mobile Health (use of mobile phones in health-related interventions)</td>
</tr>
<tr>
<td>MMR</td>
<td>Maternal Mortality Ratio</td>
</tr>
<tr>
<td>MNCH</td>
<td>Maternal, newborn, and child health</td>
</tr>
<tr>
<td>MoH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>NHE</td>
<td>National Health Expenditures</td>
</tr>
<tr>
<td>PHC</td>
<td>Primary Health Center (specific terminology to India)</td>
</tr>
<tr>
<td>SEARO</td>
<td>South-East Asia Region, World Health Organization</td>
</tr>
<tr>
<td>SK</td>
<td>Shasthya Karmis/Health Workers (specific terminology to Bangladesh)</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Message Service (text messaging)</td>
</tr>
<tr>
<td>SS</td>
<td>Shasthoshebikas/volunteers (specific terminology to Bangladesh)</td>
</tr>
<tr>
<td>TBA</td>
<td>Traditional Birth Attendants</td>
</tr>
<tr>
<td>THE</td>
<td>Total Health Expenditures</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific, and Cultural Organization</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>VHW</td>
<td>Village Health Worker</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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</table>
EXECUTIVE SUMMARY

“I used a cell phone for the first time after I was released from prison. I had difficulty coping with it because it seemed so small and insubstantial. But in this day and age, even one voice can be heard loudly all over the world.

Aung San Suu Kyi

Patient data collection, emergency health services, routine healthcare delivery, and the intersection of these three components are the primary challenges faced by medical practitioners in rural regions of low income countries. This is certainly the reality experienced by healthcare providers in Achham, Nepal, and is the crux of the following publication. Achham, a remote district in Nepal’s Far-Western region, is a collection of small villages racked by poverty. The principal source of healthcare is delivered by female community health volunteers (FCHVs): lay primary care providers that service the communities they were born and raised in. Achham’s FCHVs are supported by Bayalpata Hospital, the sole source of formal medical care accessible to the 260,000 population. In the past FCHVs communicated with Bayalpata Hospital, the volunteers’ provider of medications, updated training information, and patient referrals, on a mixed oral and paper-based system. FCHVs would orally communicate to their literate peers of their patients’ needs, which would then be transcribed into binders that were delivered to Bayalpata’s staff by hand. This paper-based form of data collection had been found as a source of delay to health service delivery throughout Achham. There exists a communication gap that, if filled, could capacitate Bayalpata Hospital and Achham’s FCHVs alike to respond to evolving health needs in a more effective fashion. The explosive expansion of mobile and social networking technologies, even in the most remote communities, offers a unique opportunity to achieve this.

This publication seeks to evaluate the viability of an intervention aimed at real-time surveillance of and public sector response to maternal health needs in the impoverished remote district of Achham, Nepal. The intervention will be undertaken in a partnership with the local non-governmental organization Nyaya Health, regional Bayalpata Hospital, the district-wide network of FCHVs and the technology non-governmental organizations MedicMobile and HealthMap. The intervention involves implementing real-time cellular-phone-based data collection and a communication resource for female community health volunteers (FCHVs). In other words, the proposed intervention will harness the power of smart phone technology to expedite communication between FCHVs and Bayalpata Hospital, making healthcare delivery more efficient.

This particular intervention will focus on improving maternal health for two reasons, 1) pregnant women are a focal group of the Nepali government’s core public health service delivery scheme, and 2) for social and cultural reasons, maternal health may be the most easily monitored subset of care Bayalpata Hospital is able to provide in the context of this study.
The evaluation of the viability of this intervention will be multi-faceted. The first chapter of this publication will more clearly define mHealth, an umbrella term for mobile phone based health interventions, the proposed intervention, and its goals. The second chapter will examine the social nuances of gender and caste, providing incite as to why maternal health, specifically maternal mortality, should be the subset of healthcare examined in this intervention. The third chapter will review the history of FCHVs in Nepal, examining why providing FCHVs with mobile phones, as opposed to other healthcare providers in Achham, makes the most sense. The fourth chapter will examine the status of healthcare in Achham as a whole, while the fifth chapter will closely examine the status of maternal health. These two chapters will provide a baseline understanding of the current norms of healthcare in Achham, and further, how the proposed intervention can be a source of improvement. The sixth chapter will examine the spatial and temporal benefits of the proposed intervention. The seventh and final chapter will provide case studies of similar interventions that have proven successful in Nepal’s neighbors: India, Bangladesh, and Indonesia. This seven part analysis was conducted in an effort to provide an integrated clinical, historical, sociological, and topographical assay of the viability of the proposed intervention. This publication is of the opinion that based on this seven part examination, the proposed mHealth solution is a pro-active platform for rapid health service to improve maternal health in rural Achham.

Keywords
mHealth, maternal health, FCHVs, Nepal, community-based intervention
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INTRODUCTION

“The quickest way to get rid of poverty right now is to have one mobile telephone.

Muhammad Yunus

Globally, poor and rural communities experience delays and reduced quality in healthcare services. Numerous barriers stand in the way of service delivery: challenges in human resource recruitment, supply chain reliability, management practices, as well as outright corruption. These delays initiate a vicious cycle where government-supported services are weakened and unregulated, necessitating intervention by private organizations to fill the gaps in these essential services. Despite collaboration between private and public healthcare delivery, all too often the poorest of the poor cannot access these services due to high cost and other challenges. The unpredictability in the maintenance of public health can result in the neglect of critical issues faced by poor populations. The distribution of healthcare benefits continues to exhibit significant variation, extending from the global north-south divide to a rural-urban divide. The phenomenon of inverse care, whereby those with the greatest resources appropriate the best healthcare to the detriment of those in real need, often those least able to access and afford it, is often driven by public health spending policies that bias resource allocation of healthcare.

Disparity in the provision of healthcare is compellingly apparent in regards to maternal health. It is certainly true that on the global scale, advances in the delivery of maternal healthcare have resulted in vital gains in life expectancies, lowering of maternal mortality rates, and improved access to critical medication and medical expertise.\(^1,2\) However in much of the world maternal health, that is the health of a woman during pregnancy, childbirth, and the postpartum period, is too closely associated with preventable complications, long term health concerns, and
even death. The cause of death for a mother who dies in the process of childbirth or in the postpartum stage will ultimately be “ chalked up” in a clinical way – diagnoses include: eclampsia, hemorrhage, obstructed labor. While this clinical diagnosis is wholly valid, for health problems such as maternal health there is also a social pathology that must be recognized. In other words, the cause of a health problem such as nationally poor maternal health cannot be understood solely from a clinical perspective: it must be an integrated evaluation of social, economic, political, geographical, and clinical factors.

In examining the distribution of global maternal mortality, researchers will note that this burden is disproportionately carried by poorer nations.

![Graph showing maternal mortality ratio against GDP's of nations](image)

**Key**
The colors of the bubbles on the graph on the left correlate with the following regions of the world:
- Sub-Saharan Africa
- South Asia
- Middle East and North Africa
- Americas
- Europe and Central-Asia
- East Asia and the Pacific

**Figure 1.** The graph above provides a fascinating examination of maternal mortality ratio against the GDP’s of the nations of the world. As the key on the right describes, the colors of each bubble are associated with varying regions of the world: dark blue represents Sub-Saharan Africa, pale blue represents South Asia, green represents the Middle East and North Africa, yellow represents the Americas, orange represents Europe and Central-Asia, and red represents East Asia and the Pacific. As the graph demonstrates, countries with higher incomes generally have a lower maternal mortality rate. These nations can be located on the lower right quadrant of the graph. Countries with lower incomes generally have a higher maternal mortality rate. These nations can be located on the upper left quadrant of the graph. Further, one will notice that Sub-Saharan Africa and South Asia dominate the higher maternal mortality statistics while the Americas, Europe, and Central-Asia occupy the lower maternal mortality rates. This graph serves to demonstrate that the maternal mortality burden is carried disproportionately by poorer countries.
The graph above contrasts national GDP against national rates of maternal mortality. This comparison is indicative of much of the realities of maternal mortality: poorer nations experience much more maternal mortality in the world that richer nations. However, the purpose of contrasting GDP against maternal mortality was to demonstrate that “poverty” is not the sole factor adversely affecting in a nation’s maternal wellness. To say the concept of “poverty” is complex is a harsh understatement. Thus, the measurement and impact of poverty is not limited to GDP alone. As was alluded to in the previous section, the high rates of maternal mortality in Sub-Saharan African and South Asia are due, in part, to gross income, but also correlate highly to histories of subjugation, cultural perspectives on health access, gender inequity, remote versus concentrated population groupings, and many other factors. In order to truly appreciate why there persists inequity in maternal wellness around the world, a multifactorial analysis that delves deeply into social as well as clinical influences must be undertaken. This thought process is the driving force of this thesis.

The purpose of this publication is to evaluate the viability of a mobile-phone based intervention to improve the status of maternal health in Achham, Nepal. Utilizing a network of community health workers, referred to as FCHVs in Nepal, the proposed intervention seeks to maximize the use of cell phones to conduct real-time surveillance of and public sector response to maternal health needs in the region of Achham, Nepal. The versatility of smart phone technology will be utilized to improve communication between FCHVs and Bayalpata Hospital, making the region’s healthcare delivery system more efficient and effective. This proposed intervention, which will be discussed in detail in Chapter 1: Overview of Intervention, is met by a demonstrably growing and ever-present need. However matching a need with a possible solution is simply not sufficient grounds to execute said solution. As was discussed above, poor
maternal health has a heavily nuanced pathology – the reasons for Nepal’s high burden of maternal mortality and other poor maternal health outcomes are as much social as they are clinical. Just as the difficulties contributing to the problem must be explored, the possible solution must be queried with the same depth. The solution seeks to fill the gaps present in the dilemma; therefore, this retribution must fulfill the multifactorial needs of maternal health burden. As Dr. Paul Farmer, founder of Partner’s in Health, states in the mission statement for his organization: “when our patients are ill and have no access to care, our team of health professionals, scholars, and activists will do whatever it takes to make them well – just as we would do if a member of our own families, or we ourselves, were ill.” A health intervention should aim to provide the highest quality of care possible in a sustainable way. This quote supports this notion wholly: in order to do well by a patient, an initiative must seek to address the whole needs of the patients. In evaluating the viability of an intervention from multiple angles: cultural, spatial, and clinical, and still finding it a justified means of resolution, a certain confidence in the success of the intervention can be affirmed. This publication seeks to provide an objective investigation for the following hypothesis: the proposed mobile phone intervention will be successful in reducing the burden of maternal mortality in Achham, Nepal based on the cultural, social, topographical, and economic nuances of the intervention.

The approach of this study is integrative of a range of primary and secondary data sources. While the findings presented here were driven largely by literature-based research and synthesis these conclusions were additionally supported by primary data sources such as: census data on patient healthcare access and interviews with FCHVs and hospital staff conducted by other Nyaya Health staff members.
As was outlined in the Executive Summary, this publication stands as a seven part analysis of the viability of a proposed intervention to improve maternal health in rural Achham. The seven parts of this examination are as follows: the first chapter will pinpoint the details of the intervention as well as the history of Nyaya Health in the region. This chapter serves to provide the reader with base understanding of the intervention to be analyzed. The second chapter will take a social examination on the cultural significance and implications gender and caste. This perspective on gender and caste inequity will provide a point of analysis on why maternal health is a form of healthcare that could most benefit from a FCHV focused intervention. The third chapter will examine the social perspectives of FCHVs in Nepal. This examination will serve as a demonstration of why utilization of the village-level arm of Bayalpata’s health delivery system will be most effective in a mobile-phone based intervention. The fourth chapter will provide an economic, political, and social perspective on overall healthcare in Achham. This chapter will elaborate on the breakdown of healthcare allocation and perception in the district of Achham specifically. The purpose of this chapter will be to provide an understanding of the challenges faced in healthcare delivery in this region on a whole. The subsequent chapter will build off of the fourth chapter in taking a finer focus to the status of maternal health in Achham. This focus will take a data driven approach to analyze the difficulties of maternal healthcare delivery across multiple demographic strata. These examinations will include location, the mother’s education level, and the mother’s age. This analysis serves to look at the disparities in maternal health access across multiple strata. This explanation will serve as a validation for the need for the intervention. It will further exhibit egregious gaps in maternal health across specific regions. The sixth chapter will examine the negative effects distance and time currently hold on the FCHV/Bayalpata collaborative medical practice in Achham. This
chapter will utilize anecdotes and analysis to cite specific everyday examples in which the use of the proposed intervention could have saved lives. The seventh and final chapter will serve as a stage for three successful case studies of similar interventions. The interventions examined were based in some of Nepal’s neighboring countries: India, Bangladesh, and Indonesia. Commonalities in the structure of the intervention, paralleled against the outcome of each case study, will support the proposed intervention in looking to similar versions of the intervention that thrived in nations with similar cultural and geographical realities. In evaluating the proposed intervention by these seven parts, the goal of this publication is to determine whether the intervention would be successful in Achham, Nepal.
CHAPTER 1: Overview of Intervention

Globally, impoverished communities suffer needless delays and inefficiencies in the delivery of essential services such as education, water, and healthcare. These services are often mandated by law and have funds allocated distribution across population, but others face significant barriers to actual implementation. Critical public health interventions are thus neglected and subsets of the population disregarded. This problem is particularly widespread in South Asia. The poor, from urban slums to remote villages, bear the brunt of the negative consequences of service delivery delays and suffer needlessly as a result of this fundamental gap in accountability for essential services, creating a bottleneck for equitable health care systems.

Data on healthcare needs, service delivery, and their inter-relationship can be effective tools for communities to use for mobilization and advocacy to improve essential services. The data that is collected is typically not available to communities nor is it collected in real-time, since they are typically obtained through paper entry. There is thus a large gap in data transparency and collection efficiency that, if filled and then put to effective use, could empower communities to identify service gaps and advocate for change. The explosive expansion of mobile, even in the most remote communities, offers a unique opportunity to achieve this. This is the reality observed in Achham, Nepal. The district of Achham is located in the Far Western Region of
Nepal. Achham has a population of approximately 270,000 citizens and is one of the most impoverished regions in South Asia.

In 2012, Nyaya Health, a non-profit organization working in Achham proposed the implementation of an intervention that would collect real-time health data via mobile phones through FCHVs to improve efficiency in data collection, and maternal health outcomes. The proposed intervention will be monitored at the district-level healthcare provider, Bayalpata Hospital. Both the hospital and the FCHV program are public sector programs operated in partnership between Nyaya Health and the Nepali government.

Prior to engaging in the proposed intervention, a brief examination as to the role of FCHVs in rural Achham will be made. Nyaya Health currently has 57 FCHVs under the umbrella of their practice. These volunteers are a part of a national network of government-sponsored community health workers. While the FCHVs are a subset of the government’s arm on healthcare, they report to Nyaya Health and its affiliated hospital, Bayalpata Hospital. As will be discussed later, FCHVs require some government mandated education requiring basic medical practices. However, on the whole rural FCHVs suffer from illiteracy and a lack of medical knowledge, often combined with inadequate training. This naturally presents itself as a hindrance in terms of providing records on patient data. This process is currently mediated by Nyaya Health’s community health network model.
Figure 2. The diagram above depicts Nyaya Health’s “Hub and Spoke” model for interactions between FCHVs, FCHLs at community health posts, and doctors at the Bayalpata Hospital. As can be observed from the figure above, FCHVs have a reach that extends to the far corners of Achham. They are responsible for the most remote of patients. The FCHVs then connect with the FCHLs, located at intermittently community health posts. The FCHLs, who are often literate, are able to transcribe the oral renditions of patient data as shared by FCHVs. The FCHLs at community health posts are then responsible for physically delivering the paper-based data to Bayalpata Hospital of patients from all FCHVs she is responsible for. This transfer of data from patient to hospital often takes up to a month. On top of delays in data delivery, the data received by the hospital were often filled with errors or incomplete. Understandably, this process causes
immense delays in healthcare delivery to regions of rural Nepal. Herein lays the crux of the problem that this intervention seeks to address.

**Intervention Intent and Goals**

The proposed intervention would enable FCHVs with mobile phones to expedite communication regarding maternal health. This intervention was proposed in the advent of the installation of a series of 3G enabled cell phone towers in Achham. Achham now has network coverage in most parts of the region. The cell phones to be utilized for the intervention, fully funded by Nyaya Health, will be “smart phones.” These phones will have multiple functions including: taking photographs, voice recording, voice recognition, playing videos, and accessing the internet if provided with a 3G, 4G, or wireless network. In equipping the FCHVs with such a dynamic tool, the purpose of this intervention is five-fold. Cell phones will be utilized for:

1) Contact central clinic in case of emergencies  
2) Update medical records to the “cloud”  
3) Refill prescriptions in a timely manner  
4) Take photographs of patients  
5) Support FCHVs in ongoing education of their own practice

The next section will provide details regarding each of these aspects. To the first point: contacting Bayalpata Hospital in the case of an emergency is fairly straightforward. Previously, FCHVs had little to no regimented access to a form of telecommunication with Bayalpata Hospital. In fact, it is the social norm in Achham to not have exposure to a method of telecommunication. To most Achhamis, mobile phones are considered a luxury. A mode of telecommunication, be it cell phone, landline, or internet accessible computer, was seen as a commodity to be far less prioritized than basic necessities such as food, health, and education. As one Achhami noted in an interview, “You have to spend 500 – 600 NPR (approximately 8.00 USD) a month for a mobile phone. Where would we get that money from? This is a huge amount,
enough to raise a child.” It was found that most Achhamis who did own mobile phones or landlines were often either affluent shopkeepers, and did so for business purposes, or were government representatives that had institutional affiliations, necessitating the use of a cell phone. Should FCHVs previously need to contact the central hospital for a patient emergency; they often have to travel to such a business owner to utilize their phone. In the time it took for the FCHV to travel to the telecommunication source, and then the Bayalpata staff member to provide advice, or travel to the location of the FCHV, it was often too late. Most mothers would die waiting during this transition period, and FCHVs often found contacting Bayalpata Hospital during a crisis to be a useless endeavor. However, in equipping FCHVs with their own cell phone, it is clear that communication regarding emergency situations may be improved.

The second point on updating patient medical records is an exciting and innovative aspect to this intervention. These cell phones would be prepared with a specially designed interface that would allow FCHVs to input patient data into a stylized form. With internet access, FCHVs would then be able to submit this patient data to a “cloud” base; an internet-hosted network of files that could be accessed by FCHVs and Bayalpata Hospital staff instantaneously. This interface will be designed by MedicMobile, a separate mobile technology NGO that will tailor the program to fit the needs of improving maternal health Achham. In other words, the program will be in Nepali, ask questions regarding maternal wellness, and allow FCHVs to express their needs to the central clinic in stylized format. FCHVs are still able to access these forms without internet access and send the data in later once the internet is up and running. In the case of FCHVs who are illiterate or struggle with literacy, the form can be read aloud to the FCHV. Further, the use of smartphone technology allows FCHVs to fill out the forms using voice recognition software. These additions to the data inputting element of the FCHV’s labor are
greatly benefitted through the use of smartphone technology. In receiving the data in a uniform format at a faster pace, Bayalpata Hospital will be able to respond to the needs of rural patients much more effectively. Further, in building a routine in terms of patient updates and receiving more accurate information, Bayalpata Hospital could release appropriate patient prescriptions as they become needed. The use of a regimented patient data service could allow for more accurate and expedited prescription refills, addressing the third point.

The fourth point, taking photographs of patients, is also a fairly straightforward element of this intervention. As was discussed earlier, FCHVs who are illiterate had previously described patient conditions orally to a literate FCHL, who would then transcribe these findings as patient data. It was found that the FCHV recounting of certain ailments were occasionally flawed, causing a misdiagnosis and mistreatment of the patient. In order to make the healthcare delivery response system more accurate, allowing FCHVs to take photographs of their patients would likely improve this aspect of Bayalpata’s overall care delivery. Logically, it would be mandatory for the FCHV to receive permission from the patient prior to taking a photograph.

The fifth and final point would be to provide FCHV with an ongoing education via video seminar that can be accessed through their phone. As will be discussed throughout the publication, FCHVs often will have difficulty attending their government sponsored, routine educational updates. While their reasons for not attending these seminars are often legitimate, it does mean that the level of their practice is not as high as it could be. Previously, all educational updates required FCHVs to travel to Bayalpata Hospital. This trek could take hours, for some days. In equipping the FCHVs with mobile phones, the device can be utilized to stream or download videos of these seminars. This will effectively save the FCHVs a trip to the clinic, as well as improve the practice of the FCHVs overall.
As was mentioned previously, FCHVs have had limited exposure to mobile phones. Coupled with the limited literacy skills of most of the FCHVs, it becomes clear that some form of education regarding the use of mobile phones will be necessary. MedicMobile will provide a multi-day training on the use of these mobile phones at community health posts. This would ensure that FCHVs would be able to travel to these lessons with some ease and flexibility, while still gaining the important skills necessary to utilize the cell phone. MedicMobile, in having conducted similar work in other communities in the past, has observed this to be sufficient time frame for the training of FCHVs. It was observed that particularly mobile-savvy FCHVs would provide a support system for FCHVs who struggled with the new technology. Education on the use of mobile phones will allow a smoother transition for the FCHVs into the new system of communication.

**History of Nyaya Health in Regions**

Having now looked at the details of the proposed intervention, a brief look to the history of Nyaya Health in this region is necessary. While this is a short section, it is important to stress that Nyaya’s tenure in Achham, a brief six years, has been met with great appreciation and trust by the community. This relationship has been established largely due to Nyaya Health’s use of Nepali doctors, nurses, and staff. 99 percent of the staff at Bayalpata Hospital is Nepali, with over 80 percent considered “hyper-local”—this 80 percent come from a three district radius of Achham District in the Far-western region. The use of a local staffing base allows for Bayalpata Hospital to feel deeply tied to the community. Achham had previously no formal access to healthcare in the form of a clinic or hospital. Nyaya Health’s decision to start the Bayalpata Hospital improved the lives of many in this region. The term *nyaya* itself focuses on
this idea of providing quality healthcare in an effective and efficient way. As Dr. Paul Farmer discussed upon visiting Bayalpata Hospital in the summer of 2012: “the Sanskrit-based word *nyaya* means ‘justice in action.’ It’s perhaps a shorter and more elegant term for global health delivery.”

As was discussed in the executive summary, this intervention will be lead by Nyaya Health, a NGO that is closely linked to Harvard Medical School, Yale Medical School, Harvard School of Public Health, and the Brigham and Women’s Hospital. These institutions serve as the research base for much of Nyaya’s work as well as a recruiting point for western doctors. Nyaya Health works in collaboration with the Nepali Ministry of Health to governs Bayalpata Hospital, the sole source of formal healthcare in the Achham district. Bayalpata’s healthcare delivery arm includes a network of district-wide FCHVs who serve as primary care providers for rural villages and as liaisons to Bayalpata Hospital. This sequence of partnerships creates a strong basis of resources for the execution of the proposed intervention: the benefits of being affiliated with some of the strongest academic beacons and its affiliated medical institutions, the commitment of Nepali domestic workers who have devoted their careers to improving healthcare in Achham, and the trust of the local community which serves as this healthcare system’s patient base.

The following page provides a pictorial timeline of Nyaya Health’s involvement in Achham.
Figure 3. The image above outlines Nyaya Health’s history in the region of Achham from 2006 to 2012.\textsuperscript{23}
Chapter Summary

In a region where healthcare inequity causes preventable deaths across large subsets of the population, hindrances to communication between healthcare providers is one of the primary sources of healthcare delivery delay. This publication promotes that notion that mobile phones have the ability to bridge healthcare service delivery gaps by delivering information, improving knowledge levels of the providers, and providing critical communication links. In particular, a mobile phone based intervention will provide five sources of benefits to the overall system of healthcare delivery in Achham: the ability to contact Bayalpata Hospital in the case of an emergency, the ability to update patient data, allowing for timely refilling and renewing of prescriptions, the ability to take photographs of patients, providing doctors with more accurate information regarding the patients ailment, and finally, updating FCHVs on their practice through video seminars. In short, the collection of real-time data via mobile phone technology has been hypothesized to allow for faster healthcare service tracking and delivery in the rural district of Achham, Nepal. This increased efficiency in data collection is conjectured to lead to improved healthcare access, services provided, and ultimately, to the decrease in maternal mortality in this region.
CHAPTER 2: Overview of Gender and Caste Inequity in Nepal

An investigator would be truly amiss to fail to integrate a discussion of gender and caste when examining a particular demographic in Nepal: a need even more amplified when engaging in a discussion on Nepal’s female rural poor. The contemporary status of Achham’s mothers are a historical consequence of both their gender and caste in Nepali society. This chapter seeks to establish a general understanding of the role gender and caste will play in maternal healthcare delivery for Achhami mothers. The intervention being examined targets low-caste women, a demographic that is often faced with disproportionate inequity in Nepali society. This thought will be explored thoroughly in this chapter. The reader should also remain wary throughout this chapter that the inequity faced by lower-caste women is part of the reason why maternal health in Achham is an easily examinable aspect of health in this region. As will be discussed in Chapter Five: Analysis on Maternal Health Indicators in Achham, most pregnant women in this region will not seek treatment during their pregnancy from a formal healthcare provider. The burden of maternal health rests heavily on the shoulders of FCHVs; largely due to social and cultural norms on the status of poor women. This chapter should be taken by the reader as an
understanding of why inequity experienced by lower-caste women significantly contributes to the poor health of mothers in Achham.

It should be made clear that the intersection of gender and caste in Nepal are complex topics that are deeply rooted in Nepali history and culture: the chapter provides only a foundational glimpse to this intricate topic. In providing a working understanding of the roles of gender and caste, this chapter will provide a lens to the larger topic at hand regarding the intervention discussed in Chapter Two: Overview of Intervention.

Prior to discussing gender and caste as manifested uniquely for many Achhami mothers, a brief history of the development of the cultural significance of gender, caste, and the intersection of the two in Nepal will be given. This will be conducted in an effort to provide a context upon which the reader can observe the gravity of the influence gender and caste has for Nepali citizens.

**Inequity through the Lens of Caste**

Nepal’s contemporary caste system serves to deliver a system of “ranked endogamous divisions of society in which membership is permanent and hereditary.”24 Nepal’s caste system is derived from Hindu doctrine, however, it is important to note that there are significant differences between the classical Hindu caste system, as defined in the ancient religious texts such as the *Manusmriti* and the *Dharmaśāstra*, and Nepal’s current caste system.25, 26 Nepal had practiced various forms of a caste system for several centuries prior to its formal institutionalization.27 These forms of the caste system varied across regions, based on the local regime’s interpretation of the holy texts. In 1853, Nepal’s classical caste system was codified in the National Legal Code, the *Muluki Ain*, by Maharaja Jang Bahadur Rana.28 Rana, founder of
the long-standing Rana monarchy, sought to create a civil code that would institutionalize his religiously-based thoughts on the maintenance of purity. The resultant \textit{Muluki Ain} was a legalized form of discrimination among Nepalis on the basis of caste. Therefore, while various adaptations of the caste system as outlined by Hindu text had been in play prior to 1853, Rana’s writing effectively implemented caste as the law of the land.\footnote{29} The \textit{Muluki Ain} outlined the Nepali caste system to be divided into four folds. These groups included (1) the Brahmin, the upper echelon composed of priests and scholars, (2) the Chhetri, a class of warriors and other military affiliated positions, (3) the Newari, a group for merchants and traders, and finally, (4) the Sudra, the lowest caste which was composed of manual laborers.\footnote{30} These class divisions from the \textit{Muluki Ain} were in effect from 1854 – 1951. The \textit{Muluki Ain} as a law was ultimately abolished by the new constitution in 1963.\footnote{31} Alongside eradication of the \textit{Muluki Ain}, the constitution outlawed all discrimination on the basis of caste. However, it takes little examination to realize that the social structures in Nepal today strongly uphold the cultural sentiments of the \textit{Muluki Ain}. While this maintenance of a cultural caste system is consistent in most parts of the nation, it is particularly amplified in rural regions.

As mentioned above, the caste system in Nepal is no longer an institutionalized mechanism of social structure. However, there is a distinct order to the contemporary caste system, one that takes from the structure outlined by the \textit{Muluki Ain} and ancient Hindu texts. This section serves to continue outlining the nuances of the contemporary interpretation of caste. Nepal’s contemporary caste system differs somewhat from the classical system discussed above. A modern look at Nepal sees that the current caste system has shifted to incorporate new forms of occupation, new principals, and a greater population density. In these changes, one observes a strong resemblance to India’s Jāti system.\footnote{32} What remains the same between the classical and
contemporary system is that caste is a hereditary subscription that is largely permanent and defines much of an individual's social behavior, obligations, and expectations. This includes, though is not limited to, the type of occupation a Nepali individual might have. It also determines the ability to own land, maintain a position of political power, and command human labor. Again, these rules are not law and thus violation is not subject to formal imprisonment or fines. However, violation of these cultural norms is certainly liable to punishment by social boycott and ostracization from the larger community.  

The contemporary Nepali caste system is divided into three subdivisions: the Tagadhari, the Matwali, and the Pani Na Chalne. Tagadhari, meaning “twice-born” are considered the formal members of Nepal’s informal caste system. This grouping encompasses the Indo-Aryan ethnic group of Nepal. Those birthed from the alleged “truest” of Nepali bloodlines fall under this system. The Tagadhari are broken down further in a system very similar to India’s Jāti system. This system maintains the four primary subsections discussed above (1) the Brahmin compose the highest class which includes priests, scholars, and now might include; teachers, doctors, government employees, and high-ranking businessmen. The next group (2) the Kshatriya compose the ruling and military elite, (3) the Vaisya, encompass the large “middle class” of Nepal that work as merchants, highly-skilled laborers, land-owning farmers, craftspeople, and low-ranking businessmen. The lower caste, (4) the Sudra, are composed of manual laborers, household servants, and non-landowning farmers. There are rankings within the Sudra caste, starting from the talo jaat or “low caste,” the saano jaat, or “lower caste,” and finally the nachunay jaat, or “lowest caste.”
Figure 4. The figure above outlines the four sections of Nepal’s Tagadhari class group. The pyramid demonstrates the four subsections within this group from highest caste to lowest caste: the Brahmin, the Kshatriya, the Vaisya, and the Sudra. The pyramid additionally reflects on the bulk of the Nepali population that composes each subsection: there are fewer individuals within the Brahmin class while a greater portion of Nepal’s population is classified as Sudra.\(^{39}\)

Outside of the subgroups of the Tagadhari class group are the Matwali and the Pani Na Chalne. The Matwali groups include populations from indigenous tribes of Nepal.\(^{40}\) While these individuals are still considered to be “pure,” these populations are seldom integrated into Nepal’s formal sector and are often economically and ethnographically disregarded and disenfranchised.

Pani Na Chalne is an umbrella term for the most impure members of Nepal’s general population. These populations are considered to have an impurity so strong and so permeable that members from the Tagadhari and Matwali are largely forbidden from both directly or indirectly touching individuals of the Pani Na Chalne. The Pani Na Chalne consists of: Nepali nationals who are Muslim, foreigners, and most notably, the Acchut or Dalit group. While the decades past have seen growing leniency towards touching of foreigners, particularly Western foreigners, Nepali culture has been largely unwavering towards its thoughts on the impurity of the Dalit group.
Figure 5. The figure above outlines the three sections of Nepal’s contemporary caste system: the Tagadhari, the Matwali, and the Pani Na Chalne. The pyramid’s structure reflects not on the bulk of the Nepali population that composes each subsection but rather the degree of purity each subsections holds. Thus, the Brahmins (at the top of the pyramid) are considered the most pure caste while the Acchut or Dalits (at the base of the pyramid) are considered the most impure.

The notion of an “untouchable” caste of people, which will hence forth be referred to by its Hindu denomination, Dalit, deserves to be explored in an analysis focusing on the rural poor. A literal translation of the term Dalit is a “caste of people from whom water is not accepted and whose touch requires the subsequent sprinkling of holy water to reenter a state of purity.” This definition delineates the reason why this caste is often referred to as untouchable. The Dalit caste is considered the most impure subset of the Nepali population. In carrying this impurity, Dalits are treated as less than second class citizens by higher-caste individuals. These discriminatory practices against Dalits are categorized in the list below. While the list is not exhaustive of the daily offenses experienced by the Dalit population, the nine social categories displayed provide the reader a foundational understanding of the prejudice against the Dalit caste.
1) Denial of entry into a house, hotel, restaurant, and temple
2) Worship lead by Dalits is not acceptable, neither is the donning of sacred cloths during services
3) Access to communal resources such as the water tap, river, etc.
4) Denial of entry and/or participation in public activities such as governmental functions, religious ceremonies, and voting
5) Forced labor, bonded labor, and discriminatory practice of labor
6) Subservience to all other levels of the caste system
7) Higher rates of rape and other methods of sexual violence against Dalit women
8) Social boycott due to intercaste marriages, i.e. if a “high-caste Hindu” marries a Dalit or either sex, the high-caste partner will be shunned from society and will be “demoted” to the Dalit caste
9) Attitudinal untouchability – children of higher caste groups will not attend school if a Dalit teacher is present.

Prejudices similar to those in the list above are experienced by minority populations, indigenous groups, and other smaller faction of communities throughout the world. However, Nepal’s discriminated caste is by no means a small portion of the population. Dalits consist of more than 25 percent of the total population of Nepal, accounting for 1,496,622 individuals. 45 90 percent of Dalits live below the poverty line on less than $1.25 a day. 46, 47 80 percent of Dalit adults are illiterate and have been restricted from accessing any avenue of formal education. 48 This inequity is even more strongly amplified in the western region, where 35.1 percent of the population is accounted as part of the Dalit caste. 49

With strength in numbers and amidst a changing cultural fabric in Nepal, the Dalit caste has taken measures to mobilize in the name of justice and equality for its people. While these reforms have been met with a range of reactions from the larger Nepali society, some improvements have been made for the Dalit people in the past decade. Select Dalit caste members have been able to break free from the cultural constraints of their birth status and stand in positions of power such as Hindu priests, politicians for Dalit representation, academics, and independent business owners. 50 This community based initiative by Dalit individuals has spurred
the development of NGOs and government factions who advocate on behalf of Dalit equality. Still, advances reflect a minority within the Dalit caste – vast millions still remain poor at social, economic, and cultural disadvantage based on their Dalit birth assignment.

**Inequity through the Lens of Gender**

The development of the cultural attitude towards gender in Nepal is not as clearly documented by institutional landmarks in the way that caste has. Gender inequity in Nepal has had a long-standing history that mirrors many of its neighbors throughout Asia. The 11th Amendment to Nepal’s current constitution prohibits discrimination by gender, a positive step in the direction of gender equality in this nation. However, researchers and Nepali female activists agree that the law and regulations associated with the 11th Amendment are no more than lip service. The ideologies of politics and idealism fail to be exercised at the community level. In emulating a second-class status for women so commonly found across a multitude of cultures around the world, it is unsurprising that in Nepal, one’s gender plays a similar role to one’s caste in terms of afforded rights and privileges. And in continuing with its parallels to caste, as caste stratification was amplified in rural regions, so too does gender-based discrimination become more prevalent in Achham and its neighboring districts. The people of western Nepal construe gender relations in several ways through codes of difference and asymmetry between female and male.

Gender relationships are construed through patrilineal interests. Men stand primarily as decision makers for women who, as characterized by sacred Sanskrit texts, manifest certain attributes such as untrustworthiness, irrationality, and a dispassion in their pursuit of men.
In Nepal, particularly in rural regions, arranged marriages remain common practice; the transition for a woman from her father’s home to her husband’s home in her early to late teens observes that a woman’s choices are largely left to the discretion of the male presence in her life.\textsuperscript{55} These choices span all aspects of the life of a woman: from her development through girlhood to a grown woman. These choices might include: educational opportunities and reproductive choices.

Educational opportunities for all Nepali students, particularly girls, have observed dramatic improvement in the preceding decades. The Gender Parity Index (GPI), a socioeconomic measure designed to evaluate relative access to primary, secondary, and tertiary education between males and females, is nationally 0.62.\textsuperscript{56,57} This is based on a scale from 0 to 1, where 1 indicates greater equity for educational opportunities between genders. However, there is still a notable disparity between educational standards for women in comparison to men. Nepal has an adult literacy rate of 56.6 percent, with a rift between males and females. The male literacy rate in Nepal is 71.6 percent in comparison to the female literacy rate of 44.5 percent.\textsuperscript{58} This rift is further widened with increasing distance from urban hubs such as Kathmandu.\textsuperscript{59} In Achham, 40 percent of women ages 15 – 49 have no access to education, in comparison to the 14 percent of men experiencing a similar inequity.\textsuperscript{60} In looking specifically to rural regions, research has demonstrated that adolescent girls confess dreams and aspirations for a better future centered on increased access to education.\textsuperscript{61} However, patriarchy-headed communities under which these girls live often inhibit educational growth by limiting the amount of education she might be permitted to receive.

However, the primary point of contention in regards to women being classified as socially inferior to men in Nepali society again surrounds a culture of purity. In drawing from the
same idiom of relative purity found in caste ranking and Hindu ideology, the caste system observes the menstrual and childbirth impurity of women as making women less pure, and thus more problematic, than men.⁶² According to Nepali culture, women are considered to carry great impurity during childbirth or menses.⁶³ This thought is largely derived from Hindu ideologies, though the concern of the impurity of a woman during her menstrual cycle or childbirth is certainly paralleled across major religions and cultures around the world.⁶⁴ Unique to Nepal’s consideration of menses and childbirth as being impure is the practice of chhaupadi. Chhaupadi is the practice of sequestering a menstruating or delivering woman in terms of the place she sleeps and the items she is permitted to touch. In addition, chhaupadi also restricts the labor and chores a woman is allowed to conduct, her attendance to prayer services, and general interactions with others.⁶⁵,⁶⁶ In being prevented from interacting with her family, friends, and larger community for a ten-day period every month, women are placed at a considerable economic and social disadvantage in comparison to their male counterparts. While more urban regions within Nepal have since abandoned or lessened the severity of this practice, rural regions remain adamant in maintaining this aspect of their culture. Depending on the caste and economic statuses of the families these women hail from, the chhaupadi structures can range from a canopied floor to the family’s barn shed.
Figure 6. Jaukala, 14, is from Rima village in Achham. Here, she poses in her school uniform for a photo in her family’s *chhaupadi* shelter. This squat shed measuring approximately one meter by two meters is separate from her family home. When the women of her family menstruate, they sleep in this space alone. Jaukala is of the Vaisya caste, and is therefore from a family of some economic affluence within her village.\

Figure 7. (From left to right) Tulachi, 15, Jandhara, 15, and Amana, 14 are also from Rima village in Achham. Here, they pose for a photo in front of their family’s *chhaupadi* shelter. For these sisters, the *chhaupadi* is a squat crawlspace directly under their home, largely exposed to the elements. This space is shared with the family’s herd of goats. These sisters are of the saano jaat denomination within the Sudra caste, implicating their family’s relatively low economic status.
Chhaupadi and its effect on health will be discussed further in Chapter 4: Healthcare Access in
Achham.

In a multitude of ways, gender plays as much of a limiting role as caste for females in
rural Nepal. It is vital to consider both of these factors when evaluating whether the intervention
discussed in Chapter Two will be successful in Achham; gender and caste manifest in most
aspects of the targeted population. Now that a distinct discussion of gender and caste has been
outlined, the following section will evaluate the intersection of these two variables as a tertiary
concept.

**Intersection of Caste and Gender**

In much of the literature discussing Nepal’s poor, should the topic of gender emerge,
discussion of caste seems to disappear, as if mere mention of either gender or caste is sufficient
to place this population economically, socially, and politically. Failure to associate caste, gender,
and the intersection of these two variables through either comparative or historical
examination strongly resembles the contention within Western feminist cultural thought where
class and race remain obstinately disconnected in feminist theory. While paralleling gender
and caste provides a strong foundation for discussing, it is important to recognize that the
institutionalized hierarchies established in gender and caste do not maintain direct
 correspondences. Only through a discussion of the intersection of these topics can one draw an
understanding of the social realities for lower caste women. While this intersection spans all
aspects of the lives of these women, specific discussion will be made on three concepts: land
ownership rights, labor burden, and access to healthcare for low caste women.

In Nepal, land ownership and economic independence are heavily intertwined in rural
regions. Without the ability and opportunity to obtain land, one is destined to be socially and
economically subservient to land owners. Women constitute 51 percent of the Nepali population and contribute 66 percent of the agricultural labor nationally. Yet, it is estimated that women control a mere 8 percent of the land. These values are not simply a reflection of cultural gender discrimination: it found its basis in federal law. Until 2003, the National Code of 1963 mandated that women were prohibited from inheriting parental property unless they remained married until the age of 35. Further, women could only sell inherited property with the consent of a male family member. On the other hand, inheritance is a birthright for Nepali men. While this ban was lifted in late 2003, the precedence remained for most women. Gender discrimination in terms of land ownership was particularly enhanced in the context of caste discrimination. Women in the Vaisya caste and higher castes, groupings that are otherwise permitted to own land, are confronted with some opposition to due to their gender. This mentality is centered around the value that Nepali culture places on the family unit. Wealth is a concept to be shared by the family: a family that is headed by a male leader. Thus, any land that is inherited by an upper caste woman is expected to be included in the wife’s dowry. In other words, the land will be transferred from a woman’s parents to a woman’s husband through marriage, and will remain at the control and disposal of the husband. Within the upper caste recent years have, however, observed more female land owners, and thus more female autonomy. Lower castes have not observed a similar paradigm shift. The reader will recall that individuals of the Sudra or Dalit castes are prohibited from owning land. This prohibition naturally extends to women. Thus, poor Nepali women are almost entirely prohibited from owning land despite cultural shifts on the notion of female land ownership. In being unable to own land, poor women are placed at a significant economic disadvantage that ultimately dictates autonomy.
In continuing with the discussion above, economic stability and autonomy are strongly linked to the labor burden borne by lower-caste women in rural Nepal. The poverty associated with people of the lower-caste, particularly women, in Nepal’s rural farming communities is the context in which their daily work lives must be understood. General landlessness had lead to a long-standing need for those in the Sudra and Dalit caste to undertake hard, daily wage-labor.  

A study reflected that nationally, 60 percent of women aged 16 and higher were employed, either formally, through wage labor, or informally, through domestic work. 75 percent of these women were employed in the agricultural sector, largely as farm hands as opposed to farmer owners. However, the study found that 61 percent of working women were not compensated for their work in any clear form (i.e. money, food). This reality is put in sharp contrast to the study’s finding on men, 76 percent of who are directly compensated for labor in the form of cash and/or in-kind payments. 77

In Nepal, there is a clear gendered division of labor, with women, particularly married women, conducting the bulk of the labor for the extended family, in addition to her own domestic chores. The table below outlines this reality, evaluating these discrepancies by both gender and caste.

**Table (A): LABOR LEISURE RATIO BY GENDER AND CASTE** 78

The table below outlines the ratio of leisure to work, by gender and caste. This ratio is measured in hours. The term “high-caste” represents individuals within the Brahmin, Kshatriya, and Vaisya. The term “low-caste” represents individuals within the Sudra and Dalit castes.

<table>
<thead>
<tr>
<th>Low-Caste Women</th>
<th>Low-Caste Men</th>
<th>High-Caste Women</th>
<th>High-Caste Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 : 2.26</td>
<td>1 : 1.12</td>
<td>1 : 2.47</td>
<td>1 : 0.97</td>
</tr>
</tbody>
</table>

As can be observed in the table above, low-caste women devote more hours of labor for every hour of leisure than their male counterparts. It should further be underscored that women overall devote more hours of labor for every hour of leisure than men in Nepal, contributing twice as
many labor hours. Further, while this data might suggest little caste-based difference in the allocation of time for productive work, there are, in fact, significant differences in the types of work in which the villagers are engaged in. High-caste women are afforded the opportunity to take on, what may be considered the Western description of, “white-collar” occupations. These types of labor settings may include, but are not limited to: office environments, teaching, medical work, and domestic labor. Occupations held by low-caste women often center on hard, manual labor including occupations such as farmhand, servant, and domestic laborer. In observing distinct differences in the education necessary to take on these respective occupations, as well as the physical energy expended for each type of occupation, it becomes clear that labor in hours across caste is not necessarily comparable.

An aspect of a woman’s labor, in considering both her gender and her caste, is her role in reproductive labor. Like productive work, reproductive work tends to interface with social hierarchies of gender and caste. Notably, reproductive work is not limited to the act of childbirth but includes antenatal and perinatal care, breastfeeding, childcare, and socialization of the child. The study from which the hourly labor/leisure breakdown across gender and caste notably did not integrate reproductive work into its analysis. Reproductive work was instead considered under “leisure” – time spent with the family. The failure to consider reproductive work as a form of labor is an egregious omission. Upper-caste women will generally have access to a caretaker or nanny – reproductive work in regards to the raising of the child is considerably less heavy for most upper-caste women in comparison to lower-caste women. Lower-caste women generally do not have access to the luxury of a hired caretaker. Further, within the context of a woman’s reproductive labor, there is an element of reproducing the social system of gender and caste inequity. Logically, reproductive choices are largely up to the discretion of a
woman’s husband. These choices include but are not limited to: the age at which a woman will have intercourse with the intent of pregnancy, how many children a woman will bear, access and permission to utilize birth control, and what type of facility a woman will deliver in. While this proclivity for men to make most reproductive decisions for his wife is observed across all castes of women, it is certainly a harsher and more prevalent reality for lower-caste women.

The final aspect through which the intersection of caste and gender will be discussed is access to healthcare. Unsurprisingly, lower-caste women experience disproportionate inequity in terms of healthcare access in comparison to both their gender and caste counterparts. Factors that limit low-caste female access to healthcare include: financial limitations, location, and the cultural precedence to not prioritize female healthcare. Thus, poor national maternal health is associated with both socio-economic and health system inequities. The lower status of poor women, their lack of voice in reproductive health matters, and adherence to cultural practices and taboos around pregnancy and childbirth continue to have significant repercussions. Education and literacy levels, though now rising, are generally low, especially among lower-caste women. This institutionalized inequity in other arenas makes it difficult to change established practices and improve understanding of safe motherhood issues. Therefore, data demonstrates that low-caste women often take a longer period of time to seek out healthcare.
Figure 8. The chart below demonstrates the longer delay lower-caste women experience in seeking or accessing healthcare in comparison to lower-caste men in rural Nepal.\textsuperscript{84}

Delayed or deferred access to healthcare amongst lower-caste women in comparison to higher-caste women, lower-caste men, or higher-caste men is not limited to maternal mortality and morbidity. Preventable diseases often escalate, sometimes to death, amongst lower-caste women more so than these other demographics. Lower-caste women in rural Nepal often take longer to seek professional healthcare treatment for a range of ailments including tuberculosis, malaria, dengue, and water-borne diseases.\textsuperscript{85} On the whole, rural men have a median lag of 1.5 months from incidence of the disease to a clinical visit. Rural women often wait up to three months prior to seeking treatment.\textsuperscript{86} These trends demonstrate that patterns of women’s access to health care are strongly disparate from that of men.\textsuperscript{87}

Additionally, the form of healthcare provider utilized by rural women and rural men differed in notable trends.
Table (B): HEALTHCARE PROVIDER USAGE BY GENDER

The table below outlines the rates by which different genders utilize healthcare providers. This data sampled rural men and women, largely from lower castes. The major types of healthcare providers made available to men and women include: traditional healers, private healthcare providers, government medical establishments, and other forms of care.

<table>
<thead>
<tr>
<th>Type of health care provider</th>
<th>MEN (n = 238), n(%)</th>
<th>WOMEN (n = 98), n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional healers</td>
<td>43 (18%)</td>
<td>34 (35%)</td>
</tr>
<tr>
<td>Private health care providers</td>
<td>181 (76%)</td>
<td>67 (67%)</td>
</tr>
<tr>
<td>Government medical establishments</td>
<td>150 (63%)</td>
<td>61 (62%)</td>
</tr>
<tr>
<td>Other</td>
<td>95 (40%)</td>
<td>32 (33%)</td>
</tr>
</tbody>
</table>

The table above demonstrates strong similarities in the types of healthcare providers utilized by men and women, indiscriminate of caste. It is thus difficult to glean from these data whether these values are truly reflective of healthcare provider use breakdown in rural Achham. However, this table demonstrates one distinctive point that enlightens this section on gender. Women predominantly use of traditional healers more so than men. While traditional healers maintain their own merit as care providers, as will be discussed in Chapter Five, one might deduce that the higher proportion of women seeking out traditional healers is due to a lack of mobility to leave the village vicinity and a lack of education on the benefits of western medicine. Interestingly, it was observed that the availability of a FCHV within a village or community incurred a shorter delay to women accessing healthcare mediums than those where the FCHV was farther away. This evaluation controlled for the distance of other healthcare facilities including traditional healers and government medical establishments: results demonstrated that the presence of the FCHV was truly the factor increasing women’s attention to their own healthcare and increased access to healthcare amenities. This evaluation did not have a similar positive effect on men.
**Chapter Summary**

The primary purpose of this chapter was to provide a foundational understanding of the extreme inequity faced by lower-caste women in Nepal. This exploration of gender and caste was key to the larger analysis at hand as the intervention seeks to provide increased support for this particular demographic of mothers. In designing an intervention that targets Dalit and Sudra mothers in Achham, the intervention will help reduce the heavy burden of poor maternal health carried by these women. In the chapter on maternal health status in Achham, it will be discussed that lower-caste women carry a disproportionate burden of maternal mortality rate in Nepal. This particular chapter intentionally preceded the discussion on women’s health in Achham in order to demonstrate the social rationale for this disproportionate burden. Gender and caste inequity illustrate examples of inequity and structural violence that contribute disproportionality in maternal health status of lower-caste women.

Under the section on caste, inequity in the form birth prescribed classism was discussed. A disparity ranging in execution from systemic poverty to institutionalized discrimination, lower-caste women in the Sudra and Dalit denomination are faced daily with societal reinforcements of poverty. While maternal mortality is experienced by any and all demographics around the world, it is dramatically exacerbated by poverty. In this sense, an examination of caste amongst the targeted demographic supported the notion that this is a needed intervention for lower-caste women. Under the section examining gender, two examples of gender-based discrimination were listed: literacy rates and *chhaupadi*. Disproportionate literacy rates among female and male adults in the far Western region were indicative of the level of education amenable to these respective genders. Public health literature has long purported the association between education level and degree of healthcare accessed: individuals who have spent more time in a formal education setting are likely to have lower morbidity rates and overall better
health behaviors. While health status is certainly an intersectional confounder, literacy level or education level is demonstrably a factor worth evaluation. *Chhaupadi*, on the other hand, is a cultural practice that has multiple evincible adverse clinical effects. As the reader will recall, *chhaupadi* is the practice of leaving a woman in isolation during her menstrual cycle or after she has given birth. Often, she is prohibited from interacting with others during these periods. This presents numerous difficulties, particularly in instances of birth complications. For instance, treatable complications such as hemorrhaging or eclampsia will not be appropriately addressed should a woman be in an isolated state. The discussion on *chhaupadi* further observed that the locations of *chhaupadi*, particularly for lower-caste women, are rudimentary structures where livestock are kept. This type of environment can lead to fatal infections that would have otherwise been preventable. Nepali mothers, in needing to abide by cultural mandates of purity experience an additional element of danger that increases their burden of maternal mortality and overall poor maternal health.

In looking to inequalities experienced and amplified due to the effects of the intersection of gender and caste, three examples were discussed. The first two; land ownership and labor burden, both served to argue a similar point of the lack of economic autonomy for low-caste women. In being unable to own land, a primary source of wealth in rural regions, and being limited to occupations of subservience, women are prevented from achieving their own economic independence. Lower-caste women are generally unable to mandate their own finances, limiting their ability to access and travel to high-quality healthcare sources. Further discussed under the context of labor burden was reproductive work. Reproductive work, that is the act of childbirth as well as prior and subsequent rearing of the child, must be considered as part of the labor a woman might contribute to her larger community. In mirroring the restrictions of non-
reproductive work, the privilege of choice in reproductive work is extended to men more so than women. Finally, a gender-based comparison of delays to healthcare access for low-caste or rural populations were illustrated. On the whole, lower-caste women will experience a longer delay in health access than their male counterparts. This is a largely self-subscribed delay for women. These types of delays for female patients adversely contributed to the health status of these patients: in delaying a diagnosis and subsequent treatment, an ailment can significantly worsen. In seeing this trend of delayed outreach for care, one observes that the standards of healthcare amenable to lower-caste women are another source of inequity. In taking the time to analyze gender, caste, and the intersection of the two as it affects lower-caste women, this chapter served to demonstrate that the patients this intervention will target feel the weight of a persistent structural violence that serves to purport their daily inequity.
CHAPTER 3:
History of FCHVs in Nepal

Recruiting local community members to serve as community health workers or volunteers has become common practice in many developing countries. In an effort to provide a more accessible means of basic health care to rurally-based or poor families, CHWs are trained to become beacons of healthcare in their communities. The use of CHWs has been demonstrated as being an effective measure against preventable death in developing communities. In developing countries where formally trained health workers are scarce and mortality rates run high, the use of these volunteers to provide the preventive and promotive aspects of health care to the community is one of the best standing alternatives. In being local, volunteers are physically based in the community they serve as well as socio-economically, culturally, experientially, and linguistically representative of the community. By these measures, local health workers are, for many, the most trusted and reachable healthcare providers in the area.

Female Community Health Volunteers in Nepal
Nepal’s brand of community health workers are known as female community health volunteers (FCHVs). These volunteers, almost exclusively women, are trained by the government to provide basic health care measures, education on basic healthcare tenants, and as
a liaison to larger clinics or hospitals in the case of complicated ailments. The Nepali Female Community Health Volunteer Program was launched in the capital city of Kathmandu in 1988. It was quickly extended to neighboring regions and ultimately to the far stretches of Nepal’s borders throughout the late 1980s. The program was immensely popular in its inception and proved to be effective in its mission of raising the level of healthcare provision to the poor and marginalized populations of the Nepal. One study discussed how there exists an observable trend over the last two decades between FCHV coverage of a village and (1) use of important primary health care programs by villagers, and (2) reduction in childhood mortality and morbidity. The literature further demonstrated the increasing significance of FCHVs; 36 percent of emergency cases throughout all districts observed FCHVs as a first-responder. Anecdotes from villagers, particularly in rural communities, cite FCHVs as their favored first point of contact in any medical situation. The FCHV program in Nepal now integrates more than 50,000 volunteers and is growing in size. Its corp members serve the majority of the country with exception to several urban municipalities.

The Nepali government’s FCHV program is a unique model of community healthcare on the global health stage. While similar programs in other nations compensate their health workers with formal salaries; Nepal’s FCHV program is largely voluntary. While the structure of the FCHV program varies between districts, very few FCHVs receive a regular salary: most Nepali FCHVs receive only small stipends or non-monetary incentives such as bicycles, free health care, or future job opportunities. Yet, while many volunteer-based healthcare programs in other countries face high levels of attrition, the Nepali FCHV program loses fewer than 5 percent of its volunteers annually. This is a particularly remarkable statistic in considering the fidelity necessary to remain active in the Nepali FCHV program. The FCHV program is predominantly a
nomination-based system; local women must initially be selected by their communities to enter the program. This measure is taken to ensure that the FCHVs within the program are accessible and familiar members of their community. Little emphasis is placed on prior education or previous involvement in a healthcare profession. In fact, 38 percent of Nepali FCHVs are illiterate, with a higher rate of illiteracy in rural regions. Once nominated within a district, the women take part in an 18-day initial training preparing them for a wide range of health issues including immunizations, diarrhea, family planning, infectious and sexual diseases, first aid, facilitation, social mobilization, and more. This initial training is supplemented by periodic refresher trainings placing a further emphasis on maternal and child health. Once formally trained through this government program, the FCHVs are sent back to their communities to spend approximately five hours a week volunteering. Volunteering can come in many different flavors, including; patient consultations in the FCHVs home, off-site visits to the patient’s home, travelling to the district clinic or hospital for supplies, patient referrals, and delivery of paper-based data of the FCHV’s village to the Ministry of Health’s District Office.

In light of limited compensation and high level of commitment, one might question why so many Nepali women elect to enter the FCHV program. This question is further inspired by looking to anecdotes shared by several FCHVs highlighting how much of a strain their role as a FCHV has placed on their livelihoods. As one FCHV noted:

“I provide services to the community in my free time, and that’s ok. But besides that there are specific days I need to collect all mothers or kids in my catchment area and take them to the health facility. And there are FCHV meetings on specific days at the health facility. To get to the health facility, I need to walk through the jungle for an hour and walk for another hour through other villages. So being a FCHV is not something
I do just in free time. I have to be committed to working a full day with not a lot of flexibility, same as any job.”113

A compelling illustration of all tasks appropriated to FCHVs, this anecdote demonstrates that involvement is demanding and the lack of compensation remains rigid even for long-term volunteers.

**Sociological Perspectives on FCHV Retention Rates**

Sociological research indicates three possible explanations for the rates of high involvement and high retention of Nepali women in the FCHV program: (1) a sense of obligation to the community, (2) the opportunity to earn dharma or religious merit through service to the community, and (3) voluntary-based leadership as a source of empowerment for women.

The first point demonstrates a distinct culture upheld universally amongst community health workers in programs around the world. Many women report that their primary decision to become a community health worker or volunteer was based not in compensation but in great communal pride and responsibility.114,115 In seeing themselves as the leaders and primary caregivers of their villages, many health workers understand that they are able to provide a unique service. They have both an intimate understanding of the nuanced dynamics of their village as well as access to medical resources. In other words, the health workers are able to deliver the efficiency and effectiveness of western medical care through the vehicle of a trusted and respected member of the community. They are instrumental in providing community members with the necessary support for their emotional and social well being and empowering them to have increased control over their health.116 In being tasked with a noble cause that might only be successful with a local representative, health workers are universally inclined to join a community health task force.
The second rationale for the high involvement of women in the Nepali FCHV program is based in religious initiative. Nepal, a constitutionally Hindu state, finds 80.6 percent of its population identifying as Hindu. A central concept within the theology of Hinduism is *dharma*. A simplified definition of *dharma* is an individual’s religious and moral duties that help them to reach god. It stands both as an encompassment of natural universal laws that enable one to be contented and happy in addition to a means of gaining karma. Accumulation of karma allows for the possibility of being born into a higher caste or happier existence in the next life. Understanding that this religious context would be an incentive for individuals to join the FCHV cohort, the Nepali government intentionally intertwined the idea of volunteerism in the FCHV program with Hindu morals. As was expected, these higher aspirations served as a driving force for many women to join the FCHV program. It was an opportunity for the practice of dharma. The lack or minimal provision of monetary compensation allows FCHVs to receive acknowledgement of their volunteer status by the community. As one FCHV leader reflected:

“If a FCHV tries to sell her services for monetary gain, then our whole philosophy of morality and getting a seat in heaven and serving the people will be killed. We are not thinking that ‘you do this, you get that.’ That sort of thing doesn’t work. [The FCHV program] has to be a very sustainable type of thing. It has to be tied to Nepali morals and values.”

In finding dharmic value in serving the community through the FCHV program, many FCHVs feel that the long hours, little to no pay, and long-term commitment to their village is justified through religious redemption and growth.

Finally, the third understanding for the extensive commitment of FCHVs to the Nepali government’s community-based health initiative is based in the self-empowerment of FCHVs. In its inception, the Ministry of Health primarily sought female CHVs as it fit into the maternal trope of caregiver. But as the program and its volunteers matured, the women involved in the
program found fluidity in the restrictions previously allotted to their gender. They emerged as burgeoning social leaders within their communities, spearheading public campaigns and development projects beyond the constraints of health. In the over two decades that the program has been run, FCHVs have begun running for office and having a larger, more active role in the decision making processes of their respective communities. In extending the hand of leadership to women in rural and poor communities, the FCHV program has served as a means of empowerment and strength for its members.

There are several critiques of the Nepali community health worker program. These critiques purport that the impact of the FCHV program has been, on occasion, more harmful than beneficial for predominantly rural and poor populations. This argument is made on four fronts; (1) the lack of formal training of FCHVs, (2) discrimination of the Dalit caste, (3) exploitation of FCHV labor, and (4) a strong focus on western medicine over the merits and accessibility of traditional healers.

As was discussed previously, FCHVs are entered into the government program based on a nomination from the community. No prior engagement or knowledge of healthcare is required; neither is a formal education. Fewer than half of FCHVs are literate upon entering the program and many FCHVs remain illiterate during their tenure as their primary care providers for their communities. Critics further argue that the training provided to FCHVs is limited and lacking in terms of appropriate medical knowledge. Though supplementary trainings provided to FCHVs considerably aids in strengthening the medical knowledge of FCHVs, it is by no means equivalent to the formal training undertaken by nurses or other health practitioners, such as midwives. This reality can, on occasion, stimulate rather than evade preventable death.
Patients presenting serious health issues may seek the assistance of the FCHV over an immediate visit to a district health center; this delay in seeking appropriate medical attention can cause an irreversible progression in a patient’s case. One anecdote shared by a FCHV in Achham recalled; “A new-born baby was not breathing normally. What was required was to blow in the baby’s mouth, but we did not know that at that time. The infant passed away before we could get it to hospital. Now, I know better.” Further, recent studies have demonstrated that 28 percent of FCHVs in rural districts have yet to complete the required initial training but are regularly volunteering on behalf of their districts. 30 percent of all FCHVs who received the basic training never received any follow-up training, and 44 percent complain of a lack of replenished supplies. Much of the delay in training and lack of supplies is concentrated in rural districts.

The second argument of critics of the FCHV program is in regards to the discrimination of marginalized populations by FCHVs. The point specifically looks to the treatment of Dalit women and the Dalit population at large. As the reader will recall, Dalits are individuals of the lowest caste in Nepal, a population otherwise known as untouchables. Dalits are culturally stigmatized in the Southeast Asian caste system. As was discussed in the previous chapter, these individuals frequently suffer from restriction to the use of public amenities, deprivation of economic opportunities, and general neglect by the state and society. A caste which has been conscribed to conduct “unclean labor,” such as the cleaning of houses, disposal of dead animals, and disposal of human waste, this demographic of the population is often cast down upon as being polluted. Individuals of higher castes, including many FCHVs, will not directly touch someone of the Dalit caste. It is arguable that the Dalit caste stands as the population most in need of the type of community healthcare relationship that a FCHV might offer. This population is privy to limited state-sponsored welfare and have limited to no opportunities for
social mobility. Particularly in considering the unhygienic labor that this population is tasked with, the Dalit caste can be characterized as the most at-risk population in Nepali society. Interviews have demonstrated that Dalit mothers are unable to have consultations with FCHVs based on cultural stigma. While there are several FCHVs that are willing to work with women of the Dalit caste, patients argue that these practitioners live in remote villages and are thus inaccessible to more centrally-located population. It is clear that this issue can be largely attributed to a systemic question of caste in Nepal, and is not exclusive to FCHVs or the FCHV program. However, the stark reality that the community health outreach motif that stands as the pinnacle of the FCHV program is not necessarily successful in reaching the poorest of the poor. It should be emphasized that discrimination against the Dalit population is not mandated by the FCHV program. It is also not the position taken by all FCHVs.

Many activists and critics find the notion of a solely voluntary format to the Nepali CHV system jarring. While the religious and empowerment merits mentioned previously are well-recognized by these critics, a concern regarding the “blurring of the line” between empowerment and exploitation exists. The literature surrounding this question argues that the lack of full and formal compensation for FCHVs disparages the essential and skilled labor they provide for their communities. It should be noted that this particular criticism stems largely from literature by INGO representatives and foreign labor activists. While there have several instances in which Nepali FCHVs have petitioned for a formal wage, many report being primarily content with existing compensation standards.

The final point centers on the influence of FCHVs in their uses of western medicine or traditional medicine and medicinal practices. Previous to the inception of the FCHV program, many rurally-based communities and poor communities felt that they could not effectively access
facilities that practiced western medicine. This sentiment was primarily based on the high cost of treatment and unfamiliarity with the practices of western medicine. When ill, many of these individuals opted for traditional medicines and sought out the advice of local healers. The goal of the FCHV program was in part to eliminate the stigma against western medicinal practices and to refer severe cases to clinics. The hope was that in training a trusted female figure in every village, more villagers would be inclined to visit a formal clinic, staffed by doctors trained in western medicine, for treatment. The FCHV program has been successful in accomplishing this – over the near thirty years since the inception of the FCHV program, 73 percent of the general population has reported directly benefiting from a FCHV. However, this increase in utilization of western medicine has caused a decline and at times, a discreditation of traditional medicines. While the benefits of western medicine are undeniable, critics of the FCHV program argue that a total eradication of traditional medicine would be both a loss to the Nepali cultural of traditional remedies and to studies in alternative medicine. These critics fully recognize that western medicine has made a dramatic impact on the reduction of mortality and preventable death in Nepal. Further, they understood the FCHV program to be a mechanism of this success. The benefits are clear yet, the critics irrevocably lament the minimization of traditional healing on the Nepali medical spectrum. It should be emphasized that much of this progression towards western-medicine is concentrated in larger cities and the capital of Kathmandu. In many rural regions, traditional medicine is still heavily utilized and for some, preferred over western medicine. In Achham, 99.5 percent of all deliveries take place in homes or in cattle sheds and not in a formal medical facility. Often these births are assisted by traditionally trained midwives or informal healthcare providers.
Figure 9. FCHVs play a vital role in the formal health system in Achham. They traditionally wear light blue saris, allowing them to be easily identified by their dress.¹⁵⁶
Chapter Summary

The Nepali FCHV program has a short history in its twenty-four years. However the dramatic and measurable impact this cohort of volunteers has had on the Nepali medical stage is striking. In many ways, the inception of the FCHV program in rural and poorer districts was simultaneously the start of the expansive use of western-medicine by the majority of the Nepali population. FCHVs stand as beacons of healthcare access in their communities, serving both the role of provider and liaison to advanced medical care. The liaison element of the FCHV role is in part literal, in the form of patient referrals to district clinics and hospitals. However, it also holds a cultural element in being able to present a trusted representative for the unfamiliar territory of western-medicine for many of Nepal’s rural poor. Insecurities regarding the use of western medicine over traditional cures may be dissipated when it is associated with a familiar local representative. The government derived FCHV program has brought about immense health reform for the majority of districts in Nepal. Its success in utilizing local representatives to encourage physical and social well being amongst rural and poor populations has empowered many to have autonomy over their health and their livelihoods.
CHAPTER 4:
Healthcare Access in Achham

This chapter seeks to provide a general overview of the healthcare system currently in place in Achham. This overview will investigate both Achham as a district and Nepal at-large in an effort to fully appreciate the nuances of the healthcare system at play. In discussing a national healthcare system, numerous factors or lens that could be taken into consideration arise. In an effort to provide an overview that will most supplement the larger discussion of this study, this section will investigate broad health indicators in Achham. This analysis will discuss (1) health-relevant information on Achham as a region as well as general health statistics for Nepal, (2) the primary means of and access to care, (3) governmental involvement and national-level expenditures on healthcare, and (4) typical process of childbirth in Achham.

One of seventy-five districts in Nepal, Achham is one of the more remote regions of the nation. Home to a population of 231,285 in an area of 1,692km², Achham’s territory is slightly larger than New York City.\textsuperscript{157, 158} Achham is a part of the larger Far Western region of Nepal.\textsuperscript{159} The Far Western region is often characterized by incredible poverty and its limited access to fundamental infrastructure such as consistent access to uncontaminated water, consistent access to electricity, and access to a range of healthcare services.\textsuperscript{160, 161, 162, 163} The Far Western region observes between a 53 – 72 percent incidence of poverty, with increased levels in more
mountainous regions like Achham. While the Far Western region has observed some
development in the past several decades, the average income for Achhamis remains below $0.50
USD a day.\textsuperscript{164} Literacy rates remains indisputably low in the majority of rural regions; the Far
Western region noted a 27 percent literacy rate in comparison to its urban counterparts which
observed up to a 76 percent literacy rate.\textsuperscript{165} While these irrefutable indicators of poverty are
based in a multitude of factors, a key point to emphasize is the physical isolation between
Achham and regions of Nepal greater infrastructure. In an effort to better contextualize
Achham’s isolation from the rest of the nation, one might consider that the closest operating
room and airport for Achhamis are located in Kathmandu at approximately ten hours away by
public transport (see Figure 1).\textsuperscript{166}

\begin{center}
\textbf{Figure 10.} The figure above is of Nepal. The section highlighted in red is the district of Achham. The blue dot
marks Kathmandu, the capital of Nepal.\textsuperscript{167}
\end{center}
One of the most significant deficiencies in essential population services in Achham, and in Nepal at large, is healthcare. Nepal has been ranked at 143 out of 191 recognized countries in regards to high life expectancy, placing it on the lower spectrum of these rankings.\textsuperscript{168} National average life expectancy for Nepalis is 63.8 years of age; males have a life expectancy of 63.2 years while females have a slightly higher life expectancy of 64.2 years.\textsuperscript{169} The leading causes of death amongst Nepali adults are predominantly communicable diseases including: diarrheal diseases, tuberculosis, malaria, cholera, intestinal parasites, visceral leishmaniasis, and HIV/AIDS.\textsuperscript{170} Infant and under-five mortality in Nepal is equally stark in having a mortality rate of 54 out of 1,000 live births.\textsuperscript{171} Of these 54 accounted deaths, 22 will die before their first birthday. As to be expected from the indicators of poverty mentioned before, life expectancy and rates of mortality dip down considerably as the region analyzed becomes more remote.\textsuperscript{172} In reflecting upon the numerous data presented here, one observes that Nepal is a nation struck with dire health issues; poverty settled at the root of this disparity. The following sections will look to several mechanisms by which poverty feeds into inequity in the healthcare system, allowing for a relegation of healthcare quality and access for Nepal’s poor.

**Means of Access to Care**

The Nepali healthcare system is categorized by four primary institutions; (1) government medical hospitals and clinics, (2) for-profit private health care providers, (3) non-profit health care providers, and (4) traditional healers.\textsuperscript{173} Brief summaries regarding the quality of care delivered by each of these institutions will now be elaborated on. (1) Government medical hospitals are broadly available in urban regions, while government medical clinics are more frequent in rural districts.\textsuperscript{174} Both hospitals and clinics have been described as being
overcrowded and often inefficient. Though procedures and medications may be provided at a subsidized cost, the low quality of care and delays in treatment frequently result in preventable death or further complications in patients. Further, government medical clinics often run on limited supplies due to inconsistencies in replenishing stock in remote regions. (2) For-profit private health care institutions often provide the highest quality of care available in Nepal. However, the costs of treatment can run high, reserving this quality of care as a luxury for upper and upper middle class populations. (3) Non-profit health care providers have found a niche in Nepal. An institution often encouraged by the government, an array of INGOs have established themselves as primary healthcare providers for reduced or no cost. However, INGOs that stand as primary caregivers for a region can run into several problems. First, INGOS often face similar issues confronted by government medical hospitals; overcrowding and inconsistent supply chain can cause the provision of an erratic quality of care. Further, INGOs may only specialize in specific forms of care provision: examples include exclusive practice of HIV/AIDS treatment, cataract treatment, or maternal, newborn, and child health consultations. In other words, INGOs who represent limited specialties or who have very specifically allocated funding are seen as primary care providers in a given region. In an attempt to mediate need with capability, INGOs can be identified as providing an unpredictable quality of care. Finally, (4) traditional healers have had a long cultural and practical history in Nepal that permeates today. Villages, particularly rural ones, will have at least two to three traditional healers accessible to the majority of the population. In Nepal, traditional healers are often called upon when an illness is believed to come from a spirit or from persons wishing the patient harm. Healers will often give charms to their patients and pray on the patients behalf. Other healers will supplement prayer with herbal medicines. While widely utilized by many Nepalis, it should be underscored that
most traditional healers have little western-medical knowledge and have a smaller group of patients to treat at any given time. In light of this, it is difficult to contrast the quality of care provided by traditional healers in comparison to the other three healthcare institutions.

Of these four types of care, accessibility is restricted primarily by the topography of the region being examined. Varying terrains observed across Nepal can be categorized into three ecological zones; mountain, hill, and terai.

![Figure 11](image)

**Figure 11.** The figure above is a terrain-based representation of Nepal. The map is distinguished into ecological three zones; (1) mountainous region in a darker shade, (2) hillier regions in a mid-range shade, and (3) terai in the lightest shade. Note that Achham district falls into a hilly region, but is closely bordered by mountainous regions.

Of the four healthcare institutions mentioned, some are more prevalent in given ecological zones. For instance, larger scale health institutions such as governmental hospitals, for-profit private

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1Terai – a Hindi word to describe flat land regions. In Nepal, Terai is often times composed of marshy grasslands or savannas. Terai ecological zones are unique to the outer foothills of the Himalayas and to the North Indian River Plain which follows the river Indus and Ganges through India, Pakistan, Bangladesh, and Nepal.
health care providers, and larger non-profit healthcare providers can be found in terai regions.\textsuperscript{187} Terai, being fertile flat lands, became points of urban concentration as larger cities began to emerge. On the other hand, small scale government medical clinics, small scale non-profit health care providers, and traditional healers are more present in the less populated mountainous regions.\textsuperscript{188} This breakdown of healthcare institutions by ecological zone illustrated an immense divide in the quality of care physically accessible in urban regions in comparison to rural regions.

In addition, travel time for a patient can vary based on their primary method of transportation. Mode of transportation, as restricted by poverty levels, will further influence accessibility to healthcare. The urban upper-class of Nepal has access to private cars, motorcycles, and the use of public transportation.\textsuperscript{2,189,190} This allows for great mobility within urban regions, allowing for access to the healthcare institution of the patient’s choosing. For urban lower and middle-class patients, primary sources of transportation include: walking, bicycle, motorcycle, or public transportation.\textsuperscript{191} For the rural poor based in mountainous or hilly regions, bicycles and motorcycles can be difficult to maneuver. Preferred methods of transportation include: walking, horse or mule, and on occasion, public transportation.\textsuperscript{192} In regards to travel time, 94.0 percent of rural populations were able to access a traditional healer within a thirty minute travel time.\textsuperscript{3,193} This can be contrasted to the 72.9 percent who were able to access non-profit, private health care providers within a thirty minute travel, and the 49.9 who were able to access government medical establishments in the same time span.\textsuperscript{194} Populations based in urban areas were largely able to access all three methods of healthcare provision in an

\textsuperscript{2} In Nepal, buses and minibuses are the primary form of localized public transportation. Most other forms of public transportation involve long-distance trains between central Nepal and major cities in India. There is no central transnational train system; travel between remote districts to urban areas is limited to bus only.

\textsuperscript{3} In this context, travel time was not associated with one method of travel. In other words, a thirty-minute travel time was the average duration any individual experienced to arrive to their intended health service location. Travel was achieved utilizing varied means of transportation.
equal amount of travel time. In reviewing these values, it becomes apparent that rural populations generally experience reduced mobility and thus a lower quality of healthcare and are more likely to seek treatment from a traditional healer over the other three methods discussed. More on the effects of space and distance on FCHV healthcare delivery in Achham will be discussed in Chapter 6: Spatiotemporal Reflection of Cell Phone Accessibility in Achham.

Private and Public Healthcare Expenditures
This section seeks to examine Nepal’s balance of public and private healthcare systems. In 2003, Total Health Expenditures (THE) for healthcare in Nepal amounted to $333.3 million USD, from a GDP of $4,525.12 million USD. In other words, 7.7 percent of Nepal’s total GDP was spent on healthcare services. Though 7.7 percent may seem acceptable in comparison to health expenditures of other nations, a shocking 70.0 percent of this expenditure comes directly out-of-pocket for civilians. Government contribution towards healthcare services are limited; in 2000 the Nepali government spent $2.30 USD per person in health services; a final cost that amounted to 5.8 percent of its total budget. In terms of the breakdown of the funding allocation of Nepal’s health expenditure, the public sector accounted for approximately 17 percent. This value is sharply contrasted with the expenditures of for-profit healthcare providers, which accounted for 62 percent of the NHE (National Health Expenditure). Non-profits accounted for 21 percent of THE, including both practicing domestic and international NGOs and non-practicing donor agencies. As with most nations’ health system, the private sector is composed of both for-profit and non-profit institutions which cater to affluent and marginalized populations, respectively. However, in the case of 70.0 percent of all health expenditures coming out-of-pocket for all civilians, even middle class families find themselves
delving deeper into indebtedness and poverty in the face of sudden and costly health care expenditures. The ever-widening gap of health disparity between rich and poor in Nepal presents a troubling and increasingly pressing issue.

It should be noted that in the fall of 2012, the Nepali Ministry of Health piloted an intervention of universal health insurance in five districts, precluding Achham. This measure of large-scale subsidized healthcare is unlike any health intervention ever initiated by the Nepali Ministry of Health – in the past thirty years, the MoH had been focused exclusively on small-scale health interventions. The Ministry of Health stated that the implementation of such a large scale measure was indicative of the direction that the Ministry will be taking; the future of healthcare reform would take greater consideration for the poor. As of the submission of this publication, the preliminary data regarding the effect of this intervention has yet to be determined and thus cannot be analyzed as a possible measure in improving health infrastructure in Nepal. However, initial responses from several Nepali newspapers demonstrate heavy skepticism in light of poorly operated public health initiatives. As one journalist noted:

“The government’s decision to launch a pilot program on universal health insurance in five districts is a welcome development… [However] the incidents of public hospitals running without doctors, and often without even lifesaving medicines are making headlines with troubling frequency. This leaves many with only the option of knocking on the doors of private hospitals where the cost of healthcare services are beyond the reach of most Nepalis. The obvious consequence of not having a proper health safety net in place is that even moderate-income families can, in no time, be teetering on the verge of bankruptcy if a family member has to undergo a major medical procedure.”

Carrying a similar sentiment to the writer above, the desire for a cost-effective or universal health insurance package, financed by both public and private sectors, appears to be a unanimous one for Nepali citizens. However, disappointment from previously ineffective programs discourages many Nepalis from active petitioning of such large scale health reform.
The intent of this thesis is to examine a means of improving maternal health in the scope of the proposed intervention discussed in Chapter One: Overview of Intervention. While maternal health indicators will be discussed at-large in the following chapter, consideration should be given to notable anomalies in maternal health delivery in regions of rural Nepal, including Achham. One such anomaly is in the inability of individuals to touch the mother and infant during certain portions of the process of childbirth. Cultures around the world vary in the customs and norms of birth practices. In Nepal, one such norm is that no one is permitted to touch the mother, child, or objects that either the mother or child has touched once the child has been fully exhumed from the mother’s body.\textsuperscript{209, 210} The nuances of this practice, more widely observed in hill villages than in urban areas, are explicated in the anecdote below:

“Padmini (mother) groaned, grunted, and pushed for the hundredth time. Calmly, Lohārni (FCHV) said ‘Here it comes,’ and with splashing blood and water, a baby girl fell onto the mud floor. Suddenly, Lohārni and Laxmi (Padmini’s mother-in-law) moved away from Padmini. The baby, lying squirming on the floor in a dark puddle, was the reason why—the birth pollution is so intense that all present must avoid the newborn and her mother. No one had yet touched the baby as she lay alone on the earthen floor in the corner. Laxmi and Lohārni watched. Then Lohārni began the second phase of instruction to Padmini. ‘Now turn around. Put the baby on a piece of cloth. Did the afterbirth come yet? No? Okay, that has to come out quickly.’ Padmini, exhausted from her efforts of the past two hours, responded slowly. She picked up the ruddy, screaming, blood mass and placed her on a cloth. She was emotionally numb, exhausted. No one helped her. She worked alone, in spite of being exhausted. With the exception of a corpse, there is no greater impurity to the Nepalese than that of the newborn and her mother.”\textsuperscript{211}

As observed in the excerpt above on the birth of Padmini’s daughter, no person, including the attending FCHV and family members, are permitted to touch either mother or child once the child has left the mother’s body. This practice, known as \textit{chhaupadi}, will be upheld for up to ten days after the birth of the child.\textsuperscript{212, 213, 214} The mother and child will physically isolate themselves from the rest of the family by taking shelter in a cow-shed or separate part of the family home.
As was cited in the excerpt, this norm of the childbirth process in rural villages is deeply intertwined with Nepali beliefs of impurity and transference of impurity through actions and interactions; across gender, caste, and states of being. This value of impurity places the onus of postpartum care, of both mother and child, entirely on the mother. This added stress, a certain anomaly in comparing birth traditions across multiple cultures, provides increased windows of opportunity for maternal mortality and morbidity. In the case of Padmini’s anecdote, the afterbirth was neither properly released nor could it be examined by the FCHV. This presents a considerable concern for both mother and infant: abnormalities of the placenta can indicate numerous complications relating to maternal and infant health. An incomplete release of the placenta could result in preeclampsia, a leading cause of maternal mortality in Nepal and around the world. In short, the cultural understanding of the transfer of impurity through physical contact of a mother or infant shortly postpartum creates an environment of added risk for maternal mortality for rurally-based mothers in Nepal.

In light of this anecdote, and the larger understanding that rural births will typically prevent FCHVs, culturally-trained midwives, or other birth attendants from physically aiding the mother after the child leaves the mother’s body, may give the impression that the role of the FCHV is less significant than might be observed in birth traditions that permit physical contact. However, the value of the FCHV might be amplified in a setting in which physical contact is prohibited. As was observed in Padmini’s anecdote, the FCHV plays a valuable role in guiding the mother in caring for herself and for her newborn child. She is able to stand by the mother to monitor the process of care, keeping wary of any complications. From a more clinical perspective, a FCHV and the equipment she is privy to allows for distinct loopholes in Nepali standards of purity. For instance, a FCHV equipped with medical supplies is able to administer
medication or injections as necessary, so long as she does not come in direct contact with the mother.\textsuperscript{217} The FCHV is additionally permitted to handle the newborn or touch the mother if she is wearing surgical gloves; an amenity that many families in rural villages would otherwise not have at their disposal.\textsuperscript{218} Finally, a FCHV will often have the ability to contact a more experienced FCHV or a hospital/clinic based obstetrician in the case of serious complications for either the mother or child. In the case of Achham, the primary health system is Bayalpata Hospital which is staffed by primarily Nepali nurses and an equal balance of western and Nepali doctors. To summarize the perspective and value of the presence of a FCHV, culturally-trained midwife, or birth attendant, it should be noted that rural communities in Nepal will value the life of the mother over the life of the unborn child. Having said this, a family is limited in its capacity to help a daughter-in-law in danger due to financial circumstances, availability of and access to medical resources, and strict cultural boundaries regarding full physical isolation of the new mother and child.\textsuperscript{219} In having a FCHV present during a mother’s contractions, at which point all are able to touch the mother, and immediately postpartum, at which point none are permitted to touch mother and child, staggeringly high rates of MMR might be reduced in rural communities.
CHAPTER 5:
Analysis of Maternal Health Indicators in Achham

This chapter seeks to provide background on several key maternal health indicators that will be addressed by the proposed intervention. The purpose of presenting a comprehensive understanding of maternal health allows the reader to contrast feasibility of the proposed mobile phone intervention against the reality of known circumstances of maternal health in Achham. In other words, in presenting a concise overview of several maternal health indicators in Achham, the reader will be appropriately informed of the current state of maternal health; its burden, its norms, and its areas for improvement. In seeing this current snapshot of maternal health, the reader can observe the gaps which the proposed intervention might fill. Examining the realities of maternal health will allow the reader to better grasp why maternal health is the targeted subset of this evaluation.

Of the different mediums of healthcare delivered by Bayalpata Hospital, maternal health relies most heavily on FCHVs and less so on other forms of formal healthcare. This is an aspect of healthcare that can be greatly improved upon overall. It is also the subsection of healthcare delivery that can improve through a change in the FCHV healthcare delivery model. This chapter
serves the demonstrate to the reader the necessity and benefits of a maternal health focus. The delivery of this chapter will be in the form of contrast; present maternal health indicators in Achham against those of Nepal at-large.

Poverty has persisted against the urban, and, more vigorously, rural poor of Nepal to further deepen the chasm between access to high quality care and socioeconomic status. The affluent of Nepali society have both physical and monetary access to private, high quality healthcare while the middle and lower class are restricted to either low-quality care or forced poverty through the payment of high medical bills. The field of maternal health in Nepal has observed notable advances in allowing greater access to higher quality care, though the reality for many is still difficult. In an effort to best organize the presentation of this overview of maternal health information, the maternal health data to be examined in this chapter will be organized in factions. A statistical examination will be conducted on the following maternal health issues;

(A) Antenatal care
(B) Location of delivery
(C) Reasons for not delivering in a health facility
(D) Assistance during delivery
(E) Pregnancy outcomes

The statistical study of each of these issues will further be informed by demographics of the mother surveyed. These demographics will include:

(1) Mother’s age range at birth; < 20 years, 20 – 34 years, 35 – 49 years
(2) Birth order; 1, 2 – 3, 4 – 5, 6+ (i.e. first child, two to third child…)
(3) Residence; urban, rural
(4) Ecological zone; mountain, hill, terai
(5) Region within Nepal; Eastern, Central, Western, Mid-western, Far-western
(6) Mother’s education level; no education, primary education, some secondary education, SLC and above.⁴

⁴ SLC – School Leaving Certificate. The SLC is a final examination administered to students preparing to matriculate out of the Nepali secondary school system. Should the student successfully pass the SLC Examination,
In integrating these demographics into the statistical analysis presented, a more nuanced understanding of health maternal health disparity; both in Achham and in other parts of Nepal, might be appreciated. It should be noted that, for this portion of the essay, statistics affiliated with the Far-western region will serve as representative of maternal health in Achham.

Prior to engaging in a data driven analysis on maternal health in Nepal, several general statistics that will not be highlighted in the latter portion of this chapter will be discussed. Nepal’s burden of maternal mortality has been described by the WHO and similar health-focused institutions as staggering. A nation that is ranked as having some of the highest rates of maternal mortality in the world, Nepal’s Department of Health Services considers maternal mortality as one of its greatest health concerns. While Nepal has made strides in the categories of the Millennium Development Goals, maternal mortality and overall maternal wellness remains a point of contention in Nepal’s ongoing development of healthcare infrastructure.

The most recent data regarding MMR in Nepal is from 2010, finding 170 deaths per 100,000 births. This new finding observed a –7.3 percent annual change from the MMR determined in Nepal in 1990; finding 770 deaths per 100,000 births. The decrease in MMR is even more notable in that the period of follow-up for maternal mortality was increased from six weeks to twelve weeks after the onset of labor in 2002. In other words, Nepali mothers were followed-up for a longer period of time after having given birth, yet they still observed a decrease nationally in maternal mortality. Below is a graph depicting the trend of decreasing maternal mortality between 1991 and projected up through 2015.
Further improvements in the field of maternal health were observed beyond MMR. National statistics reflected that six in ten mothers were reported in having received antenatal care from a skilled provider, a significant improvement from the 24 percent in 1996. Further, 50 percent of women serviced by the FCHV program throughout Nepal had made four or more antenatal care visits during their pregnancy; a near five-fold increase from data obtained 15 years earlier. Finally, a 2010 study demonstrated that nationally, one in three birth had been assisted by a skilled provider (midwife, doctor, nurse, TBA, FCHV, etc.) over the course of the preceding five years.

However, not all data on maternal health reflected back was positive. 28 percent of deaths amongst women of reproductive age in Nepal were attributed to complications during childbirth and fell within the twelve week postpartum timeframe.228 A more intimate at Achham, again; one
of the poorest regions in Nepal, demonstrates that mortality rates remain high in rural Nepal in comparison to urban statistics. Medical practitioners and FCHVs believe that this high rate of maternal mortality can be attributed to the fact that more than 90 percent of deliveries take place in the mother’s home and not at a medical facility.\textsuperscript{229} In his time working with mothers in Achham, one doctor calculated that 1 in every 125 deliveries he attended or witnessed resulted in a maternal death.\textsuperscript{230} This would imply that MMR in Achham is 800 deaths per 100,000 births, compared to the national 170 deaths per 100,000 births. This places Achham’s burden of MMR on par with the burden of MMR experienced by Burundi, Liberia, and the Sudan: among the top ten heaviest burdens of MMR globally.\textsuperscript{231} In summary, while the field of maternal health has seen dramatic progress in the last two decades in Nepal over, not all of this progress has been successfully translated into Achham, or other rural regions of Nepal.
Antenatal Care (ANC)

Table (C): ANTENATAL CARE

The table below exhibits the percent distribution of women age 15-49 who received ANC from a skilled medical provider between 2007 – 2011. These values reflect a census of women who had a live birth.

<table>
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<tr>
<th>Background characteristic</th>
<th>Doctor</th>
<th>Nurse/midwife</th>
<th>Health assistant</th>
<th>MCHW</th>
<th>VHW</th>
<th>FCHV</th>
<th>No ANC</th>
<th>Percentage receiving antenatal care from a skilled provider</th>
<th>Number of women</th>
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<tr>
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<td>37.9</td>
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Location of Delivery
Table (D): LOCATION OF DELIVERY 235, 236
The table below exhibits the percent distribution of live births in the five years preceding the survey by place of delivery and percentage delivered in a health facility, according to background characteristics.

<table>
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<th>Background characteristic</th>
<th>Healthcare sector</th>
<th>Non-government sector</th>
<th>Private sector</th>
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<th>Other</th>
<th>Percentage delivered in a health facility</th>
<th>Number of births</th>
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## Birth Outside of a Health Facility

Table (E): REASONS FOR NOT DELIVERING IN A HEALTH FACILITY

Follow-up to Table (D); questioning mothers who delivered their child at a non-medical facility as to why they elected to do this. The table below exhibits a percentage distribution of those mothers who cite specific reasons for not delivering in a facility, according to background characteristics.

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<th>Too far/no transport</th>
<th>Poor quality service</th>
<th>No female provider at facility</th>
<th>Husband/family did not allow</th>
<th>Not necessary</th>
<th>Not customary</th>
<th>Children born before reaching facility</th>
<th>Total numbers of births</th>
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Assistance during Delivery

Table (F): ASSISTANCE DURING DELIVERY 239, 240

The table below exhibits the percent distribution of live births in the five years preceding the survey by person providing assistance during delivery, percentage of births assisted by a skilled provider, and percentage delivered by cesarean section, according to background characteristics.

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<th>Background characteristic</th>
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<th>Health assistant /AHW</th>
<th>MCHW/VHW</th>
<th>FCHV</th>
<th>TBA</th>
<th>Relative</th>
<th>No one</th>
<th>Percentage delivered by a skilled provider</th>
<th>Percentage delivered by C-section</th>
<th>Number of births</th>
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Pregnancy Outcomes

Table (G): PREGNANCY OUTCOMES

The table below exhibits the percent distribution of pregnancies ending in the five years preceding the survey by type of outcome, according to background characteristics.

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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern</td>
<td>85.9</td>
<td>1.3</td>
<td>7.6</td>
<td>5.2</td>
<td>1, 478</td>
</tr>
<tr>
<td>Central</td>
<td>88.5</td>
<td>0.3</td>
<td>5.0</td>
<td>6.2</td>
<td>1, 940</td>
</tr>
<tr>
<td>Western</td>
<td>80.3</td>
<td>0.8</td>
<td>6.8</td>
<td>12.2</td>
<td>1, 255</td>
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<tr>
<td>Mid-western</td>
<td>84.4</td>
<td>1.5</td>
<td>7.4</td>
<td>6.7</td>
<td>940</td>
</tr>
<tr>
<td>Far-western</td>
<td>81.4</td>
<td>1.2</td>
<td>8.9</td>
<td>8.5</td>
<td>744</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>89.4</td>
<td>1.0</td>
<td>5.6</td>
<td>4.0</td>
<td>2, 851</td>
</tr>
<tr>
<td>Primary</td>
<td>82.5</td>
<td>1.2</td>
<td>7.1</td>
<td>9.2</td>
<td>1, 308</td>
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<tr>
<td>Some secondary</td>
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<td>0.9</td>
<td>7.7</td>
<td>12.0</td>
<td>1, 307</td>
</tr>
<tr>
<td>SLC and above</td>
<td>81.3</td>
<td>0.3</td>
<td>8.6</td>
<td>9.8</td>
<td>889</td>
</tr>
</tbody>
</table>
In reflecting on the data presented in the previous five tables, one can clearly observe a pattern across certain demographics and poorer maternal mortality outcomes. In this reflection, several key points of interest will be highlighted. In looking to the first demographic, (1) Mother’s age range at birth, it was observed that younger women were more likely to make use of western medicine including delivery with a doctor, delivery in a health clinic, and antenatal care. In summary, younger women tended to have a higher likelihood of carrying a child to term. However, this observation might be a coincidence; younger women (<20 – 34 years) tend to have more successful births in comparison to older women (35 – 49 years). A second point of interest was affiliated to demographic (3) Residence; urban, rural, and (4) Ecological zone; mountain, hill, terai. As was discussed previously, individuals in rural mountainous regions are least likely to have access to western-medicinal care due to limited mobility. While these observations were consistent in Tables (C) – (F), the lack of western-medicine seemed to have very limited impact on the pregnancy outcome. In fact, women in rural regions were able to carry to term more so than urban regions. This finding indicates the possibility of conducting a more thorough investigation on the quality of traditional birthing techniques utilized in rural regions. It should be noted that women in rural regions gave birth to nearly nine times as many children than their urban counterparts. This finding indicates the possibility of a lack or limited use of contraception in rural regions. Further positive pregnancy outcomes were observed in this demographic discussing region within Nepal; (5) regions within Nepal: Eastern, Central, Western, Mid-western, Far-western. Regions that did not make full use of western-medicine suffered little to no difference in the outcome of their pregnancies. However, statistical breakdown by region further demonstrated the disparaging manner in which medical services are restricted to select regions. The Mid-western and Far-western region *consistently* observed a lower quality of care in
comparison to the other three regions. In summary, while pregnancy outcomes seemed to be little affected by exposure to western medicine, the detail of this statistical analysis demonstrated divides in healthcare access.

Finally, some reflection should be made on the flaws of the analysis presented above. First, some scrutiny to the meticulousness of the data examined should be made. The data displayed in these charts were taken from the 2011 Nepal National Census. While a credible source, it is likely that a more thorough a census was conducted in urban regions over rural regions. Particularly in cases of births taking place outside of a formal medical facility, it would be difficult to simply assume that the data presented is even largely complete. This notion is supported by the high instances of maternal mortality in rural Achham outlined by a medical practitioner in the region. High rates of maternal death have been found to have a correlation to “at-home births.”

Second, it should be recognized that birthing techniques have been a well-polished cultural skills amongst many rural Nepali villages. While birthing and pregnancy complications do arise that would significantly benefit from an in-facility delivery, the training midwives and TBAs receive is likely satisfactory to assist in a healthy birth. However, similar techniques have not been adapted for other health indicators, including infant and child mortality, treatment of infectious diseases, and even pregnancy-related complications. While this statistical analysis demonstrated limited correlation to low medical access and poor pregnancy outcomes, investigation of other indicators may prove otherwise.
CHAPTER 6: Spatiotemporal Reflection of Cell Phone Accessibility in Achham

In a mountainous, rural region such as Achham, understanding the value and impact of space and time is pertinent to evaluating the effectiveness of any form of health intervention. Consideration from this perspective becomes particularly relevant in the case of this proposed intervention, which attempts to strengthen a network of spatially isolated villages through the use of cell phones. In order to grasp the importance of this lens of analysis, I ask the reader to indulge me in taking on this chapter with a fresh outlook on how one evaluates space and time. Here is my reasoning for this. Naturally, an individual from New York City, a close-knit metropolitan city that relies heavily on fast-paced communication and response, will evaluate the use of time and the magnitude of space in a vastly different way from an individual from rural, remote Achham. In a setting like New York, time is measured in hours – and now with the use of smartphones as ubiquitous as actual face-to-face communication, response to communication often takes places in a measure of seconds. In regards to space, Google maps will tell a New Yorker the time it takes to get from Point A to Point B in a measure of minutes, all the while delivering this information to the inquirer in mere nanoseconds. The time it takes for a New
Yorker to walk the length of his city, a space nearly equal to the entirety of Achham, is about three times shorter than it is to traverse the whole of Achham.\textsuperscript{243} In short, the daily scale upon which New Yorkers and likely, the reader, evaluate time and space cannot be utilized to evaluate this intervention in the context of Achham. I therefore ask the reader to look at this chapter with an open consideration for time and space as hindrances.

The following chapter will discuss a spatiotemporal perspective on the proposed intervention in Achham, Nepal. This chapter will abstract these conclusions largely from a 2012 study conducted on the spatial and temporal viability of a potential mHealth intervention in Achham, Nepal. This study was conducted by Nyaya Health affiliated researchers Arul Chib, Faiz B. Mohd Irawn Law, Muhammad Nazran Ahmad, and Nadia Bte Mohamed Ismail, with editing support from Boston based Nyaya staff including myself. The publication, entitled “Moving Mountains with Mobiles: Spatiotemporal Perspectives on mHealth in Nepal” provides a data-driven analysis of the region in terms of the benefits cell phones could bring to a mountainous region. The study is based on interviews with Nyaya Health’s cohort of FCHVs on their thoughts on the difficulties they have experienced working in Achham. While this chapter will integrate data and theory from a range of sources, unlike other chapters in this publication, the brunt of the presented findings will delineate from the Chib \textit{et al} study.

“It was an emergency, and I needed help. But the closest landline was in the next village, 20 km away.”\textsuperscript{244}

“They sent a child to tell me that a patient needed my help. With the child, I walked through the jungle for an hour and then for another hour across steep hills to get to the village. So in total, it took five hours for me to reach the patient in need.”\textsuperscript{245}

The quotes above are from two different FCHVs communicating some of the hindrances they face daily in their practice. While the cohort of 51 interviewed FCHVs were not informed
that the study they were partaking in examined delays in healthcare delivery due to spatiotemporal inefficiencies, many of their responses spoke on these elements as instrumental in the delays they face in their day-to-day work. Inefficiencies discussed included routine delays to isolated incidents, and ranged in severity from at best, limited or deferred care delivery, and at worst, an escalated patient case or patient death. The two quotes above provide the evidential bases upon which this chapter will be organized: space and time as hindrances to communication and thus, healthcare delivery. The first quote demonstrates difficulties in space: distance playing a role in delayed provision of care and access to communication or resources. The first section of this chapter will examine distance as an obstacle to healthcare delivery, a barrier amplified by the harsh terrain of Achham. The second quote demonstrate difficulty in time. The latter quote demonstrates that time is one of the most precious commodities to a FCHV. A FCHV’s management of time is paramount to her effectiveness as a lay yet integral healthcare provider in her village. The second subsection of this essay will examine time as a commodity and as a hindrance. These two sections will be utilized to argue that a mobile-phone intervention may be the strongest method by which preventable delays in healthcare delivery due to distance and time may be averted. It should be noted that space and time certainly intersect heavily in this analysis, particularly in the FCHV and hospital administrator anecdotes discussed below. However, the argument will be proposed in two phases to allow the reader to better grasp the gravity of space and time as sources of inefficiencies in healthcare delivery.

**Perspectives on Distance and Terrain**

The people of western Nepal are sometimes referred to as *gauko manchay*, or “village hill people.” This nickname is highly reflective of the rough terrain Achhamis call home. Clusters of hamlets of stone, wood, and mud houses dot the sides of an ever-changing landscape,
alternating between rolling hills and sharp mountain ranges. Achham is settled around a diverse
terrain, stretching from peaks in the western Himalayan Mountains that flatten and descend
toward the Indo-Gangetic plains of the distant south. Linking the hamlets are a myriad of human
and animal footpaths cutting across fields and the sides of hills. There are a limited number of
paved roads that connect the rest of the nation to these small villages; most communities are
disconnected by stretches of dense jungle. In working in a mountainous terrain such as Achham, the daily risk of traversing the territory acts as a barrier.

Achham’s challenging terrain means that travel to a hospital, clinic, or other source of
formal healthcare is often expensive and difficult for sick patients. Numerous studies have
demonstrated that living in a mountainous terrain in Nepal correlates with a lack of access to
formal health services. In looking to maternal health specifically, a study in 2003 found that rural terrain had affected women’s access to emergency obstetric care through raised
financial and travel barriers. Other similar studies noted that this trend in maternal health was
particularly high in regards to postnatal care: the more remote the village, the less a formal
healthcare provider was utilized by patients. This is where the value of a FCHV truly permeates in rural villages.

The primary purpose of a FCHV is to aid her village in accessing high quality healthcare,
even if her village is located far away from a formal healthcare source, such as a clinic or
hospital. FCHVs are able to directly provide essential health services for patients or otherwise
refer complex cases to a formal healthcare source, such as a government-run clinic. The FCHV is
able to make this initial contact with a patient without requiring the patient to travel long
distances. In other words, in regions where health delivery is otherwise limited due to spatial
constrictions, FCHVs stand as primary and sole healthcare providers. As per their role, a FCHV
is expected to fill the void of a formal healthcare source for all persons in her village. However, the size of a FCHV’s village can vary dramatically; her responsibilities might span to neighboring villages or individual families outside of the village center. The presence of a FCHV in the community eliminates part of the problem posed by space. But from the perspective of a FCHV, it appears as if the problems posed by space were only deterred, not diminished. Crossing fast moving rivers, walking down steep slopes prone to landslides, and navigating a region characterized by isolation: mobility is very much a factor of whether a FCHV has the ability to do her job well. Fortunately, all FCHVs were born and raised in this region – these women are the professionals when it comes to navigating jagged boulders and slippery slopes. The realities of the harsh terrain will persist as an obstacle that FCHVs face every day.

The issue of mobility across long distances for FCHVs in terms of the provision of patient care, for the moment, appears inviable. However, the heavy impact of spatial hindrances can be lessened by reducing the need to travel by widening the communication network at the disposal of FCHVs in Achham. As was discussed in Chapter 1: Overview of Intervention, FCHVs have limited access to any form of telecommunication including land lines, internet accessible computers, and notably, cell phones. However, the anecdotes shared by the interviewed FCHVs that cited distance as a source of inefficiency find in common a way of reducing this inefficiency through a means of communication. Observe the frustration of one FCHV, who shared an anecdote of when she lost a patient due to a preventable, spatially-based reason. “I walked for an hour from the health post to see my patient. She was in a bad way. I was not sure of the medicine I needed to save her, but I wanted to treat the mother myself. I needed to get an O.K. from the doctor. When I walked back to the clinic, he was at lunch. The patient died waiting for the doctor to come back.” This anecdote, as well as the others shared, could have
perhaps seen resolution should the FCHV had access to a cell phone. The FCHV could have utilized the cell phone to: contact the patient to determine what her ailments were, call the doctor to get him to return from lunch early, or consult treatment options with the doctor over the phone. Therefore, while the FCHV would have still had to trek an hour to visit the patient in need, her efforts would have been maximized through more informed patient care. For the Achhami FCHV, a remote and displaced work setting leads to gaps in information retrieval and delivery of services. Cell phones can provide a source of mediation for this gap.

Distance further manifests as a hindrance in creating spatial stratification between FCHVs and Bayalpata Hospital. This prevents routine correspondence and interaction between the two entities, resulting in healthcare delivery delays. As was discussed in a previous chapter, Bayalpata Hospital sits in the center of a valley in Achham. Bayalpata Hospital caters to villages throughout Achham, ranging in distance from an hour walk away to a day’s travel.

Figure 12. The image above is of Bayalpata Hospital. The image serves to illustrate the spatial stratification of the hospital with the villages it serves. As the image shows, Achham is characterized by extremely harsh terrain, cut through by the Himalayas. Villages are far flung within the region, making travel to and from the clinic a difficult process.
The spatial divide that exists between Bayalpata clinic and villages places a barrier for the creation of a symbiotic relationship between hospital administrators and the FCHVs. Interviews with Bayalpata’s hospital administrators indicated a sentiment that FCHVs were not able to maintain a close contact with hospital staff due to the lengthy distance between the hospital and village. It was simply too much to ask the FCHVs to make the trek from their villages to Bayalpata’s location without reason. This inability to develop a routine form of communication was limiting as it delayed access to vital information about new protocols within hospital procedures and developments within the hospital’s operational structure. Cell phones intervention proposed in this publication could be beneficial in this perspective. The cell phone would establish a secondary method of communication that could be utilized for a large scale voice messaging system in which updates about the hospital could be delivered routinely to FCHVs via voice mail. This would circumvent any concerns regarding the literacy level of each FCHV and would provide a method for the hospital to send out vital information that can be absorbed by the FCHVs at their convenience. Naturally, a voice mail would eliminate the hindrance of distance.

The concern of providing routine updates was the most vital concern of Bayalpata’s hospital administrators. However, further into the interview, hospital administrators noted a lack of rapport between the FCHVs and the hospital: they sensed that infrequent interactions led the FCHVs to believe that the hospital was not fully committed to the FCHV program. Similarly, interviews with FCHVs dictated a belief that the hospital had lack of confidence in the FCHV program. In noticing a similar discord across both groups, the interviewer asked for an explanation. The hospital administrator shared:

“I think a lot of it has to do with miscommunications, accidents. One time, I had incorrectly scheduled a meeting with a FCHV for a Wednesday. The FCHV was from a
very remote village, and our meeting was going to be at Bayalpata Hospital. I realized on Tuesday afternoon that I had made a mistake in my scheduling, and I would be away from the clinic site during our meeting time. I wasn’t able to pass on this message to the FCHV, so she ended up taking a day to walk to the clinic only to turn right around again. I felt really guilty, but there was nothing I could do.”

Figure 13. The image above is of two FCHVs resting on a hillside. These FCHVs are en route to Bayalpata Hospital for an update on their FCHV training. These periodic trainings require FCHVs to travel long distances on foot. Tired from these treks, FCHV will often take rests in areas that expose them to the elements. There are no means of public transportation made amenable to these women, nor paved roads that would allow easy access for vehicles. Walking is the only viable means of mobility for these women through this remote region.
The anecdote above shared by the hospital administrator demonstrates that the lack of communication between FCHVs and Bayalpata is not only preventing the building of trust between the two entities, but perhaps even souring the situation. Due to the unpredictable nature of working in the medical profession, incidents such as the one shared by the hospital administrator are not isolated. The all too common nature of these anecdotes has purported the sentiment that perhaps Bayalpata Hospital does not hold as much faith in the FCHV program. Standing as one of the most successful arms of Bayalpata’s medical outreach strategy, the hospital administrators, staff, and Nyaya Health officials all agree that this is not the case: they are exceptionally proud and seek to be supportive of the FCHV program. In light of this, the anecdote above could have clearly been ameliorated should the FCHV had access to a cell phone: the hospital administrator could have contacted the FCHV regarding the change in schedule and halted the FCHV’s long trek to the hospital.

**Perspectives on Time**

For individuals living in the remote reaches of the depths of the Himalayas, time is precious resource. For FCHVs, time is a commodity that must be prioritized to manage healthcare duties, emergencies, travel, and administrative duties. For hospital administrators, striking a balance between a desire for efficiency and the barrier of inflexibility of time for FCHVs proves to be an ongoing difficulty.

The critical nature of healthcare delivery demands that response times be near instantaneous, particularly in the case of life-threatening situations. Finding themselves frequently in difficult or unfamiliar situations that often progress into emergencies, the FCHVs who work across Achham expressed a need for an immediate response communication system. As the reader will recall, the FCHVs were surveyed for their access to telecommunication
resources, be that in the form of a cell phone, landline, or internet-accessible computer. Most respondents said they did not have access to a cell phone or internet-accessible computer. A minority of respondents said they had access to a landline, but all of these individuals made a point of emphasizing that the landline was not in their home but in another part of the community. While landlines were the most widely utilized form of communication, it should be noted that the high cost of installing and maintaining a landline, the lack of an extensive network for landlines, and the stifling bureaucracy associated with installing a landline make the utilization of a landline based intervention less than ideal. Thus, in order for a FCHV to receive an immediate response to a patient’s needs in the current system, the FCHV would likely have to increase reaction time by physically moving herself to a means of communication.

When an interview was conducted with a hospital administrator from the Bayalpata Hospital, his primary concern was in having larger lapses in time between updating patient information. He expressed frustration in frequently losing contact with FCHVs leading to a loss to follow-up with her patients: the regiments they were on and the patients’ outcome. This is extremely inefficient for Bayalpata in attempting to determine the proper course of treatment for their patients: both high-risk and low-risk. As the hospital administrator continued to reflect: “We hear frequently about patients who run out of medicines. They only talk to the FCHV once they have completely run out of medication. By the time the prescription is refilled, usually a month or maybe two have lapsed.” He continued to cite that irregular updates to patient data prevent him and other Bayalpata staff from sending the appropriate medicines and amounts to the villages. “If the patient’s health is improving, we do not want to send the wrong amount of medicine.” The hospital administrator noted two factors for the reason gaps in patient data exist: varying conceptions of time between medical volunteers and rural patients and a lack of
routine follow-up with FCHVs. In regards to the first point, the hospital administrator commented:

“Some patients do not understand that the medication they are taking is time sensitive: it is most effective if it is taken precisely as regimented. So if they see that an initial dose is working, they might not check in with their FCHV immediately. FCHVs work hard to track down patients and go to the homes of the patients. They will take notes, and then submit it once a month. But the paper [patient record] system, combined with the patients not taking their medicines correctly, makes this a slow process.”

Difficulties with patient adherence are certainly not unique to Achham. It is a frustration echoed by medical practitioners in every country of the world. The FCHVs are overcompensating for this systemic flaw by making house calls and maintaining a relationship with patients. From reflecting on the anecdote, it appears that one avenue in which to improve this system is by uprooting the paper-based system of patient records for a cloud-based one. As was discussed in the description of the intervention in Chapter 1, the smart phones provided to FCHVs will be loaded with an application specifically for medical records. This application, designed by MedicMobile, will allow FCHVs to upload patient data to a cloud-based server as she takes it down. Once uploaded to the cloud, this information can be accessed by the hospital staff in Bayalpata instantaneously. The paper-based system was time inefficient; every step of the transfer of data, from patient to the FCHV to the central hospital staff would cause unnecessary delays. Utilizing the patient data application will expedite this process, improving healthcare delivery for Achhami villages.

The final perspective on time that will be discussed in this section is in regards specifically to keeping the FCHVs updated in their practice. In order to better inform FCHVs on medical procedures and protocols not covered in their initiation education, Bayalpata Hospital hosts routine seminars. These seminars focusing on improving procedural techniques in a range of focal areas including: maternal health, infant and child health, and communicable diseases.
While these seminars are undoubtedly beneficial to the FCHV, many find it difficult to strike a
balance between allocating time to attend these seminars and leave their patients unattended. One
FCHV anecdote highlights this difficulty:

“"My sister was hemorrhaging badly after her delivery. We needed to massage the uterus,
but we did not know that at the time. I later discovered that we had learned this technique
of slowing hemorrhages in a lesson at [Bayalpata] hospital. But I could not attend the
lesson as travel to the hospital would have taken several days. My sister was due to
deliver. I did not want to leave her."

Nyaya Health’s data finds that FCHVs are reluctant to attend these seminars as more FCHVs are
of the opinion that their time would be better spent attending to their patients. The anecdote
above demonstrates that both increased training as well as a devotion to patients is necessary for
a FCHV to be effective. This example strongly demonstrates that, to FCHVs, time is a
commodity to be rationed. How could the proposed cell phone intervention play a role in
stretching the time a FCHV has? As discussed in Chapter 1, the cell phone to be utilized will be a
smart phone, capable of streaming online videos. Instead of requiring FCHVs to trek to
Bayalpata Hospital to attend these lessons, it is possible to allow FCHVs to stay in their villages
with their patients while being able to keep up to date with new medical practices. It should be
noted that online streaming will likely not eliminate the live seminars hosted by in-house by
Bayalpata staff. As was discussed in a previous section, it is important to maintain a personal
relationship between FCHVs and the hospital. However, in providing the FCHVs with an
alternate form of access to updating their training, these women are not forced to choose between
providing immediate care for their patients and improving their practice for their future patients.
CHAPTER 7:
Case Studies of mHealth Interventions

The concept of using mobile phones is by no means a new idea proposed by Nyaya Health. The implementation of mobile phones in public health care is a very recent model that is referred to as mHealth. In maximizing on emerging technologies, mHealth has the capacity to dramatically expand access to communication channels, allowing for the transmission of both voice and data instantaneously. The speed of this data transfer has the capacity to empower health workers to make improved diagnosis and provide populations with a more efficient and expedited access to health care services. In order to aptly evaluate whether or not the proposed intervention can possibly be successful in reality, case studies of successful implementations should be examined. In drawing parallels between case studies and the proposed intervention for Achham, one can observe best practices that were successful and likely support the notion that the intervention in Achham is in fact viable. The following chapter will closely examine three mHealth interventions in India, Indonesia, and Bangladesh. These nations were closely studied due to the cultural, spatial, and/or economic similarities between each respective nation and
Nepal. The three case studies should be reviewed only in comparison to the proposed intervention in Nepal, not with each other.

**mHealth Intervention in India**

The following case study stems from the article mHealth: A Potential Tool for Health Care Delivery in India by Kannan Ganapathy and Aditi Ravindra. An overview of the basis and findings of the study will be presented, followed by a comparison to the proposed intervention.

One in every sixth human on the planet lives in the sub-continent of India. This staggering population, marked with great wealth as well as extreme poverty, finds a distinct challenge in needing to provide health care to the 800 million living in suburban and rural areas. In the paper, Ganapathy, *et al.* argues that a mHealth intervention is the most promising solution. This is because India, an emerging economy, is witnessing an unprecedented, exponential, and phenomenal deployment of Information and Communication Technology. The tele-density of India, 29 percent in 2008 reached 47 percent in 2012. To take for example Chennai, the dense hub that is sometimes referred to as the “Detroit of India,” has received reports from the Cellular Operators Association of India, that 5.6 million of its 8 million population will have a mobile phone by March 31st, 2008. This is a 13,000 percent increase in cellular subscription since March 1998. In other words, the physical number of cell phones and has increased in Chennai by 133 times. This story is the same in most other metros and cities in India.

It was Gandhi who voiced, “India lives in its villages.” While this is certainly true in terms of population distribution, it is clear that India’s health policy does not echo this sentiment. 75 percent of the health infrastructure in India is concentrated in urban areas, where only 27 percent of the population resides. mHealth interventions have been tried and succeeded in
urban areas: Apollo Hospitals, the largest health care provider in Asia, partnered with Ericsson, a world leader in telecommunication, to begin implementation of a large-scale mHealth system in India in June 2008. This type of proposal was not met by rural regions. The health status of the rural population has not been the focus of India’s push for the development of health infrastructure. However, the need for a large-scale health intervention was distinctively present in rural regions.

In September 2007 Ericsson, a mobile-phone mogul company, undertook a three month mHealth project in 18 rural villages and 15 rural towns. This project, entitled Gramiyoti or “Light of the Village,” showcased for the first time the benefits of mobile broadband technology for rural India. Using next generation mobile technology, Ericsson was able to establish a 3G network across these communities: a high-speed cell phone network that was reached by approximately 3,000 patients and healthcare practitioners.275 Ericsson then partnered with Apollo Hospitals, Hand in Hand (a local NGO), Edurite, One97, CNN, and the Cartoon Network to deliver a range of services including telemedicine, e-education, e-governance, voice and video call services, live television, and entertainment.

Many benefits stemmed from the use of these services. With the help of a social service agency, villagers requiring medical attention were able to request ambulances through increased cell phone coverage. Formally trained nurses were able to use equipment that recorded and transmitted pulse rate, blood pressure readings, and temperature of patients in rural villages to a central hospital. A particularly advanced use of this technology shows a nurse placing a stethoscope over the chest of a patient. The patient’s heart sounds were transmitted through the 3G network to doctors in the central hospital who conducted a tele-auscultation. With the same patient, a 12-lead EKG was taken by the nurses in the rural village, which was then
instantaneously transmitted through the 3G network to the central patient. Prior to this, the teleconsultant interacted with the patient, listening to the history and doing a clinical examination remotely using a webcam. Through the 3G network, 140 individuals were remotely evaluated over a three-month period. Patient and doctor satisfaction levels were high.

The findings of this study were positive, although conducted only over a brief course of time. The Ericsson trial was only allotted for three months. After this point, all services were suspended. This may indicate that the findings of this study were flawed However, the higher rates of patient consultations over the 3G network demonstrated that an mHealth solution could be one possible way of alleviating the heavy burden of disease in rural regions of India. At the end of this study, a secondary pilot project was being planned for India and Bhutan. This secondary project would expand on the first in providing diagnostic and therapeutic services to thousands who previously had no access to modern health care. Ganapathy, et al. concluded on a positive note, sharing that an mHealth based system of consultation would extend the reach of the urban-located health care providers to the masses living in the rural areas. The writers ended with, “A success story in India could very well be a success story for the Global South.”

The mHealth case study in India observed numerous similarities and differences between the proposed intervention that should be examined. A notable difference is in the wealth of the two countries: India has the tenth largest economy in the world with a GDP of 1.947 trillion USD while Nepal has a GDP of 40.81 billion USD.276,277 As was discussed in the beginning of the article, cell phone coverage was widespread throughout India – equipping patients and healthcare providers with cell phones at the outset of the pilot program was not necessary. Unlike the intervention at hand, the problem in this region was the network coverage, not the ubiquity of mobile phone usage. Once the network coverage was enhanced to 3G levels, patients and
practitioners were already savvy with using mobile phones for a range of purposes. A final notable difference between this case study and intervention in Nepal was in the health problem targeted. This pilot program focused on preventative care for the general populace, not a targeted program on maternal health. This served to increase the scale upon which this program in India was conducted.

However, notable similarities between this study and the intervention at hand allow for the drawing of strong parallels between the success of this project and the plausible success of the proposed intervention. India and Nepal both operate under a caste system; this maintains the poor status of lower caste members, and the services they might have access to. Similarly to what is observed in Nepal, India’s poor are largely concentrated in rural regions. Finally, India’s rural poor generally observe decrease access to health services, similarly to Achhami women.

This program utilized a wider breadth of services through a mobile phone than the proposed intervention. On top of patient data updating, the use of the cell phone to contact doctors in the case of an emergency, and using smart phone technology to stream education videos, mobile phones were further used as a form of consultation. While these consultations are not considered as part of the proposed intervention, the benefits of highlighting this aspect of the successes of this story illustrate the next steps that the intervention in Nepal might be able to take. However, the primary purpose of presenting this case study was to illustrate the success of utilizing mobile phones for the purposes of updating patient data, revising and renewing rurally-based practitioners on their practice, and providing a source of fast-paced communication for emergency situations.

**mHealth Intervention in Indonesia**

The following case study stems from the article “The Aceh Besar midwives with mobile
phones project: Design and evaluation perspectives using the information and communication technologies for healthcare development model” by Arul Chib. An overview of the basis and findings of the study will be presented, followed by a comparison to the proposed intervention.

Indonesia has a substandard maternal mortality record, particularly when compared with its other Southeast Asian counterparts. Improving maternal health continues to be a serious challenge in Indonesia. In studies investigating the reason for poor maternal health in Indonesia, it was found that the only infrequent presence of skilled birth attendants during complicated deliveries was a prime issue. This issue persisted despite investments in the recruitment and training of novice midwives throughout Indonesia.

The study cited several similar programs under which the introduction of information and communication technologies (ICTs) to rural community health workers (CHWs) improved an environment that was generally characterized by under-capacitated facilities, constrained access to information and delayed responses to emergencies. In particular, the use of mobile phone was noted as being beneficial for the monitoring of pregnancies and for post-natal maternal support.

This paper takes Aceh Besar, Indonesia as a case study. The rural province of Aceh, located at the northern tip of the Indonesian island of Sumatra, suffers from a widespread lack of health infrastructure. This inequity was only amplified by the tsunami in 2008, which devastated the area. The Aceh Strategic Plan estimated that maternal mortality ranked at 373 per 100,000 live births. Despite national policies and programs initiated by the Indonesian government, there remained room for improvement. Particularly worrisome was the scarcity of medical, transportation, and communication infrastructure due to the prolonged civil unrest that was now at a standstill. With scarce healthcare facilities available to scattered and remote rural
communities, the value of midwifery services as identified as paramount. Approximately 600 midwives are located in Aceh Besar. They are associated with 22 public health centers or clinics.

To provide healthcare expertise, a mHealth intervention aimed to improve maternal healthcare in the region was initiated. The intention was to utilize mobile communications technology to facilitate, accelerate, and improve the quality of health services by supporting midwives in close proximity to these rural communities. The pilot project used simple voice communications to facilitate communication between midwives and OBGYNs, while simultaneously using mobile phones data-transfer as a reliable, efficient, timely, and cost-effective tool for data collection. The midwife mobile phone project was implemented in 15 health centers in Aceh, successfully enrolling 223 midwives. The participants of this study group used project cell phones to transmit health statistics to a central database, contact coordinators and peers for health advice and information, and communicate with doctors and patients.

Fascinatingly, the researchers investigating the effectiveness of this program evaluated heavily the midwives comfort and savvy with the mobile technology. Prior to the start of the investigation, it was determined that most midwives were familiar with the line phone. Though the midwives reported to only use line phones infrequently, they had an average experience of eight years of usage experience. This was compared to newer technologies such as the mobile phone at 2.7 years, and less than 2 years each for the computer and internet, with the majority of 81.1 percent exhibiting little or next to no experience in using the computer and internet. Though they had collectively only had a few years of experience using a cell phone, midwives reported in saying that of the different forms of communication, they most frequently utilized mobile phones. Other mediums of communication, such as the line phone and computers, were used less frequently, with internet usage negligible.
On the whole, midwives exhibited the capability to use mobile technologies towards beneficial health outcomes once the intervention was started. The rapid and easy adoption of the mobile phone by midwives underlines the importance of the technology for an occupational group characterized by the need for mobility. While researchers were initially hesitant, anticipating some pushback from midwives in the implementation of the new system, it appears as if the MWs treated the new intervention with great enthusiasm. As one midwife coordinator recalled: “The midwives did not have any problems using mobile phone. They still have a problem while using the computer to record data and have asked for the appropriate training and minimum computer application skills.” It appears as if the previous exposure midwives had to cell phones made the transition to a mobile-phone based method of communication and collaboration easier. Midwives felt comfortable with the shift to a telecommunicative method of reaching out to OBGYNs in the case of emergencies and updating patient data.
The study further interviewed OBGYNs and patients on their thoughts on the new mobile-technology intervention. These are both valuable, and previously unheard, opinions. The OBGYNs of the local clinic affiliated to the midwives responded to the new technology in saying:

“Midwives who call me usually consult patient complication during pregnancy, what midwives should do, five to six times per month… They call because they are having difficulty handling a patient… Relationship between doctors and midwives today are wonderful, we are meant to be partners… With mobile phones, doctors and midwives are closer, because communication is easier.”

The excerpt above serves to demonstrate the benefit the mobile-technology intervention had in terms of strengthening the relationship between OBGYNs and midwives. In finding OBGYNs more reliable in terms of their responses to emergencies, midwives came to trust OBGYNs and the role they play in the maternal healthcare delivery system.

A similar building of trust was observed between midwives and patients through the implementation of the mobile-technology intervention. One patient was quoted in saying:

“Now it is much better. When we need the midwives, they can come quickly. Imagine if they haven’t had the mobile phones, our house is far, to get to her house takes 20 minutes, waiting for her to arrive is another 20 minutes, that’s a total of 40 minutes. Now it is only a 20 minute wait time.”

In having access to a cell phone, midwives are better able to communicate with patients who are located outside of the village circumference. In general, this will expedite the delivery of the healthcare services, as was observed in this anecdote. In finding midwives to be more reliable: both in the standard of care they deliver and the swiftness of this delivery, patients were found to have more confidence in their local midwives. This will likely increase the use of midwives in birth situations, improving the standard of maternal health in rural Indonesia.
The mHealth case study in Aceh Besar, Indonesia observed numerous similarities and differences between the proposed intervention that should be examined. A notable difference is in the wealth of the two countries: Indonesia has a GDP of 1,208 trillion USD while Nepal has a GDP of 40.81 billion USD.\textsuperscript{291,292} Further differences can be observed in the comfort midwives felt with using mobile phone technology, in comparison to the FCHVs in Nepal. The study went in to great detail dictating how the Indonesian midwives had limited, but notable, exposure to mobile phones. This allowed for the transition to a mobile-technology form of communication fairly easy for the midwives.

However, notable similarities between this study and the intervention at hand allow for the drawing of strong parallels between the success of this project and the plausible success of the proposed intervention. While Indonesia does not operate under a caste system, its levels of poverty are similar to what is observed in Nepal. Further, it was observed that poor populations in Indonesia were concentrated in rural regions, making rural villages a target point for this intervention. Indonesia’s rural poor generally observe decreased access to health services, similarly to Achhami women. Another notable similarity between the two interventions is in the stress it places on maternal health. As the reader will recall, Nepal’s maternal mortality rate is currently at 170 deaths per 100,000 births, while Indonesia’s was maternal mortality ranked at 220 per 100,000 live births in 2010.\textsuperscript{293,294} These numbers demonstrate that the burden of maternal mortality is high in both nations, and is therefore a focal point in both Nepal and Indonesia’s government initiated healthcare intervention plan.

The nature of the intervention conducted in Aceh Besar finds strong parallels in the intervention intended for Achham. Both conducted in rural regions, the intervention seeks to maximize on female community health leaders to use mobile-phone technology to expedite
delivery of health services and rapidly and accurately update patient data. The pilot program in Aceh Besar demonstrated that mobile phones are an effective and efficient device for facilitating smoother communication, and allowing speedier emergency response. The system in Aceh Besar further aided in gathering and disseminating health-related information to midwives. In terms of the outlined intent of the intervention, the program was deemed a success.

A final finding outlined by Chib in this publication was the strengthening of trust developed in Indonesia between midwives and OBGYNs, and midwives and patients. This finding, almost a “bonus” for the researcher, demonstrated that increased communication between these different entities allowed for the development of greater trust. For the OBGYNs, it was found that the use of cell phones allowed for midwives to trust in the effectiveness of OBGYN delivered care. This finding demonstrated that midwives will be more likely to reach out to OBGYNs in cases of emergency. Similarly, the trust developed between the midwife and patient will allow for increased utilization of healthcare services. In the beginning of the publication, it was noted that one of the greatest sources of maternal mortality in Indonesia was the lack of use of a formal birth attendant in a birth setting. As patients begin to trust midwives more, one might find that more families call upon them to attend births. This will likely see an improvement in maternal health indicators in Indonesia. These findings bode well for the intervention proposed in Nepal; while differences between the two interventions certainly exist, the similarities set a precedence for successful implementation.

**mHealth Intervention in Bangladesh**

The following case study stems from the article “Assessing the scope for use of mobile based solution to improve maternal and child health in Bangladesh: A case study” by Mafruha
Alam, Tahmina Khanam, and Rubayat Khan. An overview of the basis and findings of the study will be presented, followed by a comparison to the proposed intervention.

Maternal mortality has been cited as one of the greatest health concerns by the Bangladeshi government. Current data reflects that the national maternal mortality rate is 570 per 100,000 live births. Bangladesh’s Demographic and Health Survey 2007 reported that only 13 percent of all deliveries in Bangladesh are attended by a skilled birth attendant. One of the most prominent reasons why many pregnant mothers face death or preventable miscarriages in Bangladesh is because it is expensive for government or nongovernment health organization to track maternal health cases. Because of this inability, it is difficult for healthcare providers to assess each mothers’ risk during her pregnancy and ability to allocate limited resources through a targeted intervention.

BRAC is the largest healthcare NGO operating in Bangladesh today. This NGO established the Manoshi project in 2007 to benefit maternal, neonatal, and child health in Bangladesh. By the end of 2007, the Manoshi program had been rapidly expanded to all urban slums in Dhaka, the capital of Bangladesh. The Manoshi project now has a reach of around 1.5 million slum dwellers. The BRAC Manoshi-MNCH (Maternal, Neonatal, and Child Health) program runs through a complex chain. The most grass-roots level of this chain are the Shathoshebikas (SS) or volunteers. SS go door-to-door through their communities identifying pregnant women, if any, selling medicines and getting incentives if they refer risky patient’s to BRAC’s medical center. Each SS covers 200 households, approximately a population of 1,000. SS are not required to undertake any formal education and are often illiterate. Next on the chain are the Shasthya Karmis (SK) or Health Workers. SK are ground level workers and the most important link in the chain. They have approximately 10 SS under them, and therefore have a
coverage of 2,000 households or approximately a 10,000 population. They have extensive data collection duties, and have undertaken at least ten years of formal education within their fields. SK have some medical training, and gather basic household data, visit pregnant women, recent mother and children under their supervision regularly to record data cards, provide health advice, and refer in case of emergencies. Higher up on the scale are doctors that provide a range of medical services and practice from centralized clinics or hospitals.

In the past, SK brought a series of hand-printed data cards to the central clinic. These data cards had been transcribed by SK from oral recounting of patient information from SS. This was evaluated by BRAC as a source of inefficiency. Patient data would often get lost in the transition between the SS to SK to the primary care providers. The chain of providers within the Manoshi project were not utilizing their time optimally due to extensive delays between a patient’s consultation and giving them medical advice. The card based method was also evaluated as being costly: specific sources of funding were allotted to the cost of the cards and travel for the SK to and from the central clinics. Further analysis revealed that the card based program became more costly when patient data were found incomplete or missing. The system was inefficient: both in terms of time and cost. This inefficiency was costing the lives of mothers.

Click Diagnostics proposed a simple and yet powerful mechanism for data collection, which would address most, if not all, of the bottlenecks faced by the Manoshi project. The Click module in the BRAC Manoshi project enabled SK, the community health workers, mobile-based data collection software that would allow instantaneous submission of data from patient interview to a centralized system. A secured web page would allow doctors in clinics and hospital to view patient data. The system would further utilize an advanced algorithm to allow for patient triage: prioritizing high risk patients automatically for doctor review.
The project can be divided into three components. The varying aspects of this project are detailed below:

1) Development of mobile module
   Mobile module was developed on a Nokia 3110c mobile phone (one phone costs approximately $90), with capability for:
   - Complete Bangla interface
   - Secured log-in
   - Flexible decision tree
   - Range/type validation and cross-validation of data
   - Photo capture from within software
   - Voice records within software to record open ended data
   - Dynamic update of questionnaire algorithm through GPRS internet at any time without need for physical update
   - Offline data collection and storage for synchronization later (when internet is available)
   - Ability to view work schedule from within the application
   - Ability to view doctors’ feedback for each patient in real time in Bangla

2) Development of web module
   Web module with the follow features was developed:
   - Secured login
   - Use management system for different personnel with different administrative privileges
   - Real time update of new incoming
   - Simple interface to view patient data, pictures and hear voice records from within the same page
   - Transcribe voice records in respective text fields
   - Write doctor feedback in a box which is automatically transliterated into Bangla, and can be sent to a SK’s phone at the click of a button
   - A reporting tool to see daily reports of data inflow and characteristics

3) Develop Automated Risk Categorization Algorithm
   To categorize the risk level of pregnant women and recent mothers an automated risk categorization algorithm was developed

The four part program, proposed by the Click module, simplified the chain of data process and prescribed a cost effective model with lesser but skilled human resource. SS were able to communicate their patient data directly to SK over a phone call. SK could then input this updated
patient data into the mobile module, which could be instantaneously received and evaluated by a doctor. The system would expedite health delivery and would reduce costs in the long run.

It was noted in the study that SK had limited access to mobile phones prior to the start of the study. The publication raised concern that the SK or the larger community would express push back against the implementation of this new technology. However, it was observed that the SK gradually became skilled and built their expertise in collecting data by mobile software. In fact, the SK were skilled enough to train other SK to handle the mobile software. There was a secondary concern regarding patient pushback to the new technology. A particular point of concern was the use of mobile phones to take photographs of patient cases to better inform evaluating doctors. However, when SS or SK approached the community with mobile applications or asked to take photos of patients, there were no complaints regarding utilizing this method.

Overall, the mobile telemedicine platform was well accepted and ran quite successfully. The SS, SK, and doctors in central clinics all insisted that the implementation of the mobile system made their overall operation considerably more efficient, pro-active and easier.

The mHealth case study in Dhaka, Bangladesh observed numerous similarities and differences between the proposed intervention that should be examined. A notable difference is in the location where the intervention was hosted: the Manoshi project was implemented in the capital of Bangladesh while the proposed intervention will be implemented in a rural region of Nepal. The difference between urban versus rural regions significantly alters spatiotemporal perspectives in terms of the scope of this intervention.

However, notable similarities between this study and the intervention at hand allow for the drawing of strong parallels between the success of this project and the plausible success of
the proposed intervention. While Bangladesh does not operate under a caste system, its levels of poverty are similar to what is observed in Nepal. Further, it was observed that poor populations in Bangladesh, regardless of an urban or rural setting, observed notable delays in maternal health service delivery. As the reader will recall, Nepal’s maternal mortality rate is currently at 170 deaths per 100,000 births, while Bangladesh’s was maternal mortality ranked at 240 per 100,000 live births in 2010. These numbers demonstrate that the burden of maternal mortality is high in both nations, and is therefore a focal point in both Nepal and Bangladesh’s government initiated healthcare intervention plan.

The nature of the intervention conducted in Dhaka finds strong parallels in the intervention intended for Achham. Both introduced interventions that sought to maximize on female community health leaders to use mobile-phone technology to expedite delivery of health services and rapidly and accurately update patient data. While the terminology differed: SS and SK instead of FCHV, the grass-roots culture of both of these programs were integral to the success of these programs. The improvements made to the Manoshi by introducing a mobile-phone based intervention demonstrated that this type of intervention allowed for a reduction of delays in health service delivery.

One of the clear benefits of the Alam, et al publication was in the thorough detailing of the varying aspects of the implemented project. The three levels of the project: development of a cost-effective mobile module, development of a web module, and development of a patient triage algorithm. The first two points of development are highly reflective of what Nyaya Health is seeking to do in Achham. In breaking down each element of development, and finding the program outline so similar to Nyaya’s proposal indicates that the findings Alam, et al bode well for the intervention proposed for Achham. The third level of development, a form of triage
ranking for patient data, maybe a beneficial suggestion for Achham’s MedicMobile developers. In devising a method to categorize incoming patient data, it may allow doctors to be more effective in their patient evaluation.

A final finding outlined by Alam, *et al* that is supportive of the proposed intervention for Achham was that both SK and patients were or became comfortable with the utilization of the new technology. The research displayed by Alam, *et al* indicated that the level of exposure SK had to mobile phones was similar to the level of exposure FCHVs have. Most have had some exposure to mobile phones, but very have actually handled a mobile phone and even fewer own a mobile phone. Despite this limited exposure, Alam, *et al* presented a positive response from SK, who were able to easily adjust to a mobile-phone based interventions. This precedence indicates a similarly positive reaction from FCHVs in terms of the change to a mobile-phone based form of communication. Alam, *et al* also reported positively on the response from patients to the new mobile technology. Patients were generally pleased with expedited healthcare delivery and were compliant with the use of a cell phone camera to take patient photos. In receiving positive responses from both SK and patients, the use of a mobile-phone intervention in Bangladesh proved successful.

**Chapter Summary**

This chapter utilized mHealth interventions piloted in India, Indonesia, and Bangladesh as examples of best practices regarding mobile-phone health interventions amongst poor populations. While the differences between the three case studies were distinct, the similarities between the backgrounds of each case study allowed the reader to draw parallels between the positive findings of these studies and the plausibility of the success of the intervention in Achham. In looking to see where each study “went right,” it was observed that the likeness
between the design of the interventions and its actualization would support the notion that the Achham intervention would be successful. Beyond the positive findings regarding intervention design were the interview based reception of the intervention as perceived by doctors, community health workers, and patients. A sentiment was shared across these different subgroups that mHealth interventions overall expedited healthcare delivery services and were overall beneficial to the desire to provide high quality healthcare to poor and marginalized populations. It was further heartening to reflect on responses from health workers saying that the transition from to a mobile-based form of communication was reasonable. In observing that lay community health workers, many who had limited exposure to mobile phones prior to the intervention, were able to utilize the new technology with limited errors or apprehensions bodes well for the reception of the intervention at hand by Achhami FCHVs.

In reflection of this chapter, the proposed intervention will likely be successful due to the numerous parallels between the reviewed successful case studies and the intervention for Achham. These parallels, ranging from cultural, economic, spatial, and logistical in terms of intervention design, strongly indicate that this type of mHealth intervention will thrive in a region such as Achham.
CONCLUSION

“I’m a great believer that any tool that enhanced communication has profound effects in terms of how people can learn from each other, and how they achieve the kind of freedoms in they’re interested in.”

Bill Gates

Politicians, physicians, and philanthropists have long attempted to strike a balance between those who are able to receive care and the global burden of the sick, the ailing, the dying. Though these attempts are often well-intentioned, and perhaps even well-planned, the global scales weighing populations that receive healthcare and populations that are unable to access it due to restrictions in cost, mobility, and social factors find themselves ever tipping in favor of inequity. As the field of global public health expands, it becomes clear that health interventions for the poor can no longer be evaluated solely on a clinical basis. In order to truly make improvements on the global inequities of healthcare provision and access, proposed solutions must consider the biocultural nuances and challenges. This was the approach taken by this publication to evaluate the viability of a mobile-phone intervention to improve the status of maternal health in rural Achham, Nepal.

Community monitoring interventions, that is the increased surveillance of patient outcomes and communication across a range of healthcare providers, is one strategy to improve the access to healthcare made available to the poorest of the poor. The explosive expansion of
mobile technologies, even in the most remote pockets of rural Nepal, offered a unique opportunity to create a novel public health intervention in the resource-limited settings of villages in Achham district. This opportunity could only be maximized on if the technological advances of smart phone technology were met by 1) the grassroots experience of the FCHVs utilizing the cell phones; 2) a connection to physical service infrastructure, provided by Bayalpata Hospital; and 3) a culture of connection across this healthcare provider community on the platform of improving health systems effectiveness. These necessary aspects of a successful mHealth intervention were analyzed in this publication in seven steps.

This section will now review the seven aspects taken under this publication, examining the key take away point achieved in each chapter. The first chapter served to outline the specificities of the intervention. More relevant to assessing the viability of the intervention was the overview on the history of Nyaya Health in the region. The reflection on Nyaya Health’s tenure in Achham, though brief, demonstrated the trust and necessity the organization has in Achham. As the sole source of formal healthcare provision for 257,477, as well as neighboring districts, Nyaya Health’s impact has been profound. There is a great trust and reliance that Achhamis place in Nyaya Health and Bayalpata Hospital. This purports the gravity of the need for the proposed intervention, and a viable setting for its execution. The second chapter staged a social examination on the nuances of gender and caste as it manifests in Nepali society. The majority of the women targeted by the intervention were lower-caste; as was examined in this analysis, lower-caste women were definitively the most marginalized demographic in Nepal. This analysis provided a rationale for why maternal health, and this demographic of individuals, could truly benefit from a FCHV focused intervention. In having limited mobility: socially, economically, and physically, the free care and localized care provided by the FCHVs are
essential. This sentiment was further echoed in the fifth chapter, which presented a data driven analysis of the reality of maternal health in Achham. It had been discussed previously that the burden of poor maternal health, particularly maternal mortality, was staggering in Achham. This chapter provided a statistical context for this conjecture. Further, the presentation of the data on maternal health allowed the reader to examine the nuances of maternal health burden as experienced by rural regions in comparison to urban regions, as well as across several other strata. This following with the findings of the second chapter on gender and caste, the realities of maternal health, and the distinct pockets for improvement, were outlined. The third chapter reviewed the history and social impact FCHVs have made in Nepal, and particularly rural regions. It was valuable to look at this element of the intervention as FCHVs are the working arm of this intervention. Without a community health provider that operates on a culture of reliability and maintains a history of trust in their communities, this intervention would not be viable. The historical review determined that FCHVs, though operating on a volunteer basis, are integral to the healthcare delivery of their home communities. Utilizing FCHVs in this intervention would prove beneficial in this sense, maximizing the benefits of expanding the communication network in Achham. The fourth chapter presented an economic, political, and social perspective on healthcare at large in Achham. This chapter examined many aspects of the Nepali and Achhami healthcare system, including: the breakdown of provider use, healthcare expenditures, and the use of traditional versus western medicines. The purpose of this overview was to illustrate the challenges faced in healthcare delivery in rural Nepal, and the opportunities for improvement this intervention could hold. The sixth chapter gave an overview on the current means of communication between the FCHVs spread across Achham and the staff at Bayalpata Hospital. This analysis, conducted through the lens of spatiotemporal frustrations, demonstrated the means
by which poor methods of communication resulted in preventable death and delays in healthcare services. In the case of many of the anecdotes examined in this chapter, the use of a cell phone could have directly ameliorated a delay or hindrance to healthcare delivery. The seventh chapter examined three successful case studies of similar interventions from India, Bangladesh, and Indonesia. Looking to mHealth interventions that had been conducted successfully in Nepal’s neighbors demonstrated the possibility of a mobile-phone based intervention to thrive under similar cultural, geographical, and economic actualities.

Based on these seven points of analysis, this publication is of the opinion that the proposed intervention of an mHealth method of communication between community health workers and a centralized hospital would be viable in Achham, Nepal. Overall, this publication supports Nyaya Health’s proposition to begin execution of this intervention in the winter of 2013. The hypothesized success of the proposed intervention finds additional support in the reality that a wide-range cell phone network was recently put in place in Achham. Due to the extensive coverage provided by this network, the ubiquity and ease of cell phone use will be maximized through the proposed intervention

In reflecting upon the findings cited by this paper, it is important to give consideration to some of the challenges the intervention might encounter. The discussion of limitations will be two-fold: errors in the use of technology causing harm to patients and the unpredictability of quality and confidentiality when utilizing the proposed system. The first limitation is in regards to the potential negative repercussions of “real-time” reporting of data in its accuracy. This point speaks expressly to the use of a cell phone to update patient information to the cloud-based patient record system. The hospital staff at Bayalpata Hospital initially receiving the data on the
cloud-system should be wary of the underlying possibility of a wrong or missed diagnosis by an FCHV. This error could be due to multiple factors: a loss of data during cell phone transmission due to poor internet connection, the poor quality of a photograph of a patient’s ailment, an error in the voice recognition mechanism of patient data recording, or simple human error on the part of the FCHV. Any one of these errors is entirely plausible and likely to have negative repercussions on the wellness of the patient in question. Further, as the data is submitted in real-time directly from the FCHV and no longer necessitating a scan for content from the FCHL, the rate of error might increase dramatically at the start of this intervention. Several avenues can be pursued in order to minimize the effect of these errors. One possibility is to utilize a pattern tracking system for patient data: utilizing an algorithm the cloud-data collector could compare anticipated patient progress against what is inputted by the FCHV. Should data conflict by a notable margin, the patient record could be flagged as potentially erroneous. In highlighting potential cases of data error, hospital administrators and FCHVs receive assistance in perceiving where potential sources of error could be found. This algorithm could be developed by MedicMobile to work in tandem with the current patient data updating model.

The second challenge that could be met in this intervention is the ease with which an FCHV or hospital staff might unknowingly discharge of confidential information. Quality should be at the core of all mobile mHealth systems, to guarantee a higher level of care for patients. However, the introduction of a mobile health system of patient data intake and a cloud-based patient record hub calls into question the rigidity of the security and confidentiality afforded to patients under the new communication system. The crux of this intervention is in making communication easier and more accessible: allowing all members of the Bayalpata Hospital network to communicate freely. However, the simplicity and openness of the new network puts
patient data at risk of exposure. As of now, there are in place no restrictions in regards to which Bayalpata Hospital staff or FCHV members can access what information. Confidential patient information, including patient photographs, will be able to be accessed by any and all individuals within the Bayalpata Hospital network. While it is presumed that all individuals working for Bayalpata Hospital will abide by an honor system in not accessing or sharing patient information unless it is as needed. However, it is likely that the confidentiality that patients experience under the regulations of HIPAA in the United States will be mirrored in this intervention. A possible point of mediation for this limitation is in increased training for all Bayalpata Hospital network members on patient confidentiality and safety. In increasing the level of knowledge on the appropriate uses and the egregious abuses of patient data, breaches of confidentiality may be reduced.

One further difficulty that might arise in the proposed intervention is in having the FCHVs utilize numbers in data input and utilization of the phone for emergency phone calls. FCHVs who serve as integral members in this study are largely illiterate: this illiteracy extends to numbers as well as words. Particularly in considering the fact that FCHVs have limited previous exposure to any kind of phone, it is likely that FCHVs have rarely made use of written numbers. This difficulty can be resolved in the reality that teaching FCHVs how to utilize numbers, particularly in the context of a phone number, is considerably simpler than teaching FCHVs how to read and write. In including a brief lesson or review on numerical symbol recognition in the FCHV seminar on cell phone use, FCHVs would be fully equipped and ready to utilize the smart phone interface in this intervention.
Reflections of the preceding publication demonstrate the strengths of conducting this level of analysis for NGO supported interventions. Within the world of international philanthropy, the overflowing graveyard of failed international interventions and projects demonstrates the consequences of not conducting a holistic evaluation. Too often, NGOs and philanthropic institutions will plan an intervention in a community without consideration to whether or not the intervention is, in fact, needed or wanted by the community, the cultural and social nuances of the impact such an intervention might have on the community, and the means of starting a project that carries with it longevity and sustainability within the community. In other words, NGOs will often consider an inequity to be a one-sided problem, that can be fulfilled by a one-sided solution. In failing to consider the community in a meaningful way, too often the intervention will fail or have limited impact. This publication hopes to stand out as one of many voices that advocate for the thorough evaluation of an intervention, from many perspectives, prior to its execution.

Thank you for your time and your patience in reading this publication. Should you have any questions regarding any of the thoughts published here, please do not hesitate to contact the author, Sarah Van Buren via email (sarahvb@brandeis.edu).
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