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Maternal Healthcare Utilization Among Muslim Mothers From India, Pakistan, and Bangladesh: Is There Equity?

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Abstract

To date, literature exploring maternal healthcare utilization among Muslim populations has largely focused on religious differences. However, little research exists exploring maternal healthcare utilization within Muslim populations. This highlights a research gap because studies across religious groups may obscure important variation within Islamic women. The primary objective of this study assessed if there is equity in MHU among Muslim mothers in India, Pakistan, and Bangladesh. Multivariate logistic regression revealed inequities to be present in the three countries. Predicted probabilities revealed a narrower equity gap in MHU in Bangladesh compared to India and Pakistan. The successes of Bangladesh's recent efforts to reduce inequity within its Muslim community offer lessons for policy-makers in India and Pakistan. The results from this study underscore the need to look past Islam as a reason for inequity and look further within Muslim communities for solutions.

Keywords

Islam, Muslim, antenatal care, skilled birth attendant, institutional delivery, equity, India, Bangladesh, Pakistan

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List of Abbreviations

ANC	Antenatal care
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Activist
BDHS	Bangladesh Demographic Health Survey
BHU	Basic Health Unit
BUHS	Bangladesh Urban Health Survey
CEmONC	Comprehensive emergency obstetric services
CSSM	Child Survival and Safe Motherhood Program
DHH	District Headquarter Hospital
DHS	Demographic Health Survey
FTA	Federally Administered Tribal Areas
HPNSDP	Health Population and Nutrition Sector Development Plan
JSY	Janani Suraksha Yojana
LHV	Lady Health Visitor
LHW	Lady Health Worker
MCWC	Mother and Child Welfare Center
MDG-5	Fifth Millennium Development Goal
MHCWC	Maternal Health and Child Welfare Center
MHU	Maternal Healthcare Utilization

MHVS	Maternal Health Voucher Scheme
MMR	Maternal Mortality Ratio
MNCH	Maternal Neonatal and Child Health
MNHI	Maternal and Neonatal Mortality and Morbidity
MoH	Ministry of Health
MoHFW	Ministry of Health and Family Welfare
NFHS	Indian National Family and Health Survey (1992-93)
NFHS-2	Indian National Family and Health survey – 2nd Edition (1998-99)
NFHS-3	Indian National Family and Health Survey – 3rd Edition (2005-06)
NGO	Non-Governmental Organization
NHM	Indian National Health Mission
NIPS	National Institute of Population Studies
NRH	Indian National Rural Mission
PBS	Pakistan Bureau of Statistics
PCA	Principle Component Analysis
PDHS	Pakistan Demographic Health Survey
RCH	Indian Reproductive Child Health Program
RHC	Rural Health Center
SBA	Skilled Birth Attendant
THH	Tehsil Headquarter Hospital

UNICEF	United National Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization
ZINB	Zero Inflated Negative Binomial Model

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Chapter 1

1 Introduction

1.1 Background

Since the inception of the fifth Millennium Development Goal (MDG-5) in 2000, the global community had been ushered into a world-wide pledge to reduce the 1990 global maternal mortality rate by 75% by the year 2015. Between 1990 and 2015, the global Maternal Mortality Rate (MMR) fell by 45%, a substantial achievement but still failing to meet the MDG-5 target goal (UN Secretary General, 2015). In 2013, it was estimated that globally, 289,000 maternal deaths occurred annually with one of the highest concentrations of maternal deaths occurring in South Asia; over 20% of all maternal deaths world-wide occur in India, Pakistan and Bangladesh (WHO et al., 2015).

As suggested by the World Health Organization, evidence-informed interventions to reduce maternal mortality include the use of at least four antenatal care visits during pregnancy, use of a skilled birth attendant, and delivery at a medical institution (WHO, 2004; WHO, 2007b).

In the past two decades, a wealth of health services research has examined determinants of maternal service use. Particularly, a systematic review conducted in 2008 revealed that a women's own socio-demographic profile can significantly affect her likelihood of seeking appropriate maternal health services (Simkhada et al., 2008). Such factors include her economic status, age, educational attainment, husband's education, parity, birth order/interval, place of residence, and religion (Simkhada et al., 2008).

Within developing countries in Sub Saharan Africa and South Asia, religion has consistently been cited as a significant predictor of maternal healthcare utilization (Anwar et al., 2015; Bashar et al., 2012; Hossain & Hoque, 2015; Kabir, 2007; Nketiah-Amponsah & Arthur, 2013; Solanke et al., 2015; Tawiah, 2011; Yadav & Kesarwani, 2016).

The link between religion and health is not new. Social scientists have long realized the profound effects of religion on health (Rai, 2015). Scientific inquiries examining religious influences on social behavior can be first traced to Emile Durkheim in 1897, who noted that religion had a pivotal role in health, with lower suicide rates among societies with higher religious integration (as cited in Barrett, 2008). However, partly due to the secularization of science, empirical investigation into the effect of religion on health was often ignored (Barrett, 2008). In 2001, Koenig and colleagues published the first edition of the 'Handbook of Religion and Health'. Cited multiple times, this was the first comprehensive summary of scholarly material affirming the association between religion and physical/mental health (Koenig et al., 2012).

A multitude of literature has been published further expanding upon the 'religion-health' connection (Koenig et al., 2012). Yet, studies examining maternal healthcare utilization (MHU) within religious populations remain limited, particularly within the perspective of Non-Judeo-Christian religions such as Islam (Barrett, 2008).

Islam is the fastest growing religion in the world, with an estimated population of 1.8 billion people in 2015 (Lipka & Hackett, 2017). Globally, roughly 60% of the Muslim population reside in Asia with Pakistan (11.1%), India (10.3%), and Bangladesh (9.3%)

ranked in the top four countries housing the largest proportion of Muslims globally (Pew Research Forum, 2009). More importantly, these three countries share a unique sociocultural history as they were united until 1947 (Rai, 2015). However, in years since, they have developed unique demographic profiles, thus offering a unique opportunity for maternal health research in this region (Rai, 2015).

To date, literature on MHU among Muslim populations has largely focused on religious differences, with most showing that Muslim women fare worse than their Non-Muslim counterparts on many indicators of appropriate maternal healthcare use (Anwar et al., 2015; Bashar et al., 2012; Hossain & Hoque, 2015; Kabir, 2007; Yadav & Kesarwani, 2016). However, research exploring maternal healthcare utilization within Muslim populations continue to remain scarce. This highlights a clear research gap as studies across religious groups that compare Muslim women to non-Muslim women may obscure important variation within Islamic women.

As the global community continues to reach for the proposed 75% reduction in MMR proposed by MDG-5 in the post-2015 era, 'equity', defined as the "absence of avoidable or remediable differences among groups of people" (WHO, n.d), is fundamental to reducing maternal mortality and has become an important marker when understanding disparities in access to healthcare in the developing world (Çalışkan et al., 2015). In this regard, the lack of studies investigating equity in maternal healthcare utilization within the prominent religious group of Islam offers a specific avenue for novel research.

Therefore, the primary objective of this thesis takes advantage of the high proportion of Muslims in South Asia to assess if there is equity in maternal healthcare utilization

among Muslim women from India, Pakistan, and Bangladesh. Overall, the contributions of this study will help elucidate disparities in access to care within this population, and ultimately, inform the development of tailored interventions to address the maternal healthcare needs of the prominent Muslim community in these countries. As a secondary objective, this study examines whether country of residence modifies the effect of religion on MHU between Muslim and Non-Muslim women from Bangladesh and India.

Chapter 2

2 Literature Review

This chapter covers four bodies of literature. First in Section 2.1, I describe background demographic and contextual information related to the three countries of interest: India, Pakistan and Bangladesh. Second in Section 2.2, I justify the importance of maternal healthcare utilization (MHU). Third, in section 2.3 I define equity. Fourth, I provide a brief overview of Islam in Section 2.4 and in Section 2.5 a summary of available evidence examining MHU among Muslim populations. Section 2.5 is relevant to the primary objective of this thesis. In section 2.6, I summarize available literature examining Muslims and Non-Muslims differences on all relevant indicators of maternal health utilization in Bangladesh and India as described below. Section 2.6 is relevant to the secondary objective of this thesis.

2.1 South Asia

2.1.1 India

South Asia is the southern region of the Asian continent, bounded by the Himalayas to the north, the Indian Ocean to the south, the Hindu Kush to the West, the Arakanese to the East, the Arabian Sea South-West, and the Bay of Bengal South-East (Chapman & Baker, 1992; McLeod, 2002). The physical and geo-political boundaries of South Asia do not coincide (Ghosh, 1989). India, Bangladesh, and Pakistan are the most populous countries in South Asia and form the core of the subcontinent. Apart from these three countries, there is currently a disagreement as to what other peripheral countries constitute South Asia. However, according to contemporary definitions, Afghanistan, Sri

Lanka, Nepal, Bhutan, and Maldives can be regarded as constituent countries (Central Intelligence Agency, n.d; World Bank, n.d)

India, Pakistan, and Bangladesh share a unique history as they were united until 1947 (Rai, 2015). After 1947, Bangladesh and Pakistan separated from India but remained politically intact; from 1956 to 1971, Pakistan and Bangladesh were collectively known as the Islamic Republic (Berglee, 2012). However, due to wavering political landscapes at the time, the Islamic Republic separated in 1972 to form current day Pakistan and Bangladesh (Berglee, 2012). Thus, due to their shared sociopolitical history, these countries share many attributes, the most prominent being that approximately 30% of the global Muslim population are collectively found within India (10.3%), Pakistan (11.1%) and Bangladesh (9.3%) alone (Pew Research Forum, 2009).

Geography and Population

India is the seventh largest country by total area and the second largest country by population. India's total land coverage is roughly 2.97 million km^2 (Central Intelligence Agency, 2016b). The country is comprised of 29 states and seven union territories which can be delineated into four regions: North India, East India, South India, and West India (Berglee, 2012; Central Intelligence Agency, 2016b). India's population is approximately 1.27 billion. In 2016, the estimated population growth rate was 1.19% and the total fertility rate was 2.45 births per woman. In 2016, the life expectancy for males and females was 67 and 70 years respectively. In 2015, the maternal mortality ratio was 174 deaths / 100,000 live births (Central Intelligence Agency, 2016). In 2016, the birth rate was estimated at 19.3 births per 1000 persons. Approximately 33% of Indians live in

urban areas, with an estimated annual urbanization rate of 2.38% (Central Intelligence Agency, 2016). See Figure 1 for a map of India.

The main religious groups in India are Hindus, compromising roughly 80% of the population, followed by Muslims with 14%, Christians with 2%, Sikhs with 2%, and other religious groups compromising the remaining 2% (Central Intelligence Agency, 2016b). Though India is considered to be a Muslim minority country, the country holds the third largest number of Muslims in the world, with a population over 160 million Muslims, second to only Indonesia and Pakistan (Pew Research Forum, 2009). The main ethnic groups in India include: Indo-Aryan (72%), Dravidian (25%), and Mongoloid and other small ethnic groups compromising roughly 3% of the total population. Hindi is the most widely spoken language in India, while English remains the primary language for political and national communication (Central Intelligence Agency, 2016b).

Healthcare

Healthcare in India is heavily rooted in the country's political and socioeconomic framework and is primarily viewed within public, private, and indigenous lenses (Gangolli et al., 2005; Kalepu, 2013).

The country's public healthcare system is complex and multifaceted, extending from the national to the village level (Vaz, 2009). India's constitution places most health services under the responsibility of the state, but provides enough flexibility

Figure 1: Map of India

Source: http://freemaps.no

Note: Madras is now termed Chennai

such that the country's federal government can also play an important role (Gangolli et al., 2005; Vaz, 2009; Wennerholm et al., 2013).

India's federal government includes the Union Ministry of Health and Family Welfare (MoHFW) which is mainly involved with the development of healthcare policy and provision of funding for health programs in the country (Gangolli et al., 2005; Wennerholm et al., 2013). Throughout the years, a number of federal programs have been implemented with the overarching goal to improve the health of the Indian people, specifically, programs related to preventative health such as the eradication of communicable diseases, nutrition, sanitation, and rural health (Kalepu, 2013).

Each state in India is responsible for its own healthcare delivery in which private and public systems have the ability to operate in parallel (Kalepu, 2013; Wennerholm et al., 2013). Approximately 75% of India's population reside in rural areas; as a result, the country's health infrastructure and resources has largely focused on rural healthcare delivery (Agarwal, 2009; Wennerholm et al., 2013). India's urban health infrastructure has largely gone unnoticed, and remains relatively disorganized (Agarwal, 2009). In comparison, the country's rural healthcare system is substantially more structured and operates in three tiers (Kalepu, 2013).

A sub center acts as the first contact point between India's public health delivery system and the community (Government of India, 2012; Vaz, 2009). Sub centers are designed to provide essential preventative, promotive, and curative services as well as national programs related to maternal/child health, family welfare, immunization, and control of communicable disease (Government of India, 2012; Vaz, 2009). Typically, each sub

center is equipped by at least one Auxiliary Nurse Midwife (ANM) and one Male Health Worker (Government of India, 2012; Vaz, 2009). Moreover, one Lady Health Visitor and one Male Health Assistant are assigned to oversee six surrounding sub centers (Vaz, 2009). Sub centers can be further categorized into two types: Type A and Type B (Government of India, 2012). Type A sub centers provide the same essential services as Type B sub centers, except for delivery services (Government of India, 2012). However, as stated previously, type A sub centers are staffed with an ANM in case a delivery is required (Government of India, 2012).

A Primary Health Centre is the first access point to qualified doctors and serves approximately six sub centers (Vaz, 2009). Overall, Primary Health Centers are designed to provide integrated curative and preventative healthcare to India's rural population. They are staffed by one Medical Officer and 14 paramedical and other support staff (Vaz, 2009).

Lastly, a Community Health Centre serves as a referral point for four primary health centers and is staffed by physicians of various specialities and other supporting staff (Vaz, 2009).

In contrast to the public health sector, India's private sector is highly unregulated, rapidly growing, and has penetrated the country's healthcare needs from private hospitals to health equipment/manufacturing (Kalepu, 2013; Ramani & Dileep, 2006; Wennerholm et al., 2013). Unfortunately, India's unregulated private sector has become a double edged sword, offering high quality health services to the India's wealthy in some instances but

perpetuating the development of private providers with little training in other situations (Wennerholm et al., 2013).

Today, the dominance of India's private sector is illustrated by the fact that it controls a noticeable proportion of healthcare services provided in the country (Wennerholm et al., 2013). India's heavy reliance on private healthcare can mainly be attributed to low quality of care, a shortage of doctors, and a chronically underfunded and overburdened healthcare system (Jilani et al., 2009; Wennerholm et al., 2013). This results in significant out-of-pocket costs and places immense financial pressure on individual citizens (Wennerholm et al., 2013).

A small portion of India's health system consists of indigenous care; this is comprised of a variety of health practices such as: homeopathy, naturopathy, and Ayurveda and Siddha (Kalepu, 2013). Recently, the government has increased efforts to formalize and standardize these traditional health practices (Kalepu, 2013). This includes increasing the educational standards within indigenous medical institutions in the country, and applied research on the effectiveness of these traditional health practices on disease (Kalepu, 2013).

Maternal Health

The fifth Millennium Development Goal (MDG-5) aimed to reduce the 1990 global maternal mortality ratio (MMR) by 75% by 2015 (Government of India, 2015). In 1990, India's MMR was estimated to be approximately 437 deaths per 100,000 live births. The country has seen great reductions in maternal mortality; annual maternal deaths in India

have declined from approximately 100,000 in 1990 to 44,000 in 2011-2013 (National Institute of Public Cooperation and Child Development, 2015).

To meet the MDG target, India's MMR had to decrease to approximately 109 deaths per 100,000 live births by 2015 (Government of India, 2015). In 2015, it was estimated that India's MMR was approximately 174 deaths per 100,000 live births (Central Intelligence Agency, 2016b), thus making substantial progress but failing to meet the MDG-5 target for 2015.

The Indian government has implemented a number of interventions to combat the country's high maternal mortality and improve the lives of all pregnant women in the country (Subha & Khanna, 2012). In 1992, the federal government implemented the Child Survival and Safe Motherhood Program (CSSM) with the purpose to universalize antenatal care, increase the use of skilled birth attendants, and establish comprehensive obstetric care facilities (Subha & Khanna, 2012). This continued until 1997 when India's CSSM program was replaced by the first phase of India's Reproductive Child Health program (RCH) (Subha & Khanna, 2012). This built upon the CSSM program and aimed to increase the scope of maternity care in the country. Specifically, the first phase of the RCH program added further maternal interventions including treatments for sexually transmitted infection, access to safe abortion, and referral transport (Vora et al., 2009).

In 2005, the second phase of India's RCH Program was launched and placed under the National Rural Mission (NRM), India's flagship program to reduce maternal mortality (Subha & Khanna, 2012; Vora et al., 2009). The goal of the NRM was to improve the health status of the people and further reduce maternal mortality in the country by

increasing accessibility to skilled birth attendants and essential obstetric services (Subha & Khanna, 2012; Vora et al., 2009). Specifically, two noteworthy components of India's NRM program were the: 1) Accredited Social Health Activist Initiative; and 2) Janani Suraksha Yojana (Boateng & Rajan, 2011).

A cornerstone of the NRM was the implementation of accredited social activists (ASHA) who serve as a bridge between rural and vulnerable populations and India's health sector (Fathima et al., 2015; Saprii et al., 2015). With respect to maternal health, the primary responsibilities of ASHAs are three-fold: 1) to increase the uptake of antenatal care counseling, 2) to educate women on the importance of skilled birth attendants and institutional delivery, 3) and to monitor a woman's postnatal health (Santhya et al., 2011). The Indian government also launched the second initiative, under the NRM umbrella, the Janani Suraksha Yojana (JSY) initiative, a conditional cash incentive program targeted towards low socioeconomic women to give birth at a medically facilitated health facility (Rai, 2015; Santhya et al., 2011). This cash incentive scheme has been implemented nationwide but with a focus towards states with low institutional delivery rates (Rai, 2015; Santhya et al., 2011). As of October 2006, different eligibility criteria were implemented regarding women from low and high performing states (Rai, 2015; Santhya et al., 2011). In the low performing states, Assam, Bihar, Chhattisgarh, Jammu and Kashmir, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttarakhand, and Uttar Pradesh, pregnant women, regardless of socioeconomic status, who deliver in an accredited health facility, are given Rs 1400 (US $ 20.00) for rural women and Rs 1000 (US $ 15.00) for urban women (Rai, 2015; Santhya et al., 2011). With respect to women from high performance states, a cash incentive is only offered to below poverty line

women (19 years or older) who are giving birth to their first or second child (Santhya et al., 2011). Moreover, ASHAs who refer women to access maternal healthcare services also receive a cash reimbursement of approximately Rs 600 (US $ 9.00) for rural referrals and Rs 200 (US $3.00) for urban referrals respectively (Santhya et al., 2011).

As of 2012, India's National Rural Mission has transformed to the National Health Mission (NHM). The NHM is now made up of the national rural mission and the newly launched National Urban Health Mission (Vellakkal et al., 2017); where, the latter is focused on improving the health of India's urban poor (Government of India, 2013; Vellakkal et al., 2017).

2.1.2 Pakistan

Geography and Population

Pakistan is the seventh most populous country in the world with a population of approximately 202 million (Central Intelligence Agency, 2016c). Pakistan has a total land coverage of 770 875 km^2 and is politically divided into four main provinces (Punjab, Baluchistan, Sindh, and Khyber Pakhtunkhwa), the Northern areas, and the Federally Administered Tribal Areas (FTA) (Berglee, 2012; Central Intelligence Agency, 2016c). The province of Punjab forms the core of the country and houses approximately 60% of the population (Berglee, 2012). Baluchistan covers a large portion of Southwest Pakistan and is the largest political unit in the country. Sindh province resides in the Southeast and holds the commercial capital of Pakistan, Karachi (Berglee, 2012). Khyber Pakhtunkhwa, also known as the North-West Frontier, extends from North Baluchistan into Northern areas of the disputed Kashmir region. Fundamentalist Islamic law is often practiced in this area; education and modernization is minimal in this region (Berglee, 2012).

The country's Northern Areas contain territories which were once part of the Kingdom of Kashmir and remain in dispute between India and Pakistan. The two main administrative units within this area are Gilgit-Baltistan and Azad Kashmir (Azad Jammu and Kashmir) (Berglee, 2012). Pakistan's Federally Administered Tribal Areas (FTA) typically operate independently of the government and contain clans and/or local leaders who form the sociopolitical infrastructure in the area (Berglee, 2012). See Figure 2 for a map of Pakistan.

In 2016, the estimated population growth rate in Pakistan was 1.45% and the total fertility rate was 2.68 births per woman. The life expectancy for males and females is estimated to be 66 and 70 years respectively. The maternal mortality ratio is 178 deaths / 100,000 live births (Central Intelligence Agency, 2016c). The current birth rate is estimated at 22.3 per 1000 persons. Currently, the median age for males and females is 23 years. Approximately 39% of Pakistanis live in urban areas, with an estimated annual urbanization rate of 2.81% (Central Intelligence Agency, 2016c)

The main religious group in Pakistan is Muslim, compromising roughly 96% of the population (Central Intelligence Agency, 2016c). The main ethnic groups in Pakistan are: Punjabi (45%), Pashtun (15%), Sindhi (14%), Sariaki (8%), Muhajirs (8%), Balochi (4%) with other small ethnic groups compromising roughly 6% of the total population. Punjabi is the most widely spoken language in Pakistan; however, English is the primary language for political and national communication (Central Intelligence Agency, 2016c).

Figure 2: Map of Pakistan

Source: Berglee, R. (2012). ***World Regional Geography: People, Places and Globalization*** **Retrieved from** http://2012books.lardbucket.org/books/regional-geography-of-the-world-globalization-people-and-places/index.html

Healthcare

Pakistan's healthcare system has seen substantial growth within the last decade (WHO, 2007a). The structure is like India's healthcare system and can be viewed within public, private, traditional, and non-profit lenses (WHO, 2007a)

Public healthcare in Pakistan is largely a provincial subject; however, the federal government plays an important role especially in the context of national program planning, support, and obtaining foreign assistance (Meghani et al., 2014). Pakistan's federal government involvement consists mainly of the involvement of the Ministry of Health (MoH) with the development of national health programs particularly focused on underserved populations (WHO, 2007a).

Pakistan's public health sector is largely underutilized (Nishtar, 2006; WHO, 2007a). Basic Health Units (BHUs) and Rural Health Centers (RHCs) make up the majority of the primary care settings (Nishtar, 2006). A BHU covers approximately 20,000 people per unit and is staffed by one medical officer, one lady health visitor (LHV) and one dispenser who only provides outpatient care (Hameed, 2008). In contrast, each RHC serves approximately 100,000 and offers inpatient and outpatient care. Each RHC is equipped with diagnostic equipment, 10-12 beds, and staffed with medical officers, nurses, lady health visitors, medical dispensers, and vaccinators (Hameed, 2008). Maternal Health and Child Welfare Centers (MHCWC) are also an essential part of Pakistan's public healthcare sector though they remain low in number (WHO, 2007a). Through BHUs, RHCs, and MHCWCs, Pakistan's integrated primary health network is expected to provide essential obstetric services to women in addition to maternal community outreach programs (WHO, 2007a). Secondary care centers are provided

through Tehsil Headquarter Hospitals (THH) and District Headquarter Hospitals (DHH), which serve approximately 100,000 to 300,000 and 1-2 million people respectively (WHO, 2007a). Together with teaching hospitals providing tertiary care, these centers are equipped with resources to manage advanced specialty care (Hameed, 2008; Nishtar, 2006).

Pakistan's various public health programs are funded by the federal government. Such programs focus on preventative health of the people and include: maternal and child health, tuberculosis control program, national AIDS control program, expanded program on immunization, malaria control project, and women's health project (Hameed, 2008; Nishtar, 2006).

The private sector in Pakistan is largely unregulated and fills many gaps of the public health sector (Shaikh, 2015). Similar to India, the lack of regulatory control in Pakistan's private sector has opened the door for medical practice among unqualified health professionals and increased financial burden among its citizens (Shaikh, 2015). Nonetheless, the dominance of Pakistan's private sector is demonstrated by the fact that it provides 70% of the healthcare in the country (Nishtar, 2006)

Pakistan's traditional medical services are largely utilized in rural areas where access to public and private services are scarce (Hameed, 2008). Three major divisions of traditional therapies include: The Islami Tibb (Greco-Arab), homeopathy, and Ayurveda (Hameed, 2008). Further research is needed to explore methods to utilize this traditional channel in order to deliver essential medical services to rural populations within the country (Nishtar, 2006).

Pakistan's non-governmental organizational (NGO) presence is relatively small within the country's health sector. NGOs are clustered within urban centers and predominately focused on health service delivery to vulnerable populations such as those with HIV/AIDS, victims of rape or drug abuse, and refugees. The NGO sector in Pakistan is faced with many limitations; they are resource constrained, inadequately regulated, and have limited sustainability (Nishtar, 2006).

Maternal Health

To meet the MDG target, Pakistan's MMR had to be reduced from 178 deaths per 100,000 live births in 1990 to approximately 130 deaths per 100,000 live births by 2015. Since 1990, Pakistan's MMR has declined from approximately 521 deaths per 100,000 live births to 178 deaths per 100,000 live births in 2015, thus making substantial progress but failing to meet the MDG-5 target for 2015 (Central Intelligence Agency, 2016c; Rizvi et al., 2015).

In 1992, the federal government launched the national Lady Health Worker (LHWs) program; a large initiative with the primary goal to provide comprehensive primary care coverage to vulnerable populations in Pakistan (Golding et al., 2011). In this program, LHWs, with approximately eight years of education are trained for six months to provide culturally sensitive primary, preventative, referral and educational services related to maternal health (Jalal, 2011). LHWs operate from their own homes and service roughly 1000 individuals in their own community (Jalal, 2011). Presently, over 100,000 LHWs have been employed covering approximately 90 million citizens in the country (Golding et al., 2011; Wazir et al., 2013). From 2005 to 2012, Pakistan's National Maternal and Child Health Program was implemented. With the overarching goal to accelerate

reductions in maternal and child mortality in the country, the aim of this program was twofold: 1) to improve the quality and coverage of maternal neonatal and child health (MNCH) services; and 2) to elicit tangible behavioral modifications that encourage greater demand and utilization of MNCH services in the country (Golding et al., 2011; Technical Resource Facility, 2013).

2.1.3 Bangladesh

Geography and Population

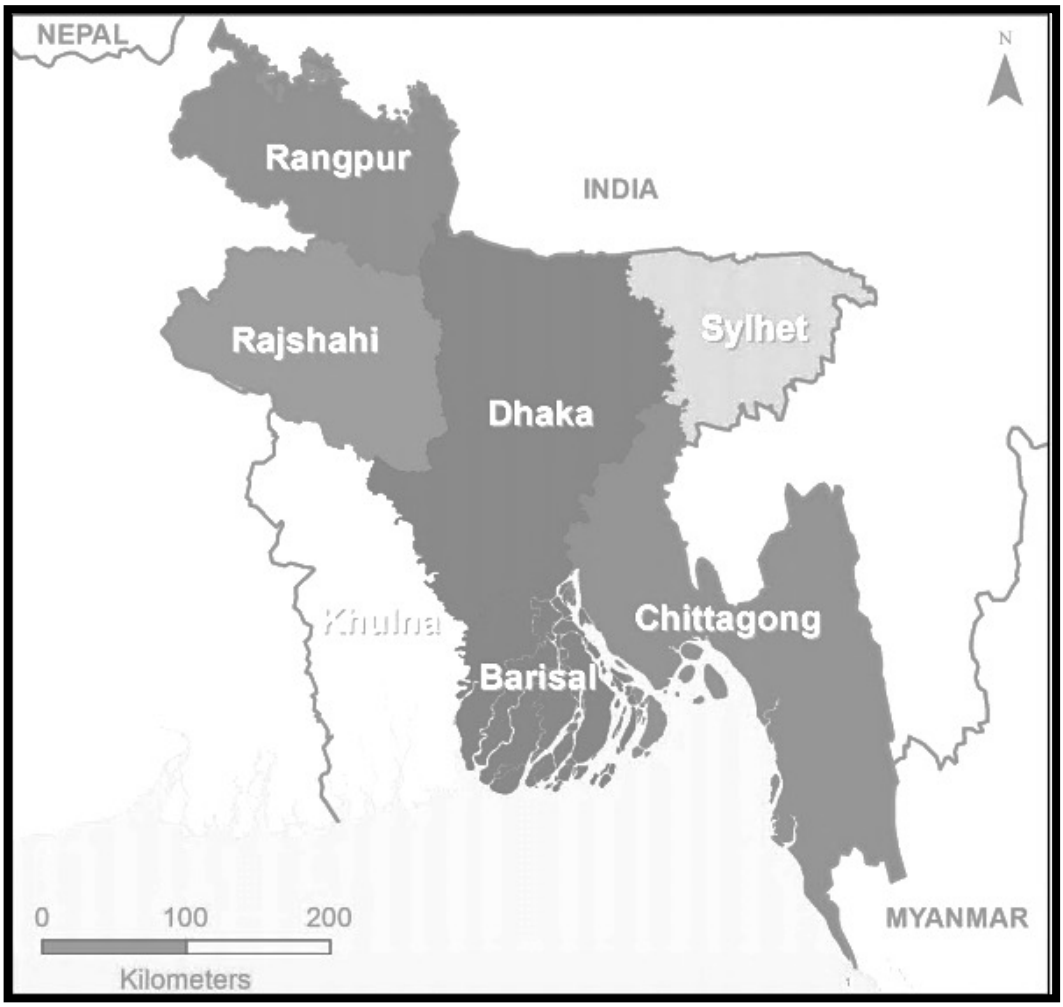
Bangladesh is the world's ninth most populous country and 95th largest by area (Central Intelligence Agency, 2016a). It has a total land coverage of 130,170 km^2 and is divided into seven major administrative divisions: Barisal, Chittagong, Dhaka, Khulna, Rajshahi, Rangpur, and Sylhet division (NIPORT et al., 2016). Each division is further organized in a hierarchal fashion composed of districts, upazilas and unions, and other community level units (WHO, 2015). See Figure 3 for a map of Bangladesh.

In 2016, the estimated population growth rate was 1.05% and the total fertility rate was 2.19 births per woman. The life expectancy for males and females is estimated to be 71 and 75 years respectively. The maternal mortality rate is 176 deaths / 100,000 live births (Central Intelligence Agency, 2016a). The current birth rate is estimated at 19 births per 1000 population. Approximately 34% of Bangladeshis live in urban areas, with an estimated urbanization rate of 3.55% (Central Intelligence Agency, 2016a).

Many languages are spoken in Bangladesh; Bengali is the official language of the government and English is typically used within the middle and upper-class and within higher education (Berglee, 2012). The main ethnic group is Bengalis compromising 98%

of the total population. Approximately 89% of the population is Muslim, followed by Hindus (9%) and Christians/Buddhists (1%) of the population (Berglee, 2012; Central Intelligence Agency, 2016a).

Figure 3: Map of Bangladesh



Source: NIPORT, Mitra and Associates, & ICF International. (2016). *Bangladesh Demographic and Health Survey 2014*. Dhaka,Bangladesh and Rockville, Maryland, USA: NIPORT, Mitra and Associates, and ICF International.

Healthcare

Healthcare in Bangladesh involves multiple players contributing to its structure and organization: public, private, and non-governmental organization (NGO) and donor agencies (WHO, 2015).

Bangladesh's public sector is highly centralized and is responsible for not only providing comprehensive healthcare services but also, through the Ministry of Health and Family Welfare (MoHFW), responsible for providing policy and regulation. Through the MoHFW and its various directorates, Bangladesh's public health system is organized and provides comprehensive promotive, preventative and curative services through all levels of service delivery (WHO, 2015).

At the core of the country's public health sector are community clinics. With the capacity to service approximately 6000 citizens, each community clinic is capable of providing a variety of family planning, preventative and limited curative services to the population; these clinics are on average only 30 minutes walking distance to proximal populations (WHO, 2015). Community clinics have upward referral networks to union sub-centers, Union Health and Family Welfare Centers, Mother and Child Welfare Centers (MCWC) which are all limited to outpatient services and emergency obstetric care, and to hospitals at both the union and upazila level which provide more extensive services (WHO, 2015).

At the district level exists district MCWCs and district hospitals which provide maternal and child services as well as a variety of primary, secondary, and specialized care for leprosy and other communicable diseases (WHO, 2015). Outside the district level exist

national medical college hospitals which provide more advanced specialty care (Bergeson-Lockwood et al., 2010; WHO, 2015).

Private healthcare in Bangladesh consists of both formal and informal health sectors. The country's formal health sector is mainly concentrated within urban areas and consists of qualified health professionals of both western and traditional medicine. In contrast, the country's private informal sector is primarily concentrated within rural areas and consists of unqualified providers of western, homeopathic, and traditional medicine (WHO, 2015). Within the past decade, Bangladesh's private healthcare sector has seen significant growth compared to the country's public sector. In 2013, it was estimated that approximately 62% of the country's medical doctors work within the private sector (WHO, 2015)

Bangladesh has one of the largest NGO presences in the world with over 4000 NGOs working in the population, health, and nutrition sector alone (WHO, 2015). NGOs in the country have been primarily active in areas related to preventative services and health promotion especially with areas related to family planning and maternal and child health (WHO, 2015). As a product of funding from various donor agencies, the role the role of NGOs in is continually growing in Bangladesh (WHO, 2015). The main donor agencies in Bangladesh include the governments of Canada, United States, and United Kingdom (Vaughan et al.; WHO, 2015).

Maternal Health

To meet the MDG target, Bangladesh's MMR had to be reduced from 574 deaths per 100,000 live births in 1990 to approximately 143 deaths per 100,000 live births by 2015. Since 1990, Bangladesh's MMR has declined from approximately 574 deaths per 100,000 live births to 176 deaths per 100,000 live births in 2015, thus making significant progress but failing to meet the MDG-5 target for 2015 (Central Intelligence Agency, 2016a; NIPORT et al., 2012).

Through Bangladesh's various safe motherhood initiatives, the country has seen large tangible increases in institutional deliveries and skilled birth attendant use (NIPORT et al., 2012). From 2001, three main safe motherhood interventions were introduced that had a considerable impact on MHU uptake in the country: 1) strengthening service provision of emergency obstetric care and Bangladesh's Initiative for Accelerating Progress Towards Maternal and Neonatal Mortality and Morbidity 2) Bangladesh's Demand-side Voucher Scheme; and 3) Bangladesh Community Skilled Birth Attendant Program (NIPORT et al., 2012).

In 1994, Bangladesh's MoHFW began the process of upgrading government health facilities to strengthen emergency obstetric care services within district hospitals, union health complexes, and MCWCs in the country (NIPORT et al., 2012). To date, though progress has been made, more work needs to be done; a study by Anwar and colleagues (2009) showed that the actual density of upgraded emergency obstetric care facilities remains low in parts of the country (Anwar et al., 2009). Furthermore, in collaboration with the United Nations, the country also launched the Initiative for Accelerating Progress Towards Maternal and Neonatal Mortality and Morbidity (MNHI) in 2007 with

the overarching goal to reduce maternal and neonatal mortality with a special focus on reducing population disparities in order to reach the MDG-5 target (NIPORT et al., 2012).

Implemented by Bangladesh's MoHFW in 2006, Bangladesh's Maternal Voucher Scheme had the overall arching goal to increase MHU within poor and vulnerable populations in the country (NIPORT et al., 2012). This scheme adopted two streams for implementation. The universal stream was adopted within the poorest upazilas where all pregnant women (with parity of one or two) were offered vouchers. The targeted stream was implemented in the rest of the upazilas where a means-testing program was used to identify eligible women (NIPORT et al., 2012).These vouchers cover three antenatal care visits, delivery assistance by skilled birth attendants, management of obstetric complications, and postnatal care within six weeks of delivery (NIPORT et al., 2012).

In 2002, the country implemented the skilled birth attendant program with the goal to increase antenatal care and skilled birth attendant uptake among women who have home deliveries. Within this program, existing Family Welfare Assistants and Female Health Assistants are trained in midwifery skills to provide home-based obstetric care in addition to their original roles (NIPORT et al., 2012). Outside the healthcare sector, the country has also seen rises in female schooling, women's empowerment, and strengthening of transportation networks within the country; all these factors have also supported declines in maternal and neonatal mortality in the country (Ministry of Health and Family Welfare et al., 2015).

2.2 Maternal Healthcare Utilization

Maternal healthcare utilization (MHU) among women can be defined as any obstetric services acquired during pregnancy. As suggested by the WHO, appropriate MHU for women includes: 1) the receipt of at least four antenatal care visits; 2) the use of a skilled birth attendant during delivery; and 3) having an institutional delivery (WHO, 2004; WHO, 2007b).

2.2.1 Antenatal Care Visits

Antenatal care (ANC) can be defined as the, "routine health control of presumed healthy pregnant women without symptoms (screening), in order to diagnose diseases or complicating obstetric conditions without symptoms, and to provide information about lifestyle, pregnancy and delivery" (Backe et al., 2014). Available research reports an association between appropriate ANC and positive maternal health outcomes; whereby, the receipt of at least four ANC visits has been shown to reduce adverse pregnancy outcomes and neonatal mortality (Asundep et al., 2014; Mohamed Shaker El-Sayed Azzaz et al., 2016).

2.2.2 Skilled Birth Attendant Use

As defined by the WHO, a skilled birth attendant (SBA) is "an accredited health professional – such as a midwife, doctor, or nurse – who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral for complications in women and newborns" (WHO, 2004, p. 1). Various studies have shown a reduction in maternal mortality in countries where the proportion of

deliveries assisted by a SBA has increased (de Bernis et al., 2003; Pathmanathan et al., 2004; Van Lerberghe & De Brouwere, 2000).

2.2.3 Institutional Delivery

Institutional deliveries generally refer to deliveries conducted in formal health facilities (Hagos et al., 2014). It is estimated that roughly 80% of all maternal deaths can be attributed to obstetric complications related to: sepsis, hemorrhage, eclampsia, and obstructed labor (de Bernis et al., 2003). Therefore, the gravity placed on institutional deliveries is rooted in the logic that medical facilities provide women better access to necessary medical interventions, equipment, and additional skilled health providers if obstetric complications occur (Okeke & Chari, 2014).

2.3 Inequity and Maternal Healthcare Utilization

Inequity can be defined as the presence of "avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically " (WHO, n.d).

As proposed by the WHO's conceptual framework of health inequity, the main social determinants of health inequity can be divided into three essential segments: socioeconomic and political context, structural determinants, and transitionary determinants (Solar & Irwin, 2007).

Socioeconomic and political context encompasses political, cultural, and societal values that cannot directly be measured at the 'individual level' within a population (Sanneving et al., 2013; Solar & Irwin, 2007). Structural determinants refer to any mechanisms that create social stratification among individuals (Sanneving et al., 2013; Solar & Irwin,

2007). Important structural determinants of health inequity include income, education, social class, and gender. This framework posits that various structural determinants within society ultimately result in the social stratification or uneven social positions among individuals, which, through various transitionary factors including one's physical environment, psychosocial or lifestyle factors, can ultimately result in inequity and negative health consequences among certain individuals (Sanneving et al., 2013).

With respect to MHU, economic status continues to be an important structural determinant of health inequity and has traditionally been used as the indicator of choice when examining inequity in maternal healthcare utilization research (Anwar et al., 2015; Kamal et al., 2016; Pulok et al., 2016). For the primary objective of thesis, economic status is used to measure equity with respect of maternal healthcare utilization.

Traditionally, household income has been the economic indicator of choice when assessing equity; however, this metric is usually very difficult to measure for many reasons: respondents may not know their exact income, respondents may hide their income from interviewers, income across household members may not be shared equally, respondents may have many sources of income, and income may vary across time periods. Invariably, obtaining such information is resource intensive. In the context of the Demographic Health Survey (DHS), detailed information on income is not collected as this would prevent information on other important subjects from being collected (Rutstein & Johnson, 2004).

Within the DHS, economic status is approximated using a wealth index constructed from households' cumulative living standards within each country-specific survey. This

approximation has many advantages. First, it represents a more stable state and requires far less interview questions compared to income (Rutstein & Johnson, 2004). For more information on how country-specific wealth indices are constructed see Section 3.3.2.

2.4 Islam

The term *'Islam'* is derived from Arabic roots, which in a religious context, means 'submission' or 'peace' (Sivers et al., n.d). The history of Islam can be traced back to ancient Arabia; where Islamic doctrines were first recorded by Prophet Mohammed in the seventh century. The two major branches of Islam are Sunni and Shia (Blanchard, 2005).

Muslims are instructed by both the Quran and Hadith (Koenig, 2014). The Quran is the main doctrine in Islam that represents the word of God, revealed to Prophet Mohammed by the Angel Gabriel (Nasr, 2010). The Hadith is a record of the traditions and beliefs of Prophet Mohammed and is considered a major source for Islamic authority and moral aptitude (Cragg, 2016). Together, the Quran and Hadith are the main underlying forces driving Islamic belief and tradition.

Islam is the fastest growing religion in the world, with an estimated population of 1.8 billion people worldwide (Lipka & Hackett, 2017). More than 60% of the global Muslim population reside in Asia and roughly 20% in the Middle East (Pew Research Forum, 2009). While the bulk of the Muslim populations originate from Asia, the highest percentage of Muslim majority countries are in the Middle East-North Africa region (Pew Research Forum, 2009)

Globally, Muslims have the highest fertility rate with an average parity of 3.1 children per mother. Thus, it is expected that the number of Muslims globally will approach 2.8 billion people by 2050 (Pew Research Forum, 2015)

2.5 Maternal Healthcare Utilization and Islam

2.5.1 Search Strategy

Comprehensive searches were conducted within PubMed (Medline-Ovid) and Google Scholar. Citations from captured citations were also used to find relevant articles. A total of three concepts were identified of which relevant MeSH headings and keywords were created for each concept. Searches for relevant studies for the primary and secondary objective were conducted concurrently.

For this study's primary objective, a trial search of "MHU and Islam and Equity" using relevant MeSH headings and keywords was initially conducted; however, after running the search, a number of studies captured were irrelevant and severely restricted in number. Due to the lack of studies examining equity in MHU within Muslim populations, the decision was made to expand the search strategy to only 'MHU and Islam' using all relevant MeSH headings and keywords to allow for a greater number of captured studies. For the study's secondary objective, a search that considered "MHU, India, and Bangladesh" using all relevant MeSH headings and keywords were conducted.

No restrictions on language or study setting were initially made on all searches. All citations were imported into Covidence systematic review software and screened for relevance according to the pre-specified inclusion criteria (Veritas Health Innovation, 2016). Google Scholar was searched for citations not identified in PubMed (Medline-

Ovid). All articles underwent title and abstract screening to identify their potential relevance. Full text screening was used to establish final eligibility into this review. The search strategy is summarized in Table 1 and Table 2.

2.5.2 Inclusion criteria

The inclusion criteria for this study's primary and secondary literature review is described below and a summary can be found in Table 1.

Primary Objective

Due to the scarcity of studies examining equity in MHU within Muslim populations, a few considerations were made. First, to offer the full breadth of knowledge within this area, all qualitative studies examining MHU within Muslim or Muslim majority populations, irrespective of study setting, were considered for this review. The vast contextual variation across studies provided unique insights into the various beliefs, attitudes, and lived experiences that are associated with MHU among various Muslim populations. The summarized qualitative literature was simply used to underscore the diversity and variability of MHU within Islam. For a review of qualitative studies examining MHU within Muslim or Muslim Majority populations see Section 2.5.3.

Empirical quantitative studies examining MHU within Muslim populations were few. Only two studies were identified that explicitly examined MHU within Muslim populations (Mukherjee & Chandra, 2014; Rai, 2015). One study was conducted within India (Mukherjee & Chandra, 2014) and the other compared MHU among Muslim women from India, Pakistan, and Bangladesh (Rai, 2015). To broaden the scope of included studies, I also considered MHU within Islamic majority countries. Given the primary geographical focus of this study was within South Asia, I limited this review to

studies examining MHU within Islamic majority populations in South Asia. The only two Islamic majority countries in South Asia are Pakistan and Afghanistan. For a review of quantitative studies examining MHU within Muslim or Islamic majority nations see Section 2.5.4.

Secondary Objective

Studies examining differences in MHU between Muslims and Non-Muslims were vast and varied in location; most studies captured within the initial search were conducted in Ghana, Ethiopia, Nigeria, India, and Bangladesh. To maintain consistency with this study's secondary objective, only studies reporting religious differences in MHU between Muslim and Non-Muslims in India and Bangladesh were considered for this review. For a review of quantitative studies reporting religious differences in MHU between Muslim and Non-Muslim see Section 2.6.

Table 1: Search strategy and inclusion criteria

Concept	MeSH Heading	Keywords
Maternal Health Utilization (MHU)	exp Maternal Health Services/ OR exp Prenatal Care/ OR exp Postnatal Care/	See below
Islam	exp Islam/	See below
India and Bangladesh	exp India/ exp Bangladesh/	-
Inclusion Criteria (Primary Objective)		
1. **Population:** Muslim or Muslim majority 2. **Outcome:** Investigated at least one MHU outcome 3. **Study Setting (Qualitative):** No setting restriction 4. **Study Setting (Quantitative):** India, Pakistan or Afghanistan, and Bangladesh		
Inclusion Criteria (Secondary Objective)		
1. **Population:** General Population 2. **Outcome:** Investigated at least one MHU outcome 3. **Comparison:** Investigated religious differences as an independent variable AND considered Islam as a comparison 4. **Study Setting:** India or Bangladesh		
Search Strategy Overview		
Primary Objective: MHU & Islam[1] Secondary Objective: MHU & Religion[1]		

[1] Within PubMed (Medline-Ovid), each concept was searched using the respective MeSH Headings and keyword terms.

Table 2: Keywords used for search strategy

MHU Keywords

ANC visit OR
ANC visit* OR
antenatal care OR
antenatal care OR
antenatal care utilization OR
antenatal care utilization OR
antenatal care visit OR
antenatal care visit OR
antenatal care visit* OR
antenatal care visit* OR
care during pregnancy OR
care during pregnancy OR
community health services OR
community health services OR
delivery care OR
delivery care OR
delivery of health care OR
delivery of health care OR
facility based deliver* OR
facility based deliver$ OR
facility deliver* OR
facility deliver$ OR
family birth OR
family birth OR
health care utilization OR
health care utilization OR
health facilit* OR
health facilit$ OR
health services OR
health services OR
health services utilization OR
health services utilization OR
home birth* OR
home birth$ OR
Home Childbirth OR
Home Childbirth* OR
home deliveries OR
home deliveries OR
home delivery OR
home delivery OR
homebirth* OR
homebirth$ OR
institutional deliver* OR
institutional deliver* OR
institutional deliver$ OR
institutional deliver$ OR
lay midwifery OR
lay midwifery OR
maternal care OR
maternal care OR
maternal health OR
maternal health OR
maternal health service OR
maternal health service* OR
maternal health utilization OR
maternal health utilization OR
maternal welfare OR
maternal welfare OR
maternity care OR
maternity care OR
medically facilitated delivery OR
medically facilitated delivery OR
midwifery OR
midwifery OR
obstetric care OR
obstetric care OR
prenatal care OR
prenatal care OR
reproductive health service OR
reproductive health service* OR
reproductive health-care deliver OR
reproductive health-care deliver* OR
reproductive health-care utilization OR
reproductive health-care utilization OR
skilled attendance OR
skilled attendance OR
skilled birth attendance OR
skilled birth attendance OR
skilled birth attendant OR
skilled birth attendant OR
traditional birth attendant OR
traditional birth attendant* OR
traditional family birth attendant OR
traditional family birth attendant OR
traditional family birth attendants OR
traditional family birth attendants OR
traditional home birth OR
traditional home birth OR
traditional midwife OR
traditional midwife OR
traditional midwifery OR
traditional midwifery OR
traditional midwives OR
traditional midwives OR
women* health service OR
women* health service

Islam Keywords

Islam OR Muslim* OR Mohammedan

2.5.3 Qualitative Literature

This section reviews qualitative literature examining MHU within Muslim populations or Muslim majority populations. In total, six qualitative studies were captured (Ali & Burchett, 2004; Ganle, 2015; Mumtaz et al., 2014; Reitmanova & Gustafson, 2008; Sarker et al., 2016; Titaley et al., 2010b). Overall, there was noticeable geographical variation across included studies, as study settings included Bangladesh, Canada, Ghana, Indonesia, Pakistan, and United Kingdom. Studies conducted in Canada, Ghana, Pakistan, and United Kingdom examined MHU within Muslim samples, and studies conducted in Bangladesh and Indonesia examined MHU within Muslim majority samples. Due to the considerable variation observed in study settings, the findings from these studies are contextually specific and are not intended to be generalizable to other Muslim populations.

Reitmanova and Gustafson (2008) examined maternity care needs and barriers among Muslim immigrants in St. Johns, Newfoundland. The study sample was quite small and consisted of six Muslim mothers who delivered at least one of their children in St. John's Newfoundland between the years 1995 and 2005. All respondents had strong preferences for female healthcare providers and expressed discomfort with the overall lack of privacy within the health facility. Major barriers to MHU included lack of knowledge and cultural insensitivity towards religious and cultural differences by healthcare providers within the facility (Reitmanova & Gustafson, 2008).

These barriers are consistent with other studies examining barriers to MHU among Muslim mothers in England. Ali and Helen (2004) investigated the maternity care

experiences within 33 Muslim mothers in England. Sampled respondents expressed strong gender preferences for female doctors and often experienced discomfort due to lack of privacy, and displeasure towards the lack of proper accommodation for Islamic dietary needs, culturally insensitive care and discrimination received by healthcare providers (Ali & Burchett, 2004).

Similarly, Ganle (2015) examined barriers to institutional delivery and skilled birth attendance among Muslim mothers in Ghana (Ganle, 2015). The populace was selected from three communities in the Central Gonja District, a Northern region in the country. The three communities were purposively sampled to represent urban areas with access to health facilities, rural communities with access to health facilities, and rural communities without access to health facilities (Ganle, 2015). All mothers sampled were Muslim, and the majority were uneducated, married, and delivered at home during their last pregnancy (Ganle, 2015). Consistent with other studies from Canada and England, preferences for female healthcare providers, lack of awareness towards Islamic needs, and healthcare provider insensitivity were identified as barriers towards MHU.

Furthermore, the study authors noted that the Central Gonja is highly patriarchal; whereby, decreased decision-making autonomy prevented mothers from seeking skilled birth attendance (Ganle, 2015). However, given the complex interplay of both religious and other contextual effects such as the relatively low levels of female education and high economic marginalization within this study's setting, it is difficult to conclude whether these patriarchal characteristics are inherent in Islam or due to other factors (Barrett, 2008; McQuillan, 2004).

Barrett (2008) suggested that there can be no clear distinction when attempting to delineate whether certain beliefs are attributable to religion or other influences. Rather, one may conceptualize religion, including Islam, as a collective influence that encompasses both religious influences and other cultural effects that may be thought as religious despite having no support from religious doctrine (Barrett, 2008).

In Bangladesh, for example, Sarker and colleagues (2016) conducted a qualitative study examining perceived barriers toward institutional delivery and skilled birth attendance in the Sunamganj district, a remote area of Bangladesh where approximately 87% of the population are Muslims. The authors noted that village doctors often believed that institutional delivery violated an Islamic obligation towards Purdah, a predominantly South Asian social practice of seclusion and veiling of mothers (Chowdhury, 1954; Sarker et al., 2016). Yet, similar studies conducted in Muslim areas in Indonesia and Ghana did not find Purdah to be a barrier to skilled birth attendance and institutional delivery (Ganle, 2015; Titaley et al., 2010a). Though it could be that the authors did not explore religious themes in that regard, such contrasting themes also highlight the possibility of deeply-rooted, regional specific cultural practices that have later adopted religious significance (Hermansyah, 2014; The Editors of Encyclopaedia Britannica, 2014).

Apart from certain regional specific practices that have later adopted significance within Islam, other cultural beliefs may be independent of religion and be shared among all members within a community (Hermansyah, 2014; Walton & Brown, 2012). Sarker and colleagues (2016) noted local traditional values were also important barriers to skilled birth attendance and institutional delivery. Within this study setting, home deliveries

were considered traditional and were expected to be upheld. Traditional birth attendants were often trusted as competent caregivers due to their perceived ‘experience’ and knowledge of proper obstetric services.

For example, Titaley et al. 2015 conducted a qualitative study to examine barriers towards skilled birth attendance and institutional delivery within the Muslim majority West Java Province in Indonesia (Crouch, 2013). Similar to barriers reported by Sarker et al. 2016, Titaley et al. 2015 noted that traditional birth attendants were thought of as experienced and knowledgeable healthcare providers. The shared attitudes expressed by mothers from within these two studies are likely a product of residing in remote areas of poverty and low education where accessibility to proper maternity services are often diminished (Sarker et al., 2016; Titaley et al., 2010b).

In Pakistan, for example, social class and caste based hierarchies have profound influences on MHU among mothers despite going against the Islamic ideal of social equality (Chowdhury, 1954; Mumtaz et al., 2014). Mumtaz and colleagues (2014) conducted a 10-month qualitative study examining MHU in one village in rural Punjab. Thematic coding revealed that MHU among these mothers was heavily dependent on village hierarchy; lower castes faced isolation, social inferiority, and stigma often leading to poorer access to maternity care. Field observations noted differentially poor treatment of low caste mothers with respect to governmental health services. In contrast to higher caste members, low caste mothers were observed to have longer wait times, be ignored by health professionals and be sent home without receiving care. This, in conjunction with significant economic disadvantages, had ultimately led to the systematic

marginalization of these mothers towards receiving appropriate maternity care (Mumtaz et al., 2014)

The available qualitative literature examining barriers towards MHU among Muslim populations remains limited. Overall, the findings from undeveloped settings in Bangladesh, Ghana, Indonesia, and Pakistan highlight the impact of regional culture, societal hierarchy, and socioeconomic conditions that may impede MHU among Muslim populations. In contrast, studies conducted in Canada and England also highlight the consequences of health systems not designed to accommodate the needs of Muslim populations. Ultimately, the findings from this qualitative review highlights variation in MHU among Muslim populations and underscores the importance of socio-economic context when examining MHU within Islam.

2.5.4 Quantitative Literature

This section examines quantitative literature examining MHU within Muslim or Muslim majority populations. A detailed literature search identified four empirical studies. One study directly measured MHU within Muslim mothers in India (Mukherjee & Chandra, 2014), two empirical studies examined MHU within the general Islamic population in Pakistan and Afghanistan (Budhwani et al., 2015; Tappis et al., 2016), and one study provided a comparative analysis of MHU among Muslim populations in India, Pakistan, and Bangladesh (Rai, 2015). There were no studies that specifically examined equity in MHU as a primary focus. Rather inequities were indirectly captured though multivariate logistic regression using wealth as a control variable.

Mukherjee and Chandra (2014) utilized the 2005-06 Indian National Family and Health Survey – 3rd Edition (NFHS-3) to examine full ANC coverage, SBA use, and postnatal care among Muslim mothers who experienced child birth between the ages of 15 and 24 years. Full ANC coverage was defined as receiving a minimum of three ANC visits, two tetanus toxoid injections, and one hundred folic acid/iron tablets. Lastly, postnatal care was defined as having a minimum of one medical checkup within 42 days of delivery.

Descriptive statistics revealed that full ANC coverage, SBA use, and receipt of postnatal care was low within this population; only 12.5%, 38.6, %, and 11.6% of Muslims accessed these services respectively. Furthermore, the results of the multivariate logistic regression revealed significant inequities in MHU; mothers of higher wealth quintiles had a significantly higher odds of full ANC coverage, SBA use, and postnatal care. Higher autonomy and education, older age, lower parity, and having wanted their child was also significantly associated with MHU (Mukherjee & Chandra, 2014).

To my knowledge, this is the only study that examined MHU among Muslim mothers in India. The study was limited to young Muslim mothers between the ages of 15 and 24; thus, limiting the generalizability of the results to all Muslim mothers in India. This study would have been stronger if it utilized a stronger conceptual framework such as Anderson's Behavioural Model for Health Services Utilization because it recognizes the influence of contextual factors on MHU (e.g. underlying determinants of health policy, attributes related to health infrastructure within an area, or community characteristics such as community education and wealth) (Andersen et al., 2007).

Budhwani et al. 2015 utilized the 2012-13 Pakistan Demographic Health Survey (PDHS) to examine community and individual correlates of ANC in the first trimester, at least four ANC visits, SBA use, institutional delivery, and immediate postnatal care in Pakistan. Multivariate logistic regression revealed significant inequities; similar to the results above for India, mothers of higher wealth quintiles had higher odds to utilize all five outcomes. Perceived distance to nearest health facility was associated with lower odds of postnatal care. Mothers from rural areas had significantly lower odds of ANC in the first trimester and receipt of at least four ANC visits compared to individuals living in urban areas; no significant difference was found between rural and urban mothers for SBA use, institutional delivery, and postnatal care (Budhwani et al., 2015).

Mothers of older age had higher odds for SBA use, institutional delivery, and receiving postnatal care; age was not found to be a significant predictor of receiving ANC in the first trimester or receipt of at least four ANC visits. Higher birth order was also significantly associated with receipt of less ANC in the first trimester, at least four ANC visits, SBA use, institutional delivery, and postnatal care. Lastly, region was also found to be significantly associated with all five outcomes; though, significant variability was found across regions with regards to the five outcomes (Budhwani et al., 2015).

Many significant associations were also found between community correlates and MHU. In Budhwani et al. 2015, a community was defined as respondents living in the same district. Mothers from districts with higher percentages of individuals receiving any ANC within the preceding five years had significantly higher odds of ANC and four ANC visits. Lastly, district education, defined as the proportion of mothers with a secondary or higher education within an administratively defined district, was also found to be a

significant determinant of institutional delivery. District level poverty, defined as the proportion of mothers who fell in the lowest quintile of wealth status within a district, was not significantly associated with any of the five outcomes. In contrast, household wealth index was significantly associated with the five outcomes (Budhwani et al., 2015).

A major weakness of this study was that it lacked further consideration of other important individual correlates of MHU. Unlike the study conducted by Mukherjee and Chandra (2014), important correlates such as media exposure (e.g. frequency of watching television, reading the newspaper, and listening to the radio exposure) and autonomy were excluded from the analysis despite previous research that indicates their importance for MHU (Agha & Carton, 2011; Bayu et al., 2015; Bloom et al., 2001; Haque et al., 2012; Islam & Odland, 2011; Kc & Neupane, 2016; Tey & Lai, 2013; Thind et al., 2008; Yadav & Kesarwani, 2016). Though this study considered contextual influences, a sounder conceptual framework that considered all relevant individual correlates would have added more methodological rigor.

Tappis and colleagues (2016) examined correlates for SBA use in Afghanistan. Unlike previous studies utilizing DHS data to examine MHU, this study was conducted by linking baseline household data from a previous cluster-randomized study with facility data within nine provinces in the country. Univariate analysis revealed that only 25% of mothers received skilled birth assistance during delivery. Results from the multi-level logistic regression analysis revealed significant inequities; mothers from higher wealth quintiles had significantly higher odds of SBA use. Younger age, being literate, and prior ANC were also significant correlates of SBA use (Tappis et al., 2016).

A few limitations within this study can be noted. First, this study examined SBA use within only nine provinces in Afghanistan; thus, limiting the generalizability of this study's results to the entire country of 34 provinces. Second, only five individual correlates were considered within the multivariate model: age during last pregnancy, literacy, wealth, birth order, and previous antenatal care. Other correlates of MHU such as husband's education, media exposure, and autonomy, and urban/rural status were not included within the analysis. It is unclear whether the authors were limited by their available data or did not consider these variables in this regard as this was not included in their discussion of the limitations of their study.

Although not significant in the adjusted analysis, a strength of Tappis et al. 2016 was the consideration of availability of conditional cash transfer projects within a respondent's community within the multi-level model. The study also reported significant variation in SBA use at the facility catchment level; roughly 13% of the variation observed was due to unmeasured facility level characteristics. These results are consistent with the literature and does lend support to the importance of controlling for contextual factors when examining MHU (Ndao-Brumblay et al., 2012; Singh et al., 2013a).

Lastly, Rai (2015) utilized the NFHS-3, 2007 Bangladesh Demographic Health Survey (BDHS), and 2006-07 PDHS to examine receipt of at least four ANC visits, SBA use, and institutional deliveries among Muslim mothers from Bangladesh, Pakistan and India. Univariate analysis revealed only 20% Bangladesh Muslims, 31% Indian Muslims, and 29% Pakistan Muslims received four or more ANC visits during their last pregnancy; only 14% of Bangladesh Muslims had an institutional delivery as compared to 33% and

34% of Indian and Pakistan Muslims respectively; only 17% of Bangladesh Muslims used a SBA compared to the 39% of Muslims who used a SBA from India and Pakistan.

Separate logistic regression models for receipt of at least four ANC visits, SBA use, and institutional delivery were performed within India, Pakistan, Bangladesh, and within the pooled dataset (Rai, 2015). The results revealed that Muslim mothers of higher wealth quintiles had significantly higher odds of all three outcomes. Furthermore, mothers from India had significantly higher odds of four or more ANC visits and SBA use compared to mothers from Pakistan and Bangladesh and mothers from India had significantly higher odds of institutional delivery compared to Bangladeshi mothers. Birth order, age at birth, maternal and husband's education, and urban/rural status were other significant correlates of MHU among Muslim mothers in India, Pakistan, and Bangladesh (Rai, 2015).

A few limitations were noted in this study. First, the utilization of outdated PDHS data and BDHS data may be problematic. Though the Indian NFHS-3 remains not updated since 2005-06, the failure to utilize the latest PDHS and BDHS data may not be beneficial to policy makers who wish to establish the most updated picture of MHU among Muslim mothers in India, Pakistan, and Bangladesh. Second, from a conceptual standpoint, predictors such as media exposure, autonomy, and contextual characteristics were not controlled for within this analysis despite their growing recognition as important correlates of MHU (Agha & Carton, 2011; Babalola & Fatusi, 2009; Bayu et al., 2015; Bloom et al., 2001; Budhwani et al., 2015; Haque et al., 2012; Islam & Odland, 2011; Kc & Neupane, 2016; Mukherjee & Chandra, 2014; Stephenson & Elfstrom, 2012; Tey & Lai, 2013; Thind et al., 2008; Yadav & Kesarwani, 2016).

2.5.5 Conclusions and Knowledge Gap

Four quantitative studies were included in this review (Budhwani et al., 2015; Mukherjee & Chandra, 2014; Rai, 2015; Tappis et al., 2016), of which only one examined MHU among Muslim mothers from India, Pakistan, and Bangladesh. All included studies examined equity indirectly through the estimation of adjusted odd ratios for wealth index. However, this effect measure is not intuitive to understand and not easily interpretable for policy makers (they represent the change in *odds* for a given change in wealth quintile compared to a reference category). To better assess inequity in MHU, a methodological improvement would be to calculate the predicted probability of MHU for mothers in each wealth quintile, using marginal effects.

In summary, a detailed assessment of inequity in MHU among Muslim mothers in India, Pakistan, and Bangladesh is currently lacking. This thesis builds upon previous studies and addresses this novel gap by using newer DHS data, a more robust conceptual framework, and improved analytic methods. Ultimately, the results from this study will provide policy makers the most methodologically sound and comprehensive picture of MHU inequity using Islam as a common denominator in India, Pakistan, and Bangladesh.

2.6 MHU – Religious Differences in India and Bangladesh

Within India, Islam is the largest minority religion with an estimated population of 138 million (Sanneving et al., 2013). Currently, the literature has shown conflicting results with regards to MHU and belonging to the Muslim community. Some empirical examinations conducted in the country have suggested that Muslim mothers have a lower odds of MHU compared to Non-Muslims independent of caste, socioeconomic status,

and other factors (Hazarika, 2011; Singh et al., 2012c), while other studies have shown the opposite effect (Jat et al., 2011; Thind et al., 2008). In Bangladesh, Islam is the largest religion with approximately 89% citizens following the faith (Bashar et al., 2012). Interestingly, unlike studies conducted in India, a growing body of literature in Bangladesh has reported more pervasive religious differentials in MHU where Muslim mothers are consistently less likely to utilize maternity services that Non-Muslims (Anwar et al., 2004; Anwar et al., 2015; Bashar et al., 2012; Hossain & Hoque, 2015; Kabir, 2007; Kamal, 2012; Kamal et al., 2013; Kamal et al., 2015b) .

Within both countries, current theories suggest that the cultural adoption of Purdah within Muslim communities may inhibit a woman's autonomous capacity to seek maternal healthcare services (Hossen & Westhues, 2011; Navaneetham & Dharmalingam, 2002; Singh et al., 2012c). However, this is not entirely the case as studies in both Bangladesh and India have also shown Muslim and Non-Muslim differentials to persist despite accounting for autonomy (Hossain & Hoque, 2015; Kamal et al., 2013; Pallikadavath et al., 2004a; Pallikadavath et al., 2004b; Singh et al., 2012c; Thind et al., 2008; Yadav & Kesarwani, 2016). Navaneetham & Dharmalingam (2002) suggest gender preferences for female healthcare providers may also inhibit mothers from seeking antenatal care, skilled birth assistance, and institutional delivery; however, the lack of empirical evidence exploring this issue further limits the validity of such hypothesizes.

Overall, the dynamics of religious differentials in India and Bangladesh is complex and largely unexplored. For this section, I summarize available evidence examining religious differences in MHU between Muslims and Non-Muslims in India and Bangladesh. For clarity, studies are organized per country. I then highlight knowledge gaps and explain

this study's contribution to the body of literature. For a summary of included studies for this portion of the literature review see Appendix H.

2.6.1 India

Eight studies were identified examining religious differences in MHU between Muslim and Non-Muslim mothers in India. All studies utilized the Indian National Family and Health Survey. One study was nationally representative (Yadav & Kesarwani, 2016), two studies examined MHU within urban and rural India respectively (Singh et al., 2014; Singh et al., 2012c), two studies reported state differences in MHU between Muslims and Non-Muslims in Southern and Northern India respectively (Navaneetham & Dharmalingam, 2002; Pallikadavath et al., 2004b), two examined MHU within the Indian state of Madhya Pradesh (Jat et al., 2011; Pallikadavath et al., 2004a), and one study examining MHU in Maharashtra (Thind et al., 2008).

Yadav and Kesarwani (2016) examined both individual and community factors relating to full ANC, SBA use, and postnatal care within two weeks of delivery. Full antenatal care was defined as, "mothers who had a minimum of three ANC visits, received at least two tetanus toxoid injections during pregnancy or one tetanus toxoid injection during the pregnancy and at least one in the three years preceding the pregnancy, and received iron and folic acid tablets for 90 days or more." (Yadav & Kesarwani, 2016, p. 4). SBA use was defined as a delivery assisted by a skilled birth attendant at home or at a health facility. Postnatal care was defined as the receipt of at least healthcare checkup within two weeks of delivery. Multilevel logistic regression revealed that Muslim mothers had a 12% lower odds of SBA use compared to Hindu mothers (OR 0.88, 95% C.I: 0.78, 0.99). No significant differences were observed for ANC and postnatal care (Yadav &

Kesarwani, 2016). To my knowledge, this is one of the few nationally representative studies examining MHU within India. The authors' conceptual framework was robust, incorporating both relevant individual and community characteristics.

Singh and Colleagues (2014) utilized the 2007-08 Indian District Level Household Survey to examine individual factors relating to full ANC, SBA use, and postnatal care in urban India among adolescent mothers (13 to 19 years of age). SBA use was consistent with Yadav and Kesarwani (2016). Full antenatal care was defined as the receipt of at least three ANC visits, two tetanus toxoid injections, and iron and folic acids/tablets/syrup for at least 90 days during pregnancy. Postnatal care was defined as the receipt of at least one healthcare checkup within 42 days of delivery. Multivariate logistic regression analysis revealed that Muslims had significantly lower odds of full antenatal care (OR: 0.73, 95% CI: 0.57,0.93) and SBA use (OR: 0.76, 95% CI: 0.60,0.95) compared to Hindu mothers; however, the results also revealed that Muslims had significantly higher odds of postnatal care compared to Hindu mothers (OR: 1.55, 95% CI: 1.20, 2.0) (Singh et al., 2014).

A few limitations were noted within this study. First, the conceptual framework used was quite limited. Contextual characteristics and important predictors such as media exposure and autonomy were not controlled for within this analysis despite their growing recognition as important correlates of MHU (Agha & Carton, 2011; Babalola & Fatusi, 2009; Bayu et al., 2015; Bloom et al., 2001; Budhwani et al., 2015; Haque et al., 2012; Islam & Odland, 2011; Kc & Neupane, 2016; Mukherjee & Chandra, 2014; Stephenson & Elfstrom, 2012; Tey & Lai, 2013; Thind et al., 2008; Yadav & Kesarwani, 2016). Second, the authors limited their analysis to adolescent mothers within urban India (13 to

19 years of age), thus limiting the generalizability of the analysis to the whole Indian population.

Similarly, Singh and colleagues (2012) utilized the 2005-06 NFHS-3 to examine full antenatal care, SBA use, and postnatal care among adolescent mothers in rural India (15 to 19 years of age). The definition of full ANC and SBA use was consistent with Yadav and Kesarwani (2016). The definition of postnatal care was consistent with Singh et al. 2014. Multivariate logistic regression analysis revealed that Muslims had significantly lower odds of SBA use compared to Hindu mothers (OR: 0.65, 95% CI: 0.51, 0.83). There was no significant difference between Hindus and Muslims with respect to full ANC and postnatal care (Singh et al., 2012c). The authors limited their analysis to adolescent mothers in rural India, thus limiting the generalizability of conclusions. Moreover, the authors failed to control for important predictors such autonomy and contextual characteristics within the study.

In an older study, Pallikadavanth et al. 2004b utilized the 1998-99 of the National Family and Health Survey- 2nd Edition (NFHS-2) to examine ANC checkups among rural mothers across four Northern Indian states (Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh). Multivariate logistic regression analysis revealed no significant difference in the receipt of at least one ANC checkup among Muslim and Hindu mothers in Bihar, Rajasthan, and Uttar Pradesh; however, Muslim mothers had significantly higher odds of having an ANC checkup compared to Hindu mothers in Madhya Pradesh (OR=4.9, $p < 0.01$) (Pallikadavath et al., 2004b). The conceptual framework adopted by the authors was reasonably robust; however, contextual characteristics were not controlled for within their analysis.

In another study, Navaneethan and Dharmalingam (2002) utilized the 1992-93 Indian National Family Health Survey (NFHS) to examine ANC use, SBA use and institutional delivery preferences across four states in Southern India: Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu. Multivariate logistic regression analysis revealed no significant difference in receiving a minimum of four ANC visits among Muslim and Non-Muslim mothers for all four states respectively. Compared to Hindus, Muslims in Karnataka had significantly higher odds of SBA (OR: 1.46, SE: 0.24), while Muslim mothers in Kerala had significantly lower odds of SBA use (OR: 0.27, SE: 0.09). Lastly, Muslim mothers in Kerala had significantly lower odds of institutional delivery compared to Hindu mothers (OR 0.29, SE 0.08) (Navaneetham & Dharmalingam, 2002).

A few weaknesses were also noted within this study. First, the authors' theoretical rationale to control for religion was under the notion that Christians are more autonomous than Muslims. Such an assumption may be an oversimplification, as previous studies conducted in India have found significant religious differentials in MHU despite controlling for autonomy (Hossain & Hoque, 2015; Kamal et al., 2013; Pallikadavath et al., 2004a; Pallikadavath et al., 2004b; Singh et al., 2012c; Thind et al., 2008; Yadav & Kesarwani, 2016). A stronger conceptual framework that considered autonomy independent of religion and controlled for contextual factors would have provided more theoretical rigor (Singh et al., 2013a). Andersen's Behavioral Model for Health Services Utilization, the conceptual model used within this thesis, recognizes the influence of contextual factors on MHU.

Jat et al. 2011 utilized the 2007-08 Indian District Level Household and Facility Survey to conduct a multi-level study examining the receipt of any ANC during pregnancy, SBA

use, and the use of postnatal care within two weeks of delivery in the Indian state of Madhya Pradesh. Multilevel logistic regression analysis revealed that Muslim mothers had significantly higher odds of ANC (OR: 1.52, 95% CI: 1.16, 1.97) and SBA use (OR: 1.26, 95% CI: 1.01, 1.56) compared to Non-Muslim mothers; no significant difference was found for religion and postnatal care (Jat et al., 2011). The results from Jat et al. 2011 are consistent with another study examining ANC provision in rural Madhya Pradesh (Pallikadavath et al., 2004a).

Lastly, Thind and colleagues (2008) utilized the NFHS-2 to examine home delivery preference in Maharashtra. Multinomial logistic regression revealed that Muslim mothers had significantly lesser odds of home delivery compared to Hindu mothers (Thind et al., 2008). A weakness of this study was that it did not control for contextual characteristics, despite their growing recognition as important correlates of MHU (Achia & Mageto, 2015; Antai, 2009; Aremu et al., 2012; Babalola & Fatusi, 2009; Babalola, 2014; Kruk et al., 2010; Osorio et al., 2014; Ram & Singh, 2006; Sagna & Sunil, 2012; Stephenson et al., 2006; Stephenson & Elfstrom, 2012; Yebyo et al., 2014).

2.6.2 Bangladesh

Eight studies were identified examining religious differences in MHU between Muslim and Non-Muslim mothers in Bangladesh (Anwar et al., 2004; Anwar et al., 2015; Bashar et al., 2012; Hossain & Hoque, 2015; Kabir, 2007; Kamal, 2012; Kamal et al., 2013; Kamal et al., 2015b). Four studies were nationally representative (Anwar et al., 2015; Bashar et al., 2012; Hossain & Hoque, 2015; Kamal et al., 2013), one examined MHU within urban slums (Kamal, 2012), two studies examined MHU within rural Bangladesh

(Kabir, 2007; Kamal et al., 2015b), and one study examined MHU in Matlab, a rural sub district South-East of Dhaka (Anwar et al., 2004).

Anwar and colleagues (2015), utilized the 1993-94, 1996-97,1999-2000, 2004, 2007, and 2011 BDHS to examine national patterns of ANC and institutional delivery among Bangladeshi mothers. Multivariate regression analysis revealed that Non-Muslims had significantly higher odds of receiving any ANC (OR: 1.10, 95% CI: 1.01, 1.19) and institutional delivery (OR: 1.73, 95% CI: 1.48, 2.02). A limitation of this study was that predictors such as media exposure, autonomy, and contextual characteristics were not controlled for within the study's analysis despite their recognition as important correlates of MHU (Achia & Mageto, 2015; Antai, 2009; Aremu et al., 2012; Babalola & Fatusi, 2009; Babalola, 2014; Kruk et al., 2010; Osorio et al., 2014; Ram & Singh, 2006; Sagna & Sunil, 2012; Stephenson et al., 2006; Stephenson & Elfstrom, 2012; Yebyo et al., 2014).

In a nationally representative study, Bashar (2012) utilized the 2007 BDHS to examine correlates of SBA use. Multivariate logistic regression revealed that Non-Muslim mothers had 42% higher odds of SBA use compared to Muslim mothers (OR 1.42, 95% CI: 1.16, 1.74). Upon stratification based on location (urban or rural), Non-Muslim mothers had significantly higher odds of SBA use compared to Muslims irrespective of whether the respondent resides in an urban (OR: 1.60, 95% CI: 1.16, 2.20) or rural location (OR: 1.56, 95% CI: 1.17, 2.07) (Bashar et al., 2012). The results from this study are robust; however, a stronger methodology that controlled for important predictors such as media exposure, autonomy, and contextual characteristics would provide more analytical rigor.

Utilizing the 2011 BDHS, Hossain and Hoque (2015) examined the association between autonomy and the frequency of ANC visits. This study took a novel methodological approach and utilized a zero-inflated negative binomial (ZINB) model to estimate the effect of religious affiliation and antenatal care intensity (defined as increasing frequency of ANC visits). Significant marginal effects were noted comparing frequency of ANC visits among Muslim and Non-Muslim mothers. Results of the ZINB model revealed that Muslim mothers are less likely to seek increasingly consecutive ANC visits as compared to Non-Muslim mothers (Hossain & Hoque, 2015) .

Kamal et al. 2013 utilized the 2007 BDHS to examine correlates of institutional delivery in the country. Multivariate logistic regression revealed that Non-Muslim mothers had a 79% higher odds of institutional delivery compared to Muslim mothers (OR: 1.79, 95% CI: 1.27, 2.51). Compared to Bashar (2012) the conceptual framework by Kamal et al. 2013 was more robust; however, contextual characteristics were still not controlled within this analysis.

Kamal (2012) utilized the 2006 Bangladesh Urban Health Survey to examine safe motherhood practices within urban slum dwelling mothers in Bangladesh. Logistic regression analysis revealed that Non-Muslims had significantly higher odds of antenatal care (OR: 4.12, 95% CI: 1.96-8.63), SBA use (OR: 3.86, 95% CI: 2.41, 6.18), institutional delivery (OR: 2.80, 95% CI: 1.69, 4.65), and postnatal care (OR: 2.65, 95% CI: 1.69, 4.17) (Kamal, 2012). A weakness of this study was its conceptual framework. The incorporation of important predictors such as autonomy and contextual characteristics would have added more theoretical rigor. The focus on urban slums within the analysis also limits the generalizability of the results to the national population.

Kamal and colleagues (2015), utilized the 2007 BDHS to examine correlates of SBA use in rural Bangladesh. Logistic regression revealed that Muslims had significantly lesser odds to utilize a SBA compared to Non-Muslims (OR: 0.71, 95% CI: 0.50, 1.00) (Kamal et al., 2015b). Like other studies, this study lacked in its conceptual framework. A more robust framework that included important predictors such as media exposure, autonomy, and other contextual characteristics would have provided more theoretical rigor to the study. Furthermore, the analysis was confined only to rural Bangladesh, thus limiting the generalizability of the results to the whole Bangladeshi population.

The results from Kamal et al. 2015 are further supported by an older study examining SBA use in rural Bangladesh. Multivariate logistic regression revealed Muslim mothers had a 51% lower odds of SBA use compared to Hindu mothers (OR 0.49, 95% CI: 0.35, 0.67) (Kabir, 2007). Similarly, in another study, Anwar and colleagues (2004), examined inequalities in SBA use in Matlab, a rural sub district Southeast of Dhaka City. Multivariate logistic regression revealed that Non-Muslims had a 76% higher odds of SBA use compared to Muslim mothers (OR 1.76, 95% CI: 1.54, 2.02) (Anwar et al., 2004).

2.6.3 Conclusions and Knowledge Gap

This review has confirmed the presence of Muslim and Non-Muslim differences in MHU. In Bangladesh, studies have shown pervasive religious differentials, while in India, the directionality of this relationship remains inconsistent. Barret (2008) noted that religion is not a fixed and unchanging entity, but rather, its meaning and influence on daily lives must be contextualized. As seen within the literature in India, the state-wise

variation in MHU among Muslims compared to Non-Muslims does lend support for this notion.

As suggested by the WHO's conceptual framework for health inequity, health disparities are not only influenced by structural determinants but also the sociopolitical circumstances in which a population is defined. It is possible that differing socioeconomic and political circumstances experienced by Muslims within India and Bangladesh may in fact modify the degree to which Non-Muslim and Muslim disparities exist within these countries. Interestingly, no research has tested this hypothesis; thus, highlighting a clear gap in knowledge.

There continues to be a growing interest with respect to religious effects on health (Koenig et al., 2012); however, there is much more to learn. The investigation of the potential moderating role of country on Muslim and Non-Muslim disparities in MHU may further elucidate the complexity of religious differences on MHU.

2.7 Objectives

The two objectives of this study are derived from the highlighted knowledge gaps discussed in the previous sections 2.5.5 and 2.6.3. The thesis is presented as a two-part study.

The primary objective of this study is comprised of three research questions and investigates whether there is equity in MHU among Muslims in South Asia. Specifically, the following research questions are:

1.1) Is there equity in MHU among Muslim women in India?

1.2) Is there equity in MHU among Muslim women in Pakistan?

1.3) Is there equity in MHU among Muslim women in Bangladesh?

This objective built upon previous studies that identified significant associations between wealth and MHU within Muslim populations.

The second objective is also derived from the literature and examines whether country of residence modifies the effect of religion on MHU between Muslim and Non-Muslim women from Bangladesh and India. Women from Pakistan were excluded from this objective because the Pakistani survey could not contribute any information regarding MHU among Non-Muslim women.

For this thesis, Andersen's Behavioral Model for Health Services Utilization was used as the conceptual framework and has guided the inclusion of relevant variables for the analyses.

Chapter 3

3 Methods

This chapter provides a detailed account of the methods used to conduct this study and is divided into 8 sections. Section 3.1 describes the data source for each country-specific survey. Section 3.2 describes Andersen's Behavioral Model, the conceptual framework used for this study. Section 3.3 describes the dependent and independent variables used. Section 3.4 describes the merging of datasets and creation of the study's final sample size. Section 3.5 provides a summary of missing values. Section 3.6 provides a summary of how sample weights were implemented. Section 3.7 describes this study's statistical methods.

3.1 Data Sources

The 2005-06 (Indian) National Family Health Survey (NFHS-3), 2012-13 Pakistan Demographic and Health Survey (PDHS), and 2014 Bangladesh Demographic and Health Survey (BDHS) were used for this study. Permission to use the BDHS, PDHS, and NFHS-3 was obtained from Measure DHS. Beginning in 1984, the Demographic and Health Survey (DHS) program has conducted nationally representative surveys of developing countries worldwide (Vaessen et al., 2005). Chosen countries are typically surveyed every five years; however, select countries may be surveyed at shorter intervals (Vaessen et al., 2005). The DHS Program is funded by United States Agency for International Development (USAID) but also may receive country-specific funding. The core content of the DHS relates to various health indicators including but not limited to: maternal health, nutrition, HIV/AIDS, malaria, genital mutilation practices, domestic violence and women's empowerment (Vaessen et al., 2005).

3.1.1 National Family and Health Survey 3rd Edition (NFHS-3)

The 2005-06 NFHS is the third nationally representative survey in India. Previous surveys were conducted in 1992-93 and 1998-99. Compared to previous surveys, the latest NFHS captured information related to several emerging health issues relevant to the Indian population at the time. Such topics included: maternal health, family life education, safe drug injections, perinatal mortality, adolescent reproductive health, high risk sexual behavior, malaria and HIV (IIPS/India & Macro Int., 2007). Funding for the NFHS-3 was provided by USAID, Bill and Melinda Gates Foundation, and United Nations Children's Fund (UNICEF). The NFHS consisted of three questionnaires: a household questionnaire, woman's questionnaire, and man's questionnaire (IIPS/India & Macro Int., 2007)

The household questionnaire collected basic demographic information, household characteristics, and biomarker measurements for nutritional status, anemia and HIV. The woman's questionnaire was opened to ever married women age 15-49 years within every household. The questionnaire ascertained a respondent's reproductive history, contraception use, pregnancy, antenatal care use, and child health (if applicable). The man's questionnaire was opened to ever married men, 15-49 years of age. Information related to reproductive behavior, contraception knowledge and healthcare involvement was collected (IIPS/India & Macro Int., 2007). For a summary of the sampling design and response rates for the NFHS-3 see Appendix A.

3.1.2 Pakistan Demographic and Health Survey

The 2012-13 PDHS is a representative survey of the population of Pakistan excluding those residing in Azad Jammu & Kashmir, Federally Administered Tribal Areas

(FATAs), and restricted military and protected areas. The Pakistan National Institute of Population Studies (NIPS) was responsible for the implementation of the PDHS (NIPS/Pakistan & ICF Int., 2013). The Pakistan Bureau of Statistics (PBS) was responsible for the creation of sample design, and provision of household listings for all sampled areas (NIPS/Pakistan & ICF Int., 2013). Funding for the PDHS was provided by USAID. Previous surveys were conducted in 1990-91 and 2006-07. The PDHS consisted of four questionnaires: a household questionnaire, woman's questionnaire, man's questionnaire, and community questionnaire (NIPS/Pakistan & ICF Int., 2013).

Aside from basic demographic information and housing characteristics, the Household Questionnaire was used to ascertain information related to school attendance, migration status, and survivorship of parents for respondents under the age of 18 years. The woman's questionnaire was opened to ever married women, age 15-49 years within a household. This survey collected information related to reproductive history, contraception use, fertility preferences, pregnancy, antenatal care, women's decision making and child health (if applicable). Only one in three households were selected for the man's questionnaire. Ever married men, age 15-49 years, were eligible for this questionnaire. Basic information regarding marriage, fertility preferences, reproductive health, STI awareness was collected (NIPS/Pakistan & ICF Int., 2013). Lastly, the community questionnaire was administered within each rural cluster to collect data related to: health services, transportation, education and communication facilities (NIPS/Pakistan & ICF Int., 2013). For a summary of the sampling design and response rates for the PDHS see Appendix B.

3.1.3 Bangladesh Demographic Health Survey

The 2014 BDHS is the seventh survey undertaken in Bangladesh (2014 BDHS Report, 2016). Previous surveys were conducted in 1993-94, 1996-97, 1999-2000, 2004, 2007, and 2011. A Technical Working Group comprised of members from National Institute of Population Research and Training (NIPORT), Ministry of Health and Family Welfare (MoHFW), University of Dhaka, International Center for Diarrheal Disease Research – Bangladesh (ICCDDR-B), USAID-Bangladesh, Save the Children, ICF International and Mitra and Associates, were responsible for survey design and implementation (NIPORT et al., 2016). The Bangladesh Bureau of Statistics was responsible for providing enumeration maps for the survey. Funding for the 2014 BDHS was provided by USAID-Bangladesh. The BDHS consisted of 3 questionnaires: a household questionnaire, a woman's questionnaires, and community questionnaire (NIPORT et al., 2016).

The household questionnaire was used to ascertain all household members and identify all eligible female respondents. This survey captured basic demographic information, and characteristics of the dwelling unit such as sanitation, type of floors and walls, and ownership of basic assets (NIPORT et al., 2016).

The woman's questionnaire was open to only ever married women age 15-49 years within a household. This survey ascertained reproductive history, contraception use, pregnancy, antenatal care, and child health (NIPORT et al., 2016).

The community questionnaire was administered to selected individuals who were knowledgeable about the socioeconomic conditions and availability of health services in

a given EA (NIPORT et al., 2016). For a summary of the sampling design and response rates for the BDHS see Appendix C.

3.2 Conceptual Framework

Andersen's Behavioral Model was used as the conceptual framework for this study (Andersen, 1995). This model has been widely adopted among scholars examining MHU within in Africa and Asia (Chakraborty et al., 2003; Rutaremwa et al., 2015; Srivastava et al., 2014; Tarekegn et al., 2014) Broadly speaking, Andersen's model is based on the premise that health services utilization rests on 5 components: contextual characteristics, predisposing characteristics, enabling characteristics, need characteristics, and individual health behaviors. See Figure 4 for a summary of included variables conceptualized to Andersen's model. Further description of included independent and dependent variables in this study can be found in Section 3.3.1 and 3.3.2

3.2.1 Contextual Characteristics

The first component of Andersen's model postulates that a person's ability to seek health services is dependent on specific contextual factors that influence the environment in which health service use occurs. Contextual characteristics may include underlying determinants of health policy that may influence quality of care or attributes related to health infrastructure such as the distribution of health facilities and number of medical personnel in a medical institution. The contextual component of Andersen's model also recognizes the importance of a community, and its effect on individual health services utilization. Contextual factors are often an aggregate of individual characteristics (Andersen et al., 2007) .

3.2.2 Predisposing Characteristics

The second component of the Andersen's model postulates that factors underlying an individual's predisposition to seek healthcare can also influence his/her subsequent health service utilization. Such predisposing factors can be a biological imperative for health service use or sociocultural determinants that help determine an individual's status in a community or ability to acquire resources when dealing with various health problems. Traditional predisposing variables include but are not limited to: age, education, autonomy, and religion (Andersen et al., 2007).

3.2.3 Enabling Characteristics

This component suggests that factors that directly enable an individual to seek healthcare can also influence his/her subsequent health service use. This can include an individual's monetary, and/or physical ability to seek reliable and appropriate health services. This may include personal factors such as individual's wealth, , distance to the nearest health center, and perceived waiting times (Andersen et al., 2007).

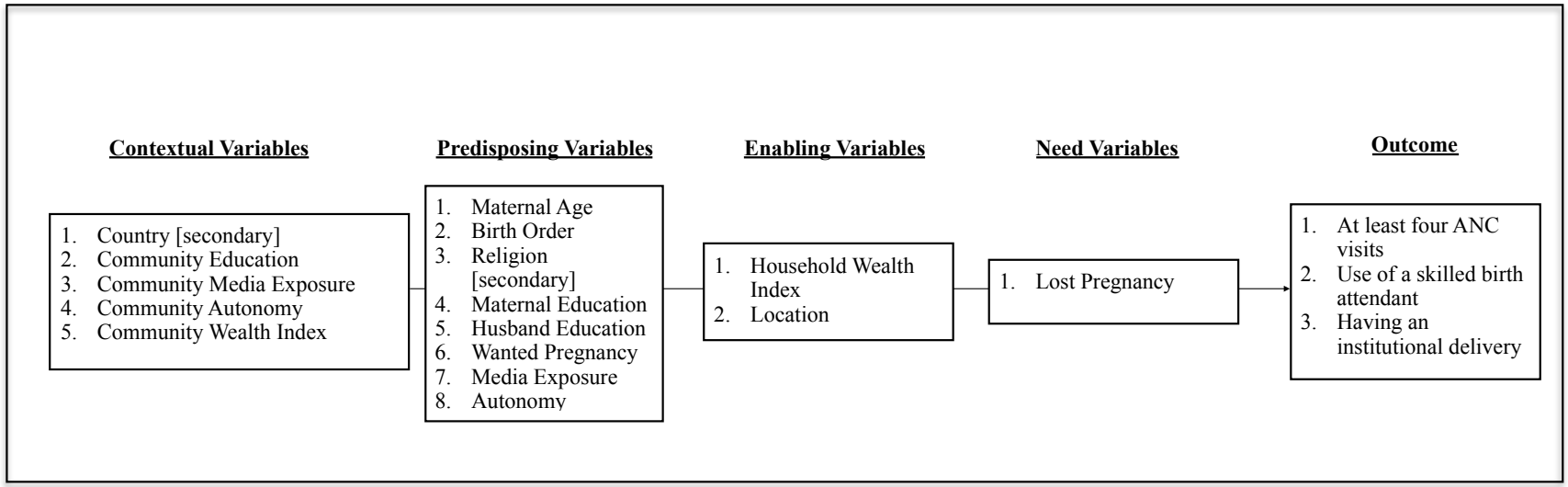
3.2.4 Need Characteristics

This component of Andersen's model postulates that characteristics attributed to an individual's objective and/or perceived state of health can also affect his/her need to seek health service use. This may include a person's emotional reaction towards his/her own illness, perception regarding the importance and/or magnitude of a given health problem and subsequent decision to seek healthcare. Need factors also include a professional evaluation of an individual's health status and need for medical attention (Andersen et al., 2007).

3.2.5 Health Behaviors

The “Health Behaviors” component postulates that personal health behaviors can also influence health service utilization. This includes a multitude of determinants and may include: diet, exercise, recreational drug use, and overall maintenance of one’s health (Andersen et al., 2007). For the purposes of this thesis, health behaviours were not considered within this study’s analysis due to lack of available data.

Figure 4: Summary of included dependent and independent variables conceptualized to Andersen's Behavioral Model



Adapted from Andersen et al. 2007

3.3 Selection and Definition of Variables

3.3.1 Dependent Variables

Three important components of maternal healthcare utilization (MHU) were operationalized for this study and are further discussed below.

Appropriate Antenatal Care

Within the Demographic Health Survey (DHS), women were asked how many antenatal care (ANC) visits they received during their last pregnancy. WHO guidelines suggest that all women should receive a minimum of four ANC visits during pregnancy (WHO, 2007b). In accordance with WHO guidelines, a binary variable was constructed in which respondents who received less than four ANC visits were coded as '0' and respondents who received a minimum of 4 were coded as '1'. Other studies examining MHU within populations have categorized appropriate ANC in a similar manner (Gupta et al., 2014; Wilunda et al., 2015).

Skilled Birth Attendant Use

Women were asked if they had received any assistance during delivery. However, due to variation in response options across countries, women were categorized as receiving assistance by a skilled birth attendant (SBA) using varying criteria described below and summarized in Table 3. A binary variable was created in which respondents were coded as '0' if they did not receive any assistance by a SBA and coded as '1' if they had received assistance by at least one SBA. Respondents who stated that they 'did not know' were classified as a missing observation.

Definitions of SBA were obtained from country-specific DHS final reports (IIPS/India & Macro Int., 2007; NIPORT et al., 2016; NIPS/Pakistan & ICF Int., 2013).

1. In the NFHS-3, women were classified as receiving care by a SBA if they received assistance by a doctor, auxiliary nurse midwife, nurse, midwife, lady health visitor (LHV) or other health personnel.

2. In the PDHS, respondents were classified as receiving care by a SBA if they received assistance by a doctor, nurse, midwife, or lady health visitor (LHV).

3. In the BDHS, respondents were classified as receiving care by a SBA if they received assistance by a qualified doctor, nurse, midwife, paramedic, family welfare visitor or community skilled birth attendant.

Institutional Delivery

Women were asked where they had their delivery. Due to variation in response options across countries, women were categorized as having delivered in an institution using varying criteria described below and summarized in Table 4. A binary variable was created in which respondents were coded as ‘‘1’ if they delivered in a public, private or NGO facility; otherwise, they were coded as “0”. Respondents who stated that they ‘did not know’ were classified as a missing observation.

Table 3: Country-specific definitions of SBA use

Country	SBA	Not a SBA
Bangladesh	1. Community Skilled Birth Attendant 2. Family Welfare Visitor 3. Nurse/Midwife/Paramedic 4. Qualified Doctor	5. Community Healthcare Provider 6. Family Welfare Assistant 7. Health Assistant 8. Neighbors/Friends 9. NGO Worker 10. No One 11. Other 12. Relatives 13. Trained Traditional Birth Assistant 14. Unqualified Doctor 15. Untrained Traditional Birth Assistant 16. Sub Assistant/ Community Medical Officer
Pakistan	1. Doctor 2. Nurse/Midwife/Lady Health Visitor	3. Family Welfare Worker 4. Hakim 5. Homeopath 6. Lady Health Worker 7. No One 8. Other 9. Relative/Friend 10. Traditional Birth Attendant
India	1. Auxiliary Nurse Midwife/Nurse/Midwife/ Lady Health Visitor 2. Doctor 3. Other Health Personnel	4. Dai/ Traditional Birth Attendant 5. No One 6. Other 7. Relative/Friend

Table 4: Country-specific definitions for an institutional delivery

Country	Institutional Delivery	Not an Institutional Delivery
Bangladesh	1) District Hospital 2) Public Hospital 3) Maternal and Child Welfare Centre 4) Upazila Health Complex 5) Upazila Health Family Welfare Centre 6) Other Public Health Facility 7) Community Clinic 8) Private Hospital / Private Clinic 9) NGO Static Clinic 10) Other NGO Health Facilities	11) Respondent Home 12) Other
Pakistan	1) Government Hospital 2) Other Public Health Facility 3) Other Private Health Facility 4) Private Hospital/Clinic 5) Rural Health Centre / Mother Child Health Centre	6) Respondent Home 7) Others Home 8) Other
India	1) Government Hospital 2) Government Dispensary 3) Urban Health Centre / Health Post/ Family Welfare Centre 4) Private Hospital / Maternity Centre / Clinic 5) NGO Hospital/Clinic or Trust Hospital/Clinic 6) Community Health Centre/Rural Hospital/Primary Health Centre 7) Sub Centre 8) Other Public Health Facility 9) Other Private Health Facility	10) Respondent Home 11) Parent's Home 12) Other's Home 13) Other

3.3.2 Independent Variables

The following section lists the study's independent variables and how they were defined. Variables were chosen, in accordance to Andersen's model, from prior literature. See Table 5 for a summary of included variables.

Contextual Variables

1. **Country (for secondary objective only)**: For the secondary objective, a categorical variable was created to account for respondent country of origin. Women from Bangladesh and India were coded '0' and '1' respectively. Since Pakistan is a Muslim majority country, no religion variable was captured and women from Pakistan were excluded from the analysis of the secondary objective.

2. **Contextual Control Variables**: As stated previously, the Andersen model, the conceptual framework used for this study, acknowledges the effect of a respondent's community on her subsequent health services use (Andersen et al., 2007). Thus, community variables were also created to control for contextual effects. For this study, a community was defined as the primary sampling unit within a given survey. This definition is consistent with other studies (Achia & Mageto, 2015; Ononokpono, 2015; Ononokpono et al., 2013; Sagna & Sunil, 2012; Singh et al., 2013a; Stephenson et al., 2006; Stephenson & Elfstrom, 2012). Community variables were created by aggregating the following individual characteristics (described further below): i) maternal education; ii) media exposure; iii) autonomy; and iv) wealth.

i. **Community education** was defined as the proportion of women with a secondary or higher education within each primary sampling unit.

ii. **Community media exposure** was defined as the proportion of women placed within the high media exposure category within each primary sampling unit.

iii. **Community autonomy** was defined as the proportion of women with intermediate or high autonomy in each primary sampling unit.

iv. **Community wealth** was defined as the proportion of households within the rich or richest wealth quintile in each primary sampling unit.

These four community variables were divided into tertiles categorized as low, intermediate, and high respectively. This method is consistent with other studies (Sagna & Sunil, 2012).

Predisposing Variables

1. **Maternal Age:** Maternal age was defined as the mother's age in years at the time of the interview. Studies have shown age to be associated with MHU (Aremu et al., 2012; Babalola & Fatusi, 2009; Babalola, 2014; Jat et al., 2011; Kamal et al., 2015a; Osorio et al., 2014).
2. **Birth Order**: Birth order refers to the order in which a child is born in a family. Studies have shown birth order to be an important determinant of MHU within populations (Jat et al., 2011; Makate, 2016; Rai, 2015).

3. **Religion** (for secondary objective only): A binary variable was created in which respondents were categorized as being Non-Muslim (coded 0) or Muslim (coded 1). Studies have shown Muslim women to be less likely to utilize maternal health services (Anwar et al., 2015; Bashar et al., 2012; Hossain & Hoque, 2015; Kabir, 2007; Yadav & Kesarwani, 2016).

4. **Maternal and Husband's education:** All respondents were asked regarding their highest level of education attended. In addition, respondents were also asked about the highest educational level attended by their current or past husband/partner. Respondents and corresponding husband/partners were categorized in two separate education variables as having 0) no education 1) primary education (1 to 5 years of schooling) and 2) secondary education or higher (6+ years of schooling). Studies have shown maternal and husband's education to be an important determinant of MHU within populations (Moyer & Mustafa, 2013; Pavalavalli & Ramesh, 1997; Rai, 2015; Simkhada et al., 2008; Singh et al., 2012c; Tey & Lai, 2013).

5. **Wanted Pregnancy:** Respondents were asked if they wanted their pregnancy. This is a standardized DHS variable in which respondents were dichotomized to wanting their pregnancy at that time or later (coded 1), or not wanting their pregnancy at all (coded 0). Studies have shown women who have wanted their pregnancy to be more likely to access MHU compared to women who did not want their pregnancy (Dutamo et al., 2015; Ochako & Gichuhi, 2016; Titaley et al., 2010a; Wado et al., 2013).

6. **Media Exposure**: If a respondent indicated that she did not watch television, read the newspaper, and listen to the radio at least once a week she was placed within the low media exposure category (coded 0). If a woman indicated that she was exposed to one media outlet at least once a week, she was placed in the intermediate media exposure category (coded 1). If a respondent indicated that she was exposed to two or more media outlets at least once a week, she was placed in the high media exposure category (coded 2). To preserve information, respondents were only excluded from the analysis if they contained missing observations in all three media exposure indicators. Previous studies have found a positive association between media exposure and MHU (Agha & Carton, 2011; Islam & Odland, 2011; Tey & Lai, 2013; Thind et al., 2008; Yadav & Kesarwani, 2016).

7. **Autonomy:** If a respondent indicated that she had no say in making large household purchases, visiting family, and decisions regarding her own health she was placed in the no autonomy category (coded 0). If a respondent indicated that she had say or had say with her husband in only one autonomy indicator she was placed in the low autonomy category (coded 1). If a respondent indicated that she had say or had say

with her husband in 2 autonomy indicators, she was placed in the medium autonomy category (coded 2). Lastly, if a respondent indicated that she had say or had say in 3 autonomy indicators, she was placed in the high autonomy category (coded 3). To preserve as much information as possible, respondents were only excluded from analysis if data to all three decision making indicators were not available. Previous studies have identified autonomy as an important determinant of MHU (Bayu et al., 2015; Bloom et al., 2001; Haque et al., 2012; Kc & Neupane, 2016; Simkhada et al., 2008; Singh et al., 2012a; Speizer et al., 2014).

Enabling Variables

1. **Location:** Access issues were accounted for by the type of location in which each respondent resided. The DHS provided a binary variable in which women were coded as either residing in a rural or urban location. Previous research has identified location as an important determinant of MHU (Alemayehu & Mekonnen, 2015; Edward, 2011; Gehendra et al., 2015; Mukherjee & Chandra, 2014; Rai, 2015; Shahram et al., 2015; Tey & Lai, 2013; Wilunda et al., 2015).
2. **Wealth Index:** The DHS creates a standardized wealth index where respondents' economic statuses are approximated via their households' cumulative living standards. As suggested by Filmer and Pritchett (2001), household asset ownership was used to analyze variations in relative household wealth using Principle Component Analysis (PCA) (Filmer & Pritchett, 2001).

   PCA is a statistical technique that takes a set of correlated variables and reduces them to a small number of uncorrelated dimensions (components) where each dimension is a linear weighted combination of the original variable set (Vyas & Kumaranayake,

2006). Typical asset ownerships used to construct the household wealth indices include but are not limited to: access to basic hydro and electricity, sanitation, and materials used to build a household (Vyas & Kumaranayake, 2006). It should be noted, the main underlying assumptions when choosing the correct set of variables for PCA, is that the variable set must describe an underlying inequality between households (Vyas & Kumaranayake, 2006). As such, variables used to construct the wealth index may vary between countries. Within the BDHS, PDHS, and NFHS-3 household wealth indices were already constructed from household asset ownership using PCA. Households were categorized into 5 classes: poorest, poor, middle, rich or richest. Previous studies have identified wealth index as an important determinant of MHU (Mukherjee & Chandra, 2014; Rahman, 2009; Rai, 2015; Simkhada et al., 2008; Tey & Lai, 2013).

Need Variables

1. **Lost Pregnancy**. Previous studies have shown abortion history and still births/fetal death to be significantly associated with increased use of MHU (Bhatia & Cleland, 1995; Ciceklioglu et al., 2005; Glei et al., 2003). The DHS provides one pregnancy variable that ascertains respondents' previous lost pregnancies. Within the DHS, a lost pregnancy is defined as a pregnancy that did not result in a live birth due to miscarriage, abortion or still birth. A binary variable was created in which respondents who had a lost pregnancy prior to the most recent pregnancy were coded as 1; otherwise, they were coded as 0. This variable was chosen to account for respondent need or motivation to access obstetric services because of prior problems or pregnancy complications.

Table 5: Definition of included variables

Variables	Definition
Dependent Variables	
Appropriate ANC	< 4 Appropriate ANC (0); ≥ 4 Appropriate ANC (1)
SBA Use	No SBA (0); SBA (1)
Institutional Delivery	No institutional delivery (0); Institutional delivery (1)
Contextual Variables	
Country [secondary objective)	India (1); Bangladesh (2)
Community Variables	Low (1); Intermediate (2); high (3)
Predisposing	
Age	(Continuous)
Birth Order	(Continuous)
Religion [secondary objective)	Non-Muslim (0); Muslim (1)
Education	No Education (0); Primary (1); Secondary or Higher (2)
Wanted Pregnancy	Not wanted (0); wanted (1)
Media Exposure	Low (0); Intermediate (1): High (2)
Autonomy	None (0); Low (1); Medium (2); High (3)
Enabling Variables	
Location	Rural (0); Urban (1)
Wealth	Poorest (1): Poor (2): Middle (3); Rich (4); Richer (5)
Need Variables	
Lost Pregnancy	No lost pregnancies (0); had lost pregnancies (1)

3.4 Creation of Final Sample

In the DHS, maternal history was captured only for women who had given birth within five years preceding the time of the NFHS-3, PDHS, and BDHS. To appropriately operationalize Andersen's model to the aim of this thesis, women who did not give birth or provide any maternal history were excluded from this analysis. Furthermore, studies have shown husband involvement to be a key predictor of a women's propensity to utilize maternal healthcare (Arokiasamy & Pradhan, 2013; Jat et al., 2011; Pallikadavath et al., 2004b; Rai, 2015; Singh et al., 2014; Singh et al., 2012b; Singh et al., 2012c). The decision was made *a priori* to limit this study's population to only women who are currently married such that the effect of husband involvement on MHU could be considered. The PDHS does not capture any information regarding religious affiliation. Given Pakistan is a Muslim majority country, it had to be assumed that all respondents from Pakistan were Muslim.

The primary objective for this study was to see if there was equity in MHU among Muslim women in India, Pakistan, and Bangladesh. Data was not pooled for this objective; rather, equity in MHU was examined independently within each country. The final population for the primary objective was married Muslim women who had given birth within five years preceding the interview. For this study's secondary objective, data from the NFHS-3 and BDHS was pooled to investigate the interaction between country and religion. The population of interest for this objective was married Indian and Bangladeshi women who had given birth within five years preceding the interview. Women from Pakistan were not considered within this analysis as they cannot contribute any information regarding maternal healthcare utilization among Non-Muslims.

See Table 6 and Table 7 for a distribution of country-specific and pooled sample sizes in accordance to the primary and secondary objective.

Table 6: Creation of final dataset in accordance with this study's primary objective

	India	Pakistan	Bangladesh
Total Number of Women Surveyed	124,385	13,558	17,863
Excluded:			
Women who did not have a child within five years preceding the interview	87,535	6,097	13,369
Women who are not currently married	735	76	53
Women who are Non-Muslim	30,331	-	358
Final Sample Size	5,742[1]	7,385	4,083

[1] Forty-two respondents did not provide their religious affiliation and were excluded form analysis

Table 7: Creation of the final dataset in accordance with this study's secondary objective

	Bangladesh	India	Pooled (N)
Total Number of Women Surveyed	17,863	124,385	-
Excluded: Women who did not have a child within 5 years preceding the interview	13,369	87,535	-
Women who are not married	53	735	-
Included:			
Number of Muslims included	4,083	5,742	9,825
Number of Non-Muslims included	358	30,331	30,689
Final Sample Size	4,441	36,073[1]	40,514

[1] Forty-two respondents did not provide their religious affiliation and were excluded form analysis

3.5 Missing Values

The DHS program has implemented special rules as to how missing values and other circumstances are dealt with during cleaning and production of the final dataset. The DHS defines a missing value, "As a variable that should have a response, but does not have a response — either because the question was not asked (due to interviewer error) or the respondent did not want to answer" (The DHS Program, n.d). The DHS also accounts for other unique forms of unusable data such as 'data inconsistencies', 'respondent does not know', and not applicable (N.A) – i.e. the respondent was not asked the question during the interview because it was not relevant; that is, due to a skip pattern.

For this study, the percentage missing was extremely low across all independent variables (< 2%). Thus, no imputation was utilized. Rather, respondents with any missing values were excluded from analysis, including those who were coded as 'not knowing' across any pertinent survey questions.

3.6 Technical Standards

STATA 14 was used to conduct the analyses for this study (STATA Corp, 2015). It is recommended to account for complex survey design through the implementation of survey weights when conducting analysis. Hence, survey weights were implemented for all multivariate analysis.

Pooling of NFHS-3 and BDHS [Secondary Objective)

Within the DHS, all country-specific weight variables are relative weights which are first normalized such that the total number of unweighted cases in a survey equals the total weighted cases at the national level (Ren, 2013). The normalized weight provided by the

DHS is only valid for country specific means, proportions or ratios; however, when pooling data across different surveys, the normalized weight is not valid and should be rescaled (Ren, 2013).

For this study, all normalized survey weights within the NFHS-3 and BDHS were rescaled using the equal allocation method (Tom Pullum, DHS, Personal Communication). That is, the normalized survey weights within each data set were rescaled such that they were weighted equally within the analysis.

STATA's 'svy' command was used to utilize all survey weights when conducting regression analysis. STATA's 'subpop' command was also used to ensure that standard errors were calculated using all available respondents while also ensuring that effect estimates were derived among respondents who belong to this study's populations of interest.

3.7 Statistical Methods

For this study's primary objective, the unit of analysis was married Muslim respondents who had given birth within 5 years preceding the time of the interview and data collection referred to the respondent's most recent live birth. Furthermore, for this study's secondary objective, the unit of analysis was married Bangladeshi and Indian respondents within five years preceding the survey and data collection referred to the respondent's most recent live birth. The analysis plan for this study is described below. Univariate, bivariate, and multivariate logistic regression were used to test the primary and secondary objectives.

3.7.1 Primary Objective

All univariate, bivariate, and multivariate analyses for this study's primary objective were stratified by country. Univariate analyses for independent variables within each country were conducted to determine the distribution and frequency of each variable and the characteristics of respondents included in the sample. Unadjusted logistic regression analysis was then used to assess the bivariate relationship between all three maternal health utilization outcomes and all independent variables. Lastly, multivariate logistic regressions were used to examine the adjusted associations between each of the three MHU outcomes and all independent variables. Marginal effects for household wealth were then used to examine equity in MHU within each country (see further information in section 3.7.4).

3.7.2 Secondary Objective

Univariate analyses for independent variables were conducted to determine the distribution and frequency of each predictor and the characteristics of respondents included in the sample. Unadjusted logistic regression analysis was then performed to assess the relationship between each of the three maternal health utilization outcomes and each independent variable within the pooled sample. Multivariate logistic regressions were then used to examine the adjusted associations between the interaction between country and religion and other independent variables for each of the three MHU outcomes.

3.7.3 Logistic Regression

The multivariate logistic regression model for a binary explanatory variable is as follows:

$$logit[\pi(x)] = \ln\left(\frac{\pi(x)}{1-\pi(x)}\right) = \beta_0 + \beta_1 x$$

$$where\ \beta_1 = logit[\pi(1)] - logit[\pi(0)] = \ln\left(\frac{\pi(1)}{1-\pi(1)}\right) - \ln\left(\frac{\pi(0)}{1-\pi(0)}\right)$$

$$Hence, \beta_1 = \ln(OR)\ and\ e^{\beta_1} = OR$$

π denotes the probability of an outcome, β_i represents the change in the probability of x $[\pi(x))$ on the logit scale, and x_i represents an independent predictor. The logistic regression model is fitted using the maximum likelihood method. If a predictor is continuous then β_i represents the change in log(odds) for an outcome $(\pi(x))$ for a one unit increase of the independent variable. However, if the predictor is categorical, β_i represents the change in log(odds) on the outcome $(\pi(x))$ for a categorical level in comparison to the reference level. For interpretation of coefficients, β_i is typically raised to the natural exponent 'e' to change the interpretation of coefficients from the log(odds) scale to odds ratios (Vach, 2013).

3.7.4 Marginal Effects

Models of binary outcomes are often estimated using multivariate logistic regression with the estimated coefficients expressed as odds ratios; however, this is often difficult to interpret (Bogard, 2016). In contrast, marginal effects are an alternative metric that represents a more intuitive understanding of the relationship between two variables and can be particularly helpful in knowledge translation with policy makers. Marginal effects represent the predicted probability of a dependent variable as a function of an explanatory variable given that all other covariates are fixed (Williams, 2012).

For this study, marginal effects were used to calculate the predicted probability of MHU for each household wealth quintile while all other categorical covariates were fixed at the most common response category for within each country-specific sample. Continuous variables such as age and birth order were fixed at their mean value.

Chapter 4

4 Results

4.1 Primary Objective

4.1.1 Results for India

This section describes the results of the univariate, bivariate, and multivariate analysis of maternal healthcare utilization (MHU) among Muslim mothers in India.

Univariate Results

Table 8 lists the distribution for the three MHU outcomes and all independent variables. The results indicated that approximately 43% (n=2,417) of Indian Muslims received appropriate ANC, 51% (n=2,900) used a SBA, and 45% (n=2,568) had an institutional delivery.

With regards to contextual variables, the highest proportion of mothers resided within communities of low education (50%, n=2,877), low media exposure (45%, n=2,585), low autonomy (44%, n=2,519), and low wealth (40%, n=2,305).

For predisposing variables, the average age of the respondents was 27 years with a mean birth order of approximately 3.3. The greatest proportion of mothers were not educated (49.0%, n=2,813), followed by 37% (n=2,188) of mothers with a secondary or higher education, and 14% (n=811) with a primary education. A similar distribution was noted for husband's education. The highest proportion of mothers were not exposed to frequent media and placed within the low media exposure category (40%, n=2,317), followed by 35% (n=1,989) of mothers with intermediate media exposure, and 25% (n=1,436) in the

high media exposure group. Thirty-seven percent (n=2,122) of mothers had high autonomy and 84% (n=4,829) wanted their most recent pregnancy.

Regarding enabling variables, 51% (n=2,954) of mothers were from rural areas. A slightly higher proportion of mothers belonged to the rich quintile (26%, n=1,489) in this sample, followed by approximately 21% of mothers belonging to the richest (n=1,178) and intermediate quintile (n=1,204), 18% (n=1,008) in the poor quintile, and 15% (n=863) in the poorest quintile. With regards to this study's need variable, 86% (n=4,949) of mothers did not have a lost pregnancy prior to their most recent birth.

Bivariate Analysis

This section describes the results for the bivariate analysis for appropriate ANC, SBA use, and institutional delivery. Table 9 lists the unadjusted associations for the three MHU outcomes against all independent variables. For a detailed presentation of the bivariate results with confidence intervals, see Tables 16, 18, and 20 in Appendix D.

For contextual variables, dose-response relationships were noted for all community variables for appropriate ANC, SBA use, and institutional delivery. For predisposing variables, mothers of older age and birth order were found to have lower odds of the three MHU outcomes. Dose-response relationships were observed for maternal and husband's education and media exposure for appropriate ANC, SBA use, and institutional delivery. Mothers who wanted their pregnancy had higher odds of the three outcomes compared to mothers who did not want their pregnancy. Autonomy was not significantly associated with appropriate ANC, SBA use, or institutional delivery.

Table 8: Univariate distribution of dependent and independent variables in India

Variable	India N (%)	
Dependent Variables		
Appropriate ANC		
< 4 Visits	3246	(57.3%)
≥ 4 Visits	2417	(42.7%)
SBA use		
No	2838	(49.5%)
Yes	2900	(50.5%)
Institutional Delivery		
No	3172	(55.3%)
Yes	2568	(44.7%)
Contextual Variables		
Community Education		
Low	2877	(50.1%)
Intermediate	1731	(30.1%)
High	1134	(19.7%)
Community Media Exposure		
Low	2585	(45.0%)
Intermediate	1804	(31.4%)
High	1353	(23.6%)
Community Autonomy		
Low	2519	(43.9%)
Intermediate	1916	(33.4%)
High	1307	(22.8%)
Community Wealth		
Low	2305	(40.1%)
Intermediate	1858	(32.4%)
High	1579	(27.5%)
Predisposing Variables		
Age (mean ± SD)	27.1	± 5.9
Birth Order (mean ± SD)	3.3	± 2.2
Maternal Education		
No Education	2813	(49.0%)
Primary	811	(14.1%)
Secondary or Higher	2188	(36.9%)
Husband Education		
No Education	1875	(33.1%)
Primary	973	(17.2%)
Secondary or Higher	2824	(49.8%)
Media Exposure		
Low	2317	(40.4%)
Intermediate	1989	(34.6%)
High	1436	(25.0%)
Autonomy		
None	1565	(27.3%)
Low	972	(16.9%)
Medium	1081	(18.8%)

Table 8: Univariate distribution of dependent and independent variables in India

Variable	India N (%)	
High	2122	(37.0%)
Wanted Pregnancy		
Not Wanted	910	(15.9%)
Wanted	4829	(84.1%)
Enabling Variables		
Location		
Rural	2954	(51.4%)
Urban	2788	(48.6%)
Wealth Index		
Poorest	863	(15.0%)
Poor	1008	(17.6%)
Intermediate	1204	(21.0%)
Rich	1489	(25.9%)
Richest	1178	(20.5%)
Need Variables		
Lost Pregnancy		
No	4949	(86.2%)
Yes	793	(13.8%)

With respect to the enabling variables, mothers from urban areas had the highest odds of appropriate ANC, SBA use, and institutional delivery compared to rural mothers. Furthermore, compared to mothers within the poorest wealth quintile, the odds of appropriate ANC, SBA use, and institutional delivery, became increasingly higher for each wealth quintile.

Regarding the one need variable, mothers who had lost a pregnancy had lower odds of appropriate ANC; however, lost pregnancy was not found to be statistically associated with SBA use and institutional delivery.

Multivariate Results

This sub-section describes the multivariate logistic regression results for appropriate ANC, SBA use, and institutional delivery among Muslim mothers in India under separate headings. The results for the three MHU outcomes are presented in Table 9. For a complete presentation of multivariate results (with confidence intervals) in India, see Tables 17, 19, and 21 in Appendix D. A summary of significant variables for the three MHU outcomes can be found in Table 14.

Appropriate Antenatal Care

All contextual variables were significant in the model. Age, birth order, maternal and husband's education, and media exposure were the predisposing variables significantly associated with appropriate ANC. The enabling variables, wealth index was also significantly associated with the outcome.

A dose-response relationship was noted for community education. Compared to mothers from low media exposure and wealth communities, the odds of appropriate ANC was

over two times greater for mothers from high media exposure (OR: 2.20, 95% CI: 1.39, 3.50) and intermediate wealth communities (OR: 1.45, 95% CI: 1.01, 2.09). Mothers from high autonomy communities had significantly lesser odds of appropriate ANC compared to mothers from low autonomy communities (OR: 0.62, 95% CI: 0.43, 0.90).

Older age was found to significantly increase the odds of appropriate ANC (OR: 1.04, 95% CI: 1.02, 1.07), while higher birth order was found to significantly decrease the odds of appropriate ANC (OR: 0.74, 95% CI: 0.68, 0.82). Compared to mothers with no education, the odds of appropriate ANC was 79% higher for mothers with a primary education (OR: 1.79, 95% CI: 1.32, 2.42), and over two times greater for mothers with a secondary or higher education (OR: 2.19, 95% CI: 1.67, 2.88). A similar relationship was noted for husband's education. Compared to mothers with the low media exposure, the odds of appropriate ANC became increasingly higher for each level of media exposure.

For wealth index, the odds of appropriate ANC increased for mothers in the intermediate quintile (OR: 1.75, 95% CI: 1.15, 2.67), rich quintile (OR: 2.17, 95% CI: 1.39, 3.37), and richest quintile (OR: 2.71, 95% CI: 1.62, 4.53).

The variables not significantly associated with appropriate ANC in the adjusted model were autonomy, wanted pregnancy, location, and lost pregnancy.

Skilled Birth Attendant Use

Except for community autonomy, all contextual variables were significant in the model. Age, birth order, maternal and husband's education, and media exposure were the predisposing variables significantly associated with SBA use. Wealth index was the only

enabling variable significantly associated with SBA use. The need variable, lost pregnancy, was also statistically associated with the outcome.

Compared to mothers from communities with the lowest respective characteristics, the odds of SBA use was significantly higher among mothers from communities of high education (OR: 5.06, 95% CI: 2.82, 9.07), high media exposure (OR: 1.61, 95% CI: 1.03, 2.51), and intermediate wealth (OR: 1.71, 95% CI: 1.25, 2.36).

Older age was associated with increased odds of SBA use (OR: 1.04, 95% CI: 1.02, 1.07), while higher birth order was associated with significantly lower odds of SBA use (OR: 0.81, 95% CI: 0.75, 0.87). Compared to mothers with no education, mothers with a secondary or higher education had an 84% higher odds of SBA use (OR: 1.84, 95% CI: 1.44, 2.35). The odds of SBA use became increasingly higher with each level of husband's education compared to husbands with no education. Mothers with intermediate media exposure had a 32% higher odds of SBA use compared to mothers with the low media exposure (OR: 1.32, 95% CI: 1.05, 1.66).

A dose-response relationship was noted for wealth index. Compared to mothers in the poorest quintile, the odds of SBA use was highest for mothers from the richest quintile (OR: 4.15, 95% CI: 2.64, 6.51), followed by mothers from the rich quintile (OR: 3.24, 95% CI: 2.26, 4.63), intermediate quintile (OR: 2.01, 95% CI: 1.45, 2.80), and lastly, the poor quintile (OR: 1.50, 95% CI: 1.10, 2.06). Mothers who lost a pregnancy had a 33% higher odds of SBA use in comparison to mothers who did not (OR: 1.33, 95% CI: 1.01, 1.75).

The variables that were not significantly associated with SBA use in the adjusted model were community autonomy, autonomy, wanted pregnancy, and location.

Institutional Delivery

Community education and wealth were the only contextual variables significantly associated with institutional delivery. Age, birth order, maternal and husband's education were the predisposing factors significantly associated with institutional delivery. The enabling variables, location and wealth index were also significantly associated with the outcome.

Dose-response relationships were noted for community education and wealth. Older age was associated with increased odds of institutional delivery (OR: 1.06, 95% CI: 1.03, 1.09), while higher birth order was associated with significantly less odds of institutional delivery (OR: 0.75, 95% CI: 0.69, 0.82). Compared to mothers with no education, the odds of institutional delivery became increasingly higher with each level of education. A similar relationship was noted for husband's education.

Urban mothers had a 45% higher odds of institutional delivery compared to rural mothers (OR: 1.45, 95% CI: 1.01, 2.07). Compared to mothers within the poorest quintile, the odds of SBA was highest for mothers from the richest quintile (OR: 4.40, 95% CI: 2.65, 7.30), followed by mothers from the rich quintile (OR: 3.17, 95% CI: 2.06, 4.86), intermediate quintile (OR: 2.45, 95% CI: 1.63, 3.67), and lastly, the poor quintile (OR: 1.71, 95% CI: 1.18, 2.48).

The variables not significantly associated with institutional delivery in the adjusted model were community media exposure and autonomy, media exposure, autonomy, wanted pregnancy, and lost pregnancy.

Table 9: Unadjusted and adjusted associations for appropriate ANC, SBA use, and institutional delivery in India

Outcome	**Appropriate ANC (N=5,594)**		**SBA Use (N = 5,667)**		**Institutional Delivery (N=5,668)**	
Variable	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR
Contextual Variables						
Community Education (Ref = low)						
Intermediate	4.34***	1.48*	3.72***	1.34	4.44***	1.41*
High	32.01***	4.54***	38.01***	5.06***	42.80***	5.15***
Community Media Exposure (Ref = low)						
Intermediate	4.86***	1.2	4.32***	1.11	5.20***	1.15
High	21.97***	2.20***	18.49***	1.61*	21.08***	1.53
Community Autonomy (Ref = low)						
Intermediate	1.57**	1.02	1.55**	1.03	1.58**	0.91
High	2.15**	0.62*	2.45***	0.85	2.45**	0.66
Community Wealth (Ref = low)						
Intermediate	4.89***	1.45*	4.97***	1.71***	6.14***	1.89***
High	16.73***	1.24	20.55***	1.70	26.15***	1.94*
Predisposing Variables						
Age (years)	0.96***	1.04**	0.97***	1.04**	0.97***	1.06***
Birth Order	0.68***	0.74***	0.74***	0.81***	0.71***	0.75***
Maternal Education (Ref = No Education)						
Primary	3.30***	1.79***	2.25***	1.28	2.73***	1.51**
Secondary or Higher	12.78***	2.19***	9.17***	1.84***	11.13***	2.02***
Husband's education (Ref = No Education)						
Primary	2.97***	1.66**	2.25***	1.35*	2.48***	1.39*
Secondary or Higher	8.91***	1.96***	5.92***	1.43**	7.08***	1.52***
Media Exposure (Ref = low)						
Intermediate	4.44***	1.54***	3.72***	1.32*	4.07***	1.27
High	11.65***	1.95***	6.90***	0.98	8.10***	1.03
Autonomy (Ref = None)						
Low	0.97	0.94	0.87	0.77	0.91	0.79
Intermediate	1.04	1.08	0.95	0.87	1.01	0.95

Table 9: Unadjusted and adjusted associations for appropriate ANC, SBA use, and institutional delivery in India

Outcome	**Appropriate ANC (N=5,594)**		**SBA Use (N = 5,667)**		**Institutional Delivery (N=5,668)**	
Variable	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR
High	1.17	1.07	1.19	1.00	1.23	1.06
Wanted Pregnancy (Ref = Not Wanted)						
Wanted	2.31***	0.86	2.27***	1.25	2.58***	1.26
Enabling Variables						
Location (Ref = Rural)						
Urban	3.80***	1.00	4.50***	1.23	5.19***	1.45*
Wealth Index (Ref = Poorest)						
Poor	1.77*	1.10	2.04***	1.50*	2.41***	1.71**
Intermediate	4.38***	1.75**	4.06***	2.01***	5.49***	2.45***
Rich	13.73***	2.17***	14.52***	3.24***	18.94***	3.17***
Richest	35.04***	2.71***	37.23***	4.15***	53.67***	4.40***
Need Variables						
Lost Pregnancy (Ref = No)						
Yes	0.72**	0.87	0.97	1.33*	0.86	1.17

*p<0.05; **p<0.01; ***p<0.001

Bivariate odds ratios were calculated by modelling each outcome against individual covariates. Multivariate Odds Ratios were calculated by modelling each outcome with all covariates. Survey weights were incorporated within both the bivariate and multivariate analysis.

Marginal Effects

The predicted probabilities of appropriate ANC, SBA use, and institutional delivery was obtained by varying wealth index while fixing the remaining covariates at specific values. These values were specified by examining the univariate distribution of this study's sample and choosing the most common frequency.

Given this, the predicted probability of the three MHU outcomes were calculated for a mother who was 27 years of age, with a birth order of 3, was uneducated, with low media exposure, had high autonomy, who wanted her pregnancy, whose husband had a secondary or higher education, who did have a prior lost pregnancy, and was from a community of low education, low media exposure, low autonomy, and low wealth in rural India. Figure 5 provides a graphical representation of the predicted probabilities for three MHU outcomes.

The results indicated that there was an overall upward trend, with the predicted probability of the three MHU outcomes steadily increasing for each increase in wealth quintile. The predicted probability of receipt of appropriate ANC was 9.9% among mothers in the poorest quintile and 23% for mothers in the richest quintile. A similar pattern was observed for SBA use and institutional delivery. The predicted probability of SBA use was 15.1% for mothers in the poorest quintile and 42.6 % for mothers in the richest quintile. The predicted probability of institutional delivery 9.4% and 31.4% for mothers in the richest quintile.

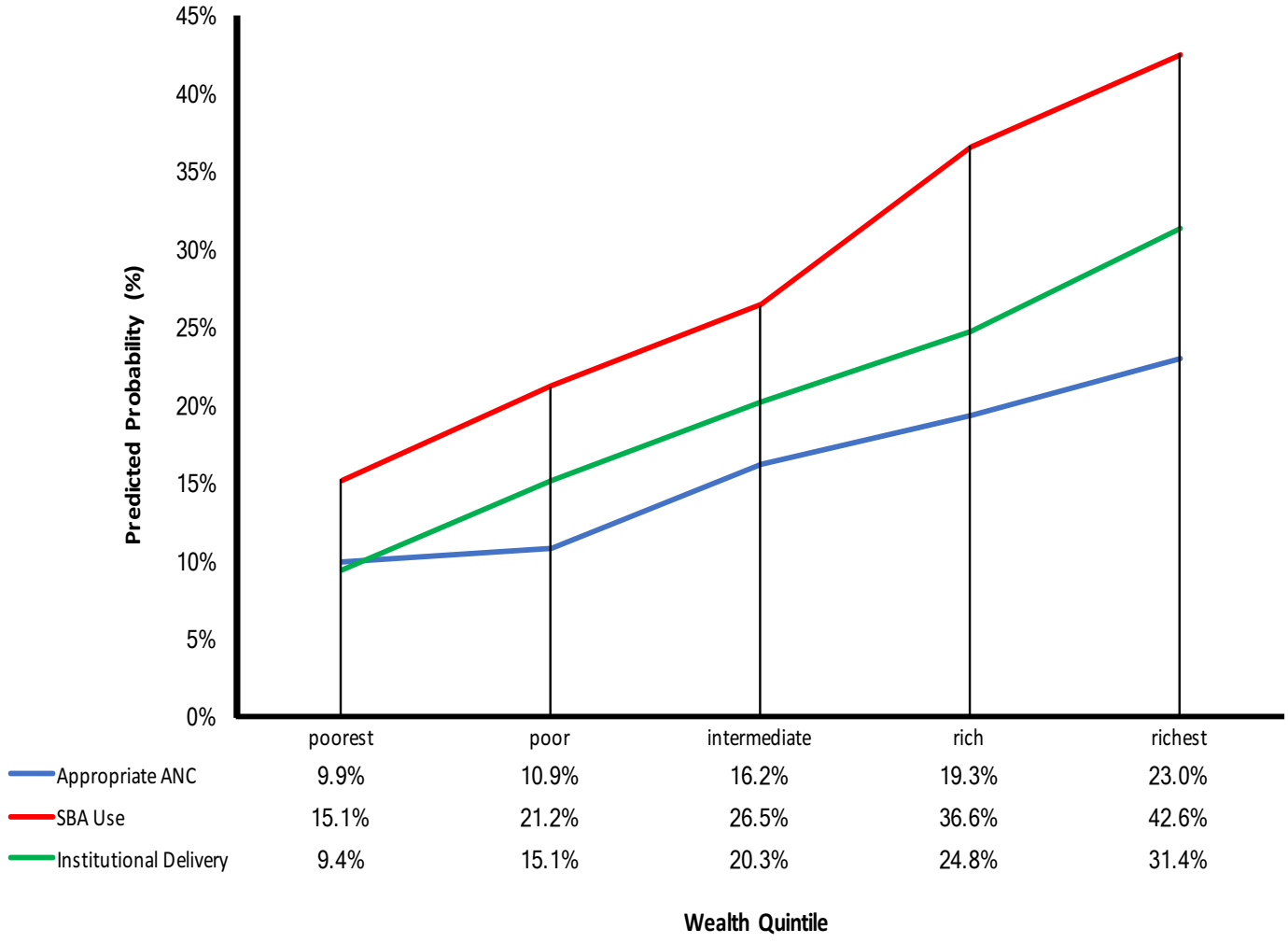


Figure 5: Predicted probabilities of appropriate ANC, SBA use, and institutional delivery among Muslim mothers in India

4.1.2 Results for Pakistan

This section describes the results of the univariate, bivariate, and multivariate analysis of maternal healthcare utilization (MHU) among Muslim mothers in Pakistan.

Univariate Results

The univariate distribution of the three outcomes and independent variables can be found in Table 10. The results indicated that approximately 39% of Pakistani Muslims (n=2,838) received appropriate ANC, 57% (n=4,181) used a SBA, and 53% (n=3,913) had an institutional delivery.

With regards to contextual variables, the highest proportion of mothers resided in communities of low education (38%, n=2,781), low media exposure (45%, n=3,349) low autonomy (37%, n=2,732), and low wealth (37%, n=2,734).

For predisposing variables, the average age of the respondents was 30 years with a mean birth order of 3.8. The highest proportion of mothers were not educated (55%, n=4,083), followed by 31% (n=2,251) of mothers with a secondary or higher education, and 14% (n=1,051) with a primary education. In comparison, 56% (n=4,098) of husbands had a secondary education or higher education, followed by 31% (n=2,259) with no education, and 14% (n=1,005) with a primary education only. Only 6% (n=405) of mothers were placed in the high media exposure group, while 52% (n=3,843) had low media exposure, followed by 43% (n=3,134) with intermediate media exposure. The highest proportion of mothers had no autonomy (47%, n=3,492) and wanted their most recent pregnancy (91%, n=6,675).

Regarding enabling variables, 56% (n=4,145) of mothers were from rural areas and the proportion of mothers within each wealth quintile was distributed relatively equally. For the one need variable, lost pregnancy, almost a quarter of the sample had a lost pregnancy prior to their most recent birth (25%, n=1,818).

Bivariate Analysis

This section describes the results for the bivariate analysis for appropriate ANC, SBA use, and institutional delivery. Table 11 lists the unadjusted associations for the three MHU outcomes against all independent variables. For a detailed presentation of the bivariate results with confidence intervals, see Tables 22, 24, and 26 in Appendix E.

For the contextual variables, dose-response associations were observed across all community variables. Regarding predisposing variables, mothers of older age and higher birth order was associated with lesser odds of appropriate ANC, SBA use, and institutional delivery. Compared to uneducated mothers or mothers with uneducated husbands, the odds of each outcome became increasingly higher with each level of education. Similar dose-response relationships were noted for media exposure and the three outcomes. Mothers who wanted their pregnancy had higher odds of appropriate ANC, SBA use, and institutional delivery compared to mothers who did not want their pregnancy. Autonomy was also significantly associated with increased odds of appropriate ANC, SBA use, and institutional delivery.

For enabling variables, urban mothers had the highest odds of appropriate ANC, SBA use, and institutional delivery compared to rural mothers. Compared to mothers within the poorest wealth quintile, the odds appropriate ANC, SBA use, and institutional

Table 10: Univariate distribution of dependent and independent variables in Pakistan

Variable	Pakistan N (%)	
Dependent Variables		
Appropriate ANC		
< 4 Visits	4529	(61.5%)
≥ 4 Visits	2838	(38.5%)
SBA use		
No	3183	(43.2%)
Yes	4181	(56.8%)
Institutional Delivery		
No	3465	(47.0%)
Yes	3913	(53.0%)
Contextual Variables		
Community Education		
Low	2781	(37.7%)
Intermediate	2447	(33.1%)
High	2157	(29.2%)
Community Media Exposure		
Low	3349	(45.3%)
Intermediate	1844	(25.0%)
High	2192	(29.7%)
Community Autonomy		
Low	2732	(37.0%)
Intermediate	2465	(33.4%)
High	2188	(29.6%)
Community Wealth		
Low	2734	(37.0%)
Intermediate	2538	(34.4%)
High	2113	(28.6%)
Predisposing Variables		
Age (mean ± SD)	29.6	± 6.4
Birth Order (mean ± SD)	3.8	± 2.4
Maternal Education		
No Education	4083	(55.3%)
Primary	1051	(14.2%)
Secondary or Higher	2251	(30.5%)
Husband Education		
No Edu.	2259	(30.7%)
Primary	1005	(13.7%)
Secondary or Higher	4098	(55.7%)
Media Exposure		
Low	3843	(52.1%)
Intermediate	3134	(42.5%)
High	405	(5.5%)
Autonomy		
None	3492	(47.4%)
Low	909	(12.3%)

Table 10: Univariate distribution of dependent and independent variables in Pakistan

Variable	Pakistan N (%)	
Medium	762	(10.3%)
High	2208	(30.0%)
Wanted Pregnancy		
Not Wanted	697	(9.5%)
Wanted	6675	(90.5%)
Enabling Variables		
Location		
Rural	4145	(56.1%)
Urban	3240	(43.9%)
Wealth Index		
Poorest	1608	(21.8%)
Poor	1464	(19.8%)
Intermediate	1410	(19.1%)
Rich	1417	(19.2%)
Richest	1486	(20.1%)
Need Variables		
Lost Pregnancy		
No	5567	(75.4%)
Yes	1818	(24.6%)

delivery significantly increased in magnitude for each wealth quintile. The need variable, lost pregnancy, was not significantly associated with the three MHU outcomes.

Multivariate Results

This sub-section describes the multivariate logistic regression results for appropriate ANC, SBA use, and institutional delivery in Pakistan under separate headings. The results for the three outcomes are provided in Table 11. For a complete presentation of multivariate results (with confidence intervals) in Pakistan, see Tables 23, 25, and 27 in Appendix E. A summary of significant variables for the three MHU outcomes can be found in Table 14.

Appropriate Antenatal Care

Community education and media exposure were significantly associated with appropriate ANC. Birth order, maternal and husband's education, media exposure, and autonomy were the predisposing variables significantly associated with appropriate ANC. The enabling variables, wealth index and location, and the need variable, lost pregnancy, were also significantly associated with the outcome.

The odds of appropriate ANC was 67% higher among mothers from high education communities compared to mothers from low education communities (OR: 1.67, 95% CI: 1.16, 2.38). Compared to mothers from low media exposure communities, those from communities of intermediate (OR: 0.70, 95% CI: 0.56, 0.87) and high media exposure had significantly lesser odds of appropriate ANC (OR: 0.76, 95% CI: 0.60, 0.98)

Higher birth order was found to significantly decrease the odds of appropriate ANC (OR: 0.89, 95% CI: 0.84, 0.94). Compared to mothers with no education, mothers with a

primary education had a 39% higher odds of appropriate ANC (OR: 1.39, 95% CI: 1.09, 1.78), while those with a secondary or higher education had over a two times greater odds of appropriate ANC (OR: 2.16, 95% CI: 1.72, 2.72). Women whose husbands had a secondary or higher education had significantly greater odds of appropriate ANC compared to women with uneducated husbands (OR: 1.24, 95% CI: 1.004,1.52). Compared to mothers with low media exposure, the odds of appropriate ANC became increasingly higher for each level of media exposure. Mothers with low and intermediate autonomy had a 33% (OR: 1.33, 95% CI: 1.04, 1.70) and 41% higher odds (OR: 1.41, 95% CI: 1.06, 1.87) of appropriate ANC respectively, compared to mothers with no autonomy.

Urban mothers had a 36% higher odds of appropriate ANC than rural mothers (OR: 1.36, 95% CI: 1.10, 1.69). Compared to mothers in the poorest wealth quintile, the odds of appropriate ANC was highest for mothers from the richest quintile (OR: 4.39, 95% CI: 3.03, 6.37), followed by mothers from the rich quintile (OR: 2.32, 95% CI: 1.70, 3.16), the intermediate quintile (OR: 1.64, 95% CI: 1.24, 2.17), and lastly the poor quintile (OR: 1.39, 95% CI: 1.08, 1.81). Lastly, mothers who had a lost pregnancy prior to their most recent birth had a 44% higher odds of appropriate ANC compared to mothers who did not (OR: 1.44, 95% CI: 1.21, 1.72).

The variables not associated with appropriate ANC in the adjusted model were community autonomy and wealth, age, and wanted pregnancy.

Skilled Birth Attendant Use

Among contextual variables, community media exposure was the only significant variables in the multivariate model. Age, birth order, maternal and husband's education, and media exposure were the predisposing variables significantly associated with SBA use. The enabling variable, wealth index, and need factor, lost pregnancy, were also significantly associated with the outcome.

The odds of SBA use was 43% higher for among mothers from high media exposure communities compared to mothers from low media exposure communities (OR: 1.43, 95% CI: 1.03, 1.98). Older age was associated with increased odds of SBA use (OR: 1.02, 95% CI: 1.0002, 1.03), while higher birth order was associated with significantly lesser odds of SBA use (OR: 0.87, 95% CI: 0.83, 0.91). Compared to mothers with no education, mothers with a secondary or higher education had an 95% higher odds of SBA use (OR: 1.95, 95% CI: 1.51, 2.52). Women whose husbands had a secondary or higher education also had an increased odds of SBA use compared to those with uneducated husbands (OR: 1.41, 95% CI: 1.18, 1.69). Compared to mothers with the low media exposure, the odds of SBA use became increasingly higher for each level of media exposure.

In terms of wealth index, compared to mothers in the poorest wealth quintile, the odds of SBA use was over two times greater for mothers in the rich quintile (OR: 2.07, 95% CI: 1.44, 2.96) and over three times greater for mothers in the richest wealth quintile (OR: 3.23, 95% CI: 1.99, 5.24). Lastly, mothers who had a lost pregnancy prior to their most recent birth had a 21% higher odds of SBA use compared to mothers who did not (OR: 1.21, 95% CI: 0.1.03,1.41).

Apart from community media exposure, all other community variables were not significantly associated with SBA use in the adjusted model. Autonomy, wanted pregnancy, and location were also not significantly associated with the outcome.

Institutional Delivery

Age, birth order, maternal and husband's education, and media exposure were significantly associated with institutional delivery. The enabling factor, wealth index, and need variable, lost pregnancy, were also significantly associated with the outcome.

Older age was associated with increased odds of institutional delivery (OR: 1.02, 95% CI: 1.004, 1.04), while higher birth order was associated with significantly lower odds of institutional delivery (OR: 0.86, 95% CI: 0.82, 0.91). Compared to mothers with no education, the odds of institutional delivery was over two times greater for mothers with a secondary or higher education compared to mothers with no education (OR: 2.08, 95% CI: 1.62, 2.66). Similarly, women whose husbands had a secondary or higher education had a 39% higher odds of institutional delivery compared to those with uneducated husbands (OR: 1.39, 95% CI: 1.16, 1.65). A dose-response relationship was noted for media exposure.

In terms of wealth, compared to mothers within the poorest wealth quintile, the odds of institutional delivery was over two times greater for mothers in the rich quintile (OR: 2.09, 95% CI: 1.46, 2.99) and nearly three and a half times greater for mothers in the richest quintile (OR: 3.49, 95% CI: 2.20, 5.52). Lastly, a lost pregnancy was associated with a 29% higher odds of institutional delivery (OR: 1.29, 95% CI: 1.11, 1.51).

Autonomy, wanted pregnancy, location, and all community variables were not significantly associated with institutional delivery within the adjusted model.

Table 11: Unadjusted and adjusted associations for appropriate ANC, SBA use, and institutional delivery in Pakistan

Pakistan	**Appropriate ANC (N=7,328)**		**SBA Use (N =7,332)**		**Institutional Delivery (N=7,345)**	
Variable	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR
Contextual Variables						
Community Education (Ref = Low)						
Intermediate	2.53***	1.17	1.83***	0.87	1.67***	0.76
High	9.41***	1.67**	6.49***	1.14	5.84***	0.93
Community Media Exposure (Ref = Low)						
Intermediate	1.42*	0.70**	1.55**	0.99	1.37*	0.89
High	2.90***	0.76*	3.42***	1.43*	3.12***	1.3
Community Autonomy (Ref = Low)						
Intermediate	2.40***	1.13	1.92***	1.18	1.88***	1.21
High	3.04***	1.08	2.29***	1.15	2.41***	1.3
Community Wealth (Ref = Low)						
Intermediate	2.04***	0.96	2.06***	1.13	1.85***	1.07
High	8.94***	1.22	5.92***	1.06	5.75***	1.11
Predisposing Variables						
Age	0.98***	1.01	0.97***	1.02*	0.98***	1.02*
Birth Order	0.81***	0.89***	0.82***	0.87***	0.82***	0.86***
Maternal Education (Ref = No Education)						
Primary	2.59***	1.39**	1.99***	1.14	1.94***	1.17
Secondary or Higher	8.70***	2.16***	6.94***	1.95***	6.86***	2.08***
Husband's education (Ref = No Education)						
Primary	1.44**	0.91	1.39**	0.99	1.49***	1.07
Secondary or Higher	3.67***	1.24*	3.34***	1.41***	3.31***	1.39***
Media Exposure (Ref = Low)						
Intermediate	3.11***	1.29**	2.62***	1.31**	2.66***	1.34**
High	8.10***	2.03***	8.41***	2.14***	7.62***	1.99**
Autonomy (Ref = None)						
Low	1.70***	1.33*	1.34*	1.06	1.37**	1.07
Intermediate	1.98***	1.41*	1.34*	0.97	1.34*	0.93

Table 11: Unadjusted and adjusted associations for appropriate ANC, SBA use, and institutional delivery in Pakistan

Pakistan	**Appropriate ANC (N=7,328)**		**SBA Use (N =7,332)**		**Institutional Delivery (N=7,345)**	
Variable	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR
High	1.45***	1.19	1.19	1.00	1.21*	1
Wanted Pregnancy (Ref = Not Wanted)						
Wanted	1.51***	1.31	1.42**	1.1	1.57***	1.27
Enabling Variables						
Location (Ref = Rural)						
Urban	4.72***	1.36**	3.17***	1.07	3.24***	1.11
Wealth Index (Ref = Poorest)						
Poor	1.83***	1.39*	1.41*	1.08	1.35*	1.08
Intermediate	2.99***	1.64***	2.29***	1.33	2.09***	1.28
Rich	6.69***	2.32***	4.94***	2.07***	4.65***	2.09***
Richest	23.54***	4.39***	13.76***	3.23***	13.86***	3.49***
Need Variables						
Lost Pregnancy (Ref = No)						
Yes	1.09	1.44***	0.99	1.21*	1.05	1.29**

*p<0.05; **p<0.01; ***p<0.001

Bivariate odds ratios were calculated by modelling each outcome against individual covariates. Multivariate Odds Ratios were calculated by modelling each outcome with all covariates. Survey weights were incorporated within both the bivariate and multivariate analysis.

Marginal Effects

The predicted probabilities of appropriate ANC, SBA use, and institutional delivery was obtained by varying wealth index while fixing the remaining covariates at specific values. These values were specified by examining the univariate distribution of this study's sample and choosing the most common frequency.

Given this, the predicted probability of the three MHU outcomes were calculated for an average mother who was 30 years of age, with a birth order of 4, was uneducated, with low media exposure, had no autonomy, who wanted her pregnancy, whose husband had a secondary or higher education, who did not have a prior lost pregnancy, and was from a community of low education, low media exposure, low autonomy, and low wealth in rural Pakistan. Figure 6 provides a graphical representation of the predicted probabilities for three MHU outcomes.

The results indicated that there was an overall upward trend in the predicted probability of the three MHU outcomes. For appropriate ANC, the predicted probability of appropriate ANC was 12.1% among mothers in the poorest quintile and 38% for mothers in the richest quintile. Regarding SBA use and institutional delivery, there was little change in the predicted probability for mothers in the poorest quintile through to the intermediate quintile, as seen by the relatively flat slope. The predicted probability for SBA use was 42.1% for mothers in the intermediate quintile and 63.8% for those in the richest quintile. The predicted probability of institutional delivery was 37.7% for mothers in the poorest quintile and 62.2% for those in the richest quintile.

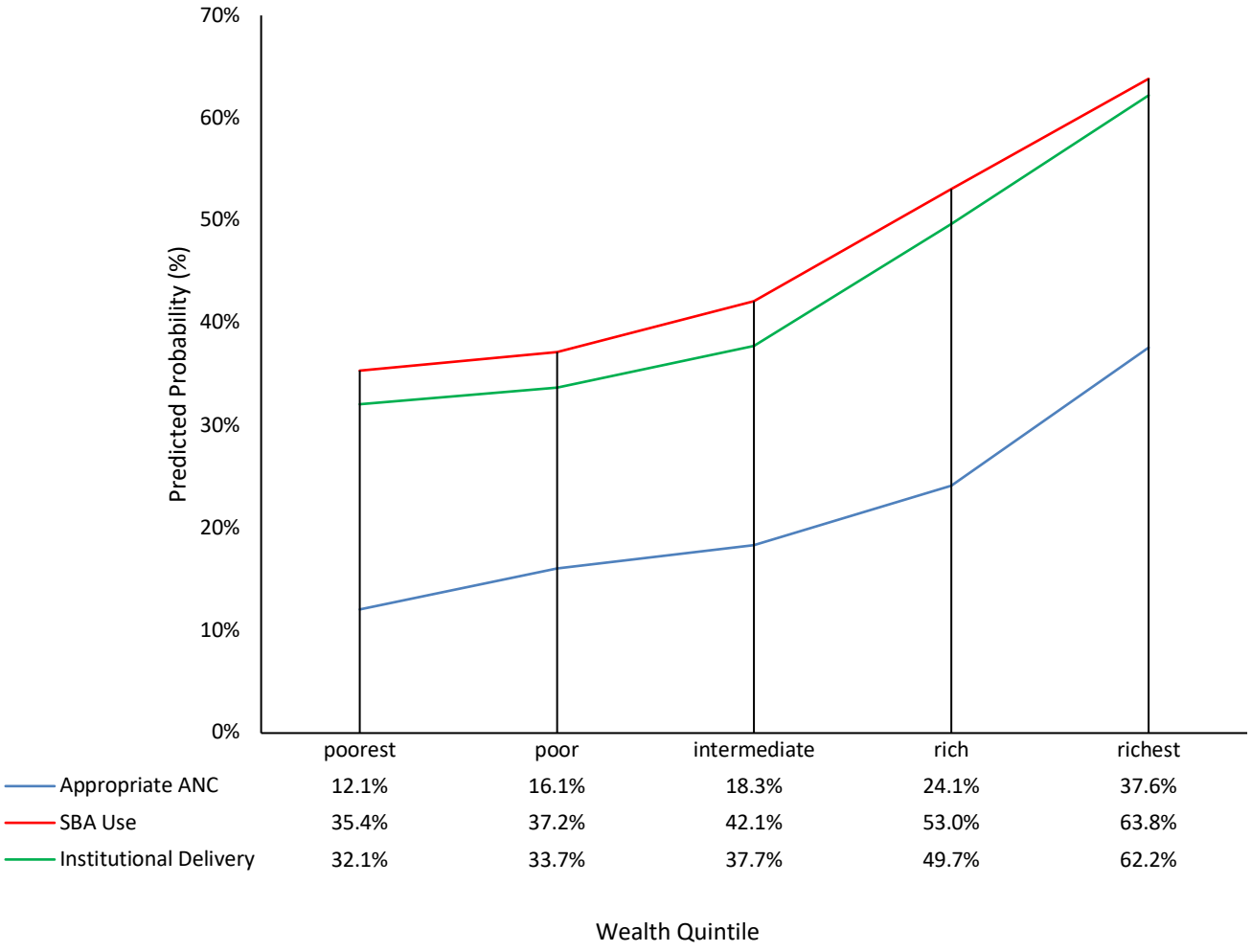


Figure 6: Predicted probability of appropriate ANC, SBA use, and institutional delivery among Muslim mothers in Pakistan

4.1.3 Results for Bangladesh

This section describes the results of the univariate, bivariate, and multivariate analysis of maternal healthcare utilization (MHU) among Muslim mothers in Bangladesh.

Univariate Analysis

The univariate distribution of the three outcomes and all independent variables can be found in Table 12. The results indicated that approximately 32% (n=1,293) of Bangladeshi Muslims received appropriate ANC, 44% (n=1,795) used a SBA, and 39% (n=1,606) had an institutional delivery.

Regarding contextual variables, the highest proportion of mothers resided in communities of low education (37%, n=1,490), low media exposure (38%, n=1,548), low autonomy (37%, n=1,518), and low wealth (35%, n=1,443).

For predisposing variables, the average age of the respondents was 25 years with a mean birth order of 2.2. The greatest proportion of mothers and husbands had a secondary or higher education (59%, n=2,419 for mothers; 47%, n=1,906 for husbands). Only 7% (n=279) of mothers were in the high media exposure group, while 49% (n=1,989) had the low media exposure, followed by 45% (n=1,815) with intermediate media exposure. The highest proportion of mothers had high autonomy (42%, n=1,713) and wanted their pregnancy (89%, n=3,649).

Regarding enabling variables, 68% (n=2,790) of mothers were from rural areas and the proportion of mothers within each wealth quintile was distributed relatively equally. With regards to the need variable, lost pregnancy, 87% (3,560) of the sample did not have a lost pregnancy prior to their most recent birth.

Bivariate Analysis

This section describes the results for the bivariate analysis for appropriate ANC, SBA use, and institutional delivery. The need variable, lost pregnancy, was not associated with any of the MHU outcomes. Table 13 lists the unadjusted associations for appropriate ANC, SBA use, and institutional delivery against all independent variables. For a detailed presentation of the bivariate results with confidence intervals, see Tables 28, 30, and 32 in Appendix F.

For contextual variables, dose-response relationships were observed for community education and media exposure for the three outcomes. Compared to mothers from low wealth communities, the odds of SBA use and institutional delivery became increasingly higher for mothers within each level of community wealth. A similar relationship was noted for increasing community autonomy and appropriate ANC.

Regarding predisposing variables, a higher birth order was associated with lower odds of appropriate ANC, SBA use and institutional delivery. Maternal and husband's education were associated with increased odds of appropriate ANC. Similarly, compared to mothers with low media exposure, the odds of appropriate ANC, SBA use, and institutional delivery became increasingly higher for level of media exposure. A wanted pregnancy had significantly higher odds for the three outcomes compared to mothers who did want their pregnancy. Autonomy was also associated with increased odds of appropriate ANC, SBA use, and institutional delivery. Age was not significantly associated with the three MHU outcomes.

Table 12: Distribution of dependent and independent variables in Bangladesh

Variable	Bangladesh N (%)	
Outcome Variables		
Appropriate ANC		
< 4 Visits	2784	(68.3%)
≥ 4 Visits	1293	(31.7%)
SBA use		
No	2288	(56.0%)
Yes	1795	(44.0%)
Institutional Delivery		
No	2476	(60.7%)
Yes	1606	(39.3%)
Contextual Variables		
Community Education		
Low	1490	(36.5%)
Intermediate	1271	(31.1%)
High	1322	(32.4%)
Community Media Exposure		
Low	1548	(37.9%)
Intermediate	1397	(34.2%)
High	1138	(27.9%)
Community Autonomy		
Low	1518	(37.2%)
Intermediate	1259	(30.8%)
High	1306	(32.0%)
Community Wealth Index		
Low	1443	(35.3%)
Intermediate	1341	(32.8%)
High	1299	(31.8%)
Predisposing Variables		
Age (mean ± SD)	24.6	± 5.8
Birth Order (mean ± SD)	2.2	± 1.4
Maternal Education		
No Education	536	(13.1%)
Primary	1128	(27.6%)
Secondary or Higher	2419	(59.3%)
Husband Education		
No Education	943	(23.1%)
Primary	1232	(30.2%)
Secondary or Higher	1906	(46.7%)
Media Exposure		
Low	1989	(48.7%)
Intermediate	1815	(44.5%)
High	279	(6.8%)
Autonomy		
None	1114	(27.3%)
Low	668	(16.4%)

Table 12: Distribution of dependent and independent variables in Bangladesh

Variable	Bangladesh N (%)	
Medium	588	(14.4%)
High	1713	(42.0%)
Wanted Pregnancy		
Not Wanted	434	(10.6%)
Wanted	3649	(89.4%)
Enabling Variables		
Location		
Rural	2790	(68.3%)
Urban	1293	(31.7%)
Wealth Index		
Poorest	836	(20.5%)
Poor	777	(19.0%)
Intermediate	774	(19.0%)
Rich	871	(21.3%)
Richest	825	(20.2%)
Need Variables		
Lost Pregnancy		
No	3560	(87.2%)
Yes	523	(12.8%)

For enabling variables, mothers from urban areas had higher odds of appropriate ANC, SBA use, and institutional delivery compared to mothers from rural areas. Compared to mothers in the poorest quintile, the odds of SBA use and institutional delivery significantly increased with each level of wealth index. A similar trend was noted for appropriate ANC.

Multivariate Results

This sub-section presents the multivariate logistic regression results for appropriate ANC, SBA use, and institutional delivery in Bangladesh under separate headings. The results for the three outcomes are provided in Table 13. For a complete presentation of multivariate results (with confidence intervals) in Bangladesh, see Tables 29, 31, and 33 in Appendix F. A summary of significant variables for the three MHU outcomes can be found in Table 14.

Appropriate Antenatal Care

Community media exposure and wealth were significantly associated with appropriate ANC. Birth order, maternal education, and media exposure were the predisposing variables significantly associated with appropriate ANC. The enabling variable, wealth index, was also significantly associated with the outcome.

A dose-response relationship was noted for community media exposure. Compared to mothers within low wealth communities, respondents from intermediate wealth (OR: 0.67, 95% CI: 0.47, 0.95) and high wealth communities (OR: 0.63, 95% CI: 0.40, 0.97) had significantly lesser odds of appropriate ANC.

Higher birth order was found to significantly decrease the odds of appropriate ANC (OR: 0.78, 95% CI: 0.65, 0.95). Compared to mothers with no education, mothers with secondary or higher education had an 87% higher odds of appropriate ANC (OR: 1.87, 95% CI: 1.29, 2.71). Mothers with intermediate media exposure had a 44% higher odds of appropriate ANC compared to mothers with low media exposure (OR: 1.44, 95% CI: 1.12, 1.86).

The odds for appropriate ANC was 92% higher for mothers in the rich quintile (OR: 1.92, 95% CI: 1.15, 3.19), while mothers in the richest quintile had over two and a half times greater odds for appropriate ANC (OR: 2.69, 95% CI: 1.65, 4.40), compared to mothers in the poorest wealth quintile.

The variables that were not significant were community education and autonomy, husband's education, autonomy, wanted pregnancy, location, and lost pregnancy.

Skilled Birth Attendant Use

Among contextual variables, community education and wealth were significantly associated with SBA use. Age, birth order, maternal and husband's education were the predisposing variables significantly associated SBA use. The enabling variable, wealth index was also significantly associated with the outcome.

The odds of SBA use was significantly higher for mothers within communities of high education (OR: 1.54, 95% CI: 1.14, 2.07) and wealth (OR: 1.57, 95% CI: 1.12, 2.22) compared to mothers from communities with the lowest respective characteristics. Older age was associated with increased odds of SBA use (OR: 1.07, 95% CI: 1.03, 1.10), while higher birth order associated with significantly less odds of SBA use (OR: 0.63,

95% CI: 0.55, 0.71). Compared to mothers with no education, the odds of SBA became increasingly higher for each level of education. Compared to women with uneducated husbands, the odds of SBA use was 75% higher for women whose husbands had a secondary or higher education (OR: 1.75, 95% CI: 1.33, 2.29). Lastly, mothers from the rich quintile had a 54% higher odds of SBA use (OR: 1.54, 95% CI: 1.14, 2.08), while those from the richest wealth quintile had over two and a half times greater odds of SBA use (OR: 2.55, 95% CI: 1.84, 3.55), compared to mothers from the poorest wealth quintile.

The variables that were not significant in the model were community media exposure and autonomy, media exposure, autonomy, wanted pregnancy, location, and lost pregnancy.

Institutional Delivery

Among contextual variables, community wealth was the only variable significantly associated with institutional delivery. Age, birth order, maternal and husband's education were the predisposing variables significantly associated with institutional delivery. The enabling variable, wealth index, was also significantly associated with the outcome.

Compared to low wealth communities, mothers from high wealth communities had a 54% higher odds of institutional delivery (OR: 1.54, 95% CI: 1.01, 2.35). Older age was associated with increased odds of institutional delivery (OR: 1.08, 95% CI: 1.04, 1.12), while higher birth order was associated with significantly less odds of institutional delivery (OR: 0.61, 95% CI: 0.53, 0.70). Compared to women with no education, the odds of institutional delivery became significantly higher with each level of education. Women with husbands with a secondary or higher education had a 57% higher odds of

institutional delivery compared to women with uneducated husbands (OR: 1.57, 95% CI: 1.19, 2.06). Lastly, compared to mothers from the poorest wealth quintile, mothers from the rich quintile had a 64% higher odds of institutional delivery (OR: 1.64, 95% CI: 1.21, 2.21), while those from the richest wealth quintile had nearly three times the odds of institutional delivery (OR: 2.92, 95% CI: 2.04, 4.18), compared to mothers from the poorest wealth quintile.

All community variables except community wealth were insignificant in the adjusted model. Media exposure, autonomy, wanted pregnancy, location, and lost pregnancy were also insignificant.

Table 13: Unadjusted and adjusted associations for appropriate ANC, SBA use, and institutional delivery in Bangladesh

Outcome	**Appropriate ANC (N=4,075)**		**SBA Use (N =4,081)**		**Institutional Delivery (N=4,080)**	
Variable	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR
Contextual Variables						
Education (Ref = Low)						
Intermediate	1.47*	0.84	2.50***	1.3	2.39***	1.24
High	2.22***	0.92	4.67***	1.54**	3.93***	1.26
Media Exposure (Ref = Low)						
Intermediate	1.99***	1.65**	1.69***	1.13	1.72***	1.16
High	3.27***	1.79**	3.74***	1.31	3.59***	1.2
Autonomy (Ref = Low)						
Intermediate	1.44*	1.13	1.31	0.93	1.40	1.02
High	1.76***	1.09	1.75**	1.02	1.88***	1.1
Wealth Index (Ref = Low)						
Intermediate	1.18	0.67*	2.31***	1.27	2.13***	1.21
High	2.62***	0.63*	5.39***	1.57**	5.41***	1.54*
Predisposing Variables						
Age	0.99	1.03	0.98	1.07***	0.99	1.08***
Birth Order	0.74***	0.78*	0.67***	0.63***	0.68***	0.61***
Maternal Education (Ref = No Education)						
Primary	1.59	1.26	2.16***	1.67*	1.95***	1.58*
Secondary or Higher	3.96***	1.87***	6.32***	2.29***	5.35***	2.11**
Husband Education (Ref = No Education)						
Primary	1.67**	1.16	1.87***	1.18	1.77***	1.15
Secondary or Higher	3.58***	1.34	5.45***	1.75***	4.88***	1.57**
Media Exposure (Ref = Low)						
Intermediate	2.69***	1.44**	2.79***	1.03	2.91***	1.08
High	6.02***	1.87	5.95***	1.26	6.42***	1.4
Autonomy (Ref = None)						
Low	1.24	1.16	1.23	1.09	1.23	1.09
Intermediate	1.23	1.1	1.31*	1.13	1.40*	1.21
High	1.29*	1.15	1.23	1.1	1.25*	1.06

Wanted Pregnancy (Ref = Not Wanted)						
Wanted	1.87*	1.02	2.01***	0.83	1.86***	0.81
Enabling Variables						
Location (Ref = Rural)						
Urban	2.38***	1.27	2.74***	1.07	2.99***	1.17
Wealth Index (Ref = Poorest)						
Poor	1.35	1.13	1.81***	1.21	1.73***	1.19
Intermediate	2.03***	1.2	2.73***	1.22	2.65***	1.26
Rich	3.27***	1.92*	4.57***	1.54**	4.58***	1.64**
Richest	6.42***	2.69***	12.28***	2.55***	12.83***	2.92***
Need Variables						
Lost Pregnancy (Ref = No)						
Yes	1.22	1.28	1.04	1.1	1.15	1.21

*p<0.05; **p<0.01; ***p<0.001

Bivariate odds ratios were calculated by modelling each outcome against individual covariates. Multivariate Odds Ratios were calculated by modelling each outcome with all covariates. Survey weights were incorporated within both the bivariate and multivariate analysis.

Marginal Effects

The predicted probabilities of appropriate ANC, SBA use, and institutional delivery was obtained by varying wealth index while fixing the remaining covariates at specific values. These values were specified by examining the univariate distribution of this study's sample and choosing the most common frequency.

Given this, the predicted probability of the three MHU outcomes were calculated for an average mother who was 25 years of age, with a birth order of 2, had a secondary or higher education, with low media exposure, had high autonomy, who wanted her pregnancy, whose husband had a secondary or higher education, who did not have a prior lost pregnancy, and was from a community of low education, low media exposure, low autonomy, and low wealth in rural Bangladesh. Figure 7 provides a graphical representation of the predicted probabilities for three MHU outcomes.

The results indicated that there was an overall upward trend in the predicted probability of the three MHU outcomes. For appropriate ANC, the predicted probability remained stable for mothers in the poorest quintile through to the intermediate quintiles. Regarding SBA use and institutional delivery, there was little change in the predicted probability for mothers in the poorest quintile through to the rich quintile, as seen by the relatively flat slope. The predicted probability for SBA use was 42.1% for mothers in the rich quintile and 54.7% for mothers in the richest quintile. The predicted probability for institutional delivery 34.8% for mothers in the rich quintile and 48.8% for mothers in the richest quintile.

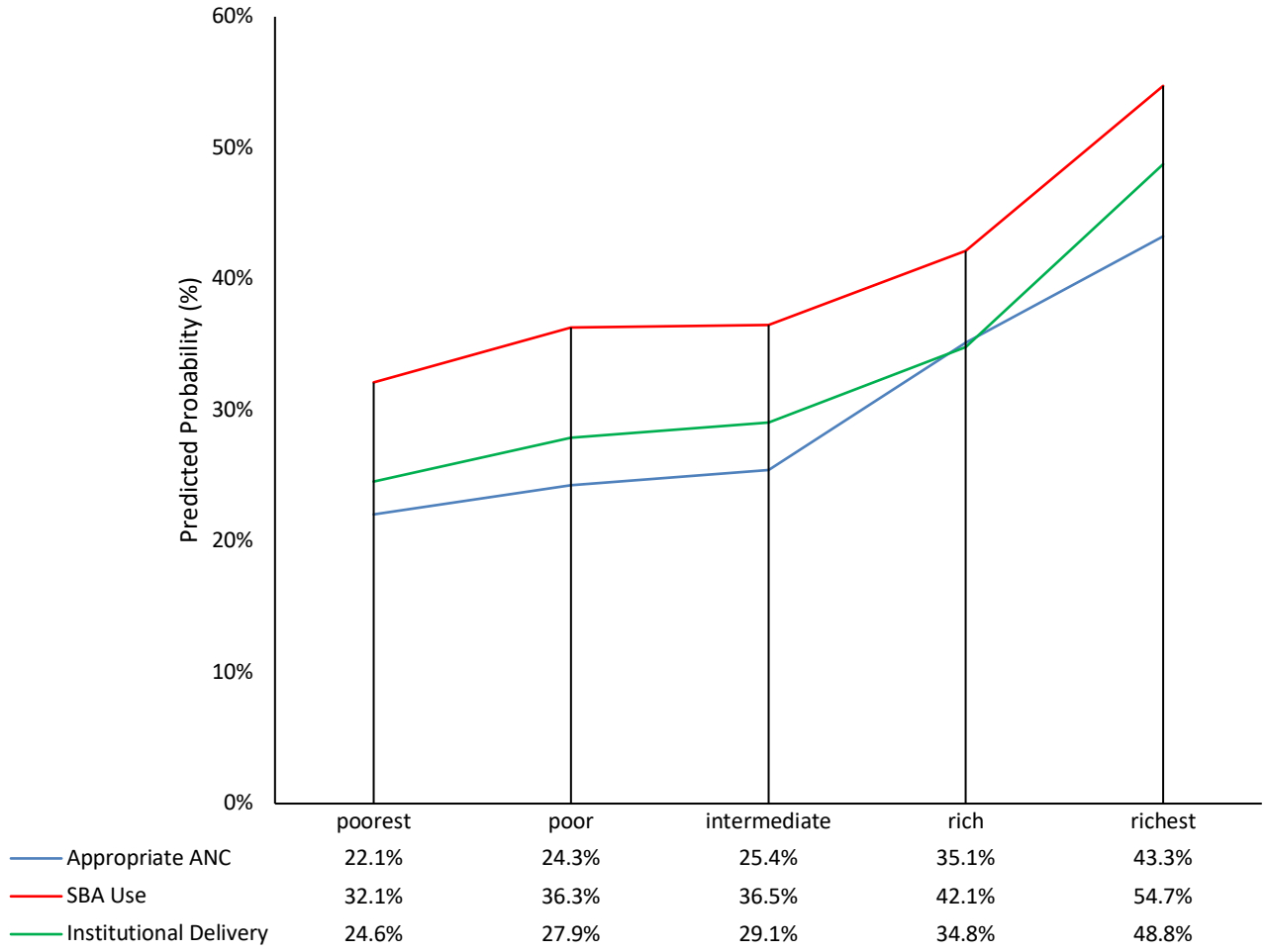


Figure 7: Predicted probability of appropriate ANC, SBA use, and institutional delivery among Muslim mothers in Bangladesh

4.1.4 Summary of Results

Table 14 provides a summary of all significant correlates for appropriate ANC, SBA use, and institutional delivery among Muslim mothers from India, Pakistan, and Bangladesh. The (+) or (-) indicates the directionality of associations for significant variables. Blank cells represent non-significant associations. Overall, age, birth order, maternal education, and wealth index were found to be significantly associated with appropriate ANC, SBA use, and institutional delivery in the three countries. Significant associations are further discussed within the discussion in Section 5.4.

Table 14: Summary of significant variables for appropriate ANC, SBA use, and institutional delivery among Muslim mothers from India, Pakistan, and Bangladesh

	Primary Objective								
	India			Pakistan			Bangladesh		
	Appropriate ANC	SBA use	Institutional Delivery	Appropriate ANC	SBA use	Institutional Delivery	Appropriate ANC	SBA use	Institutional Delivery
Contextual Variables									
Community Education	+	+	+	+				+	
Community Media Exposure	+	+		-	+		+		
Community Autonomy	-								
Community Wealth	+	+	+				-	+	+
Predisposing Variables									
Age	+	+	+		+	+		+	+
Birth Order	-	-	-	-	-	-	-	-	-
Maternal Education	+	+	+	+	+	+	+	+	+
Husband's education	+	+	+	+	+	+		+	+
Media Exposure	+	+		+	+	+	+		
Autonomy				+					
Wanted Pregnancy									
Enabling Variables									
Location			+	+					
Wealth Index	+	+	+	+	+	+	+	+	+
Need Variables									
Lost Pregnancy		+		+	+	+			

+ or – indicates directionality of relationship

4.2 Secondary Objective

The secondary objective of this study was to assess whether country moderated the effect of religion on appropriate ANC, SBA use, and institutional delivery among mothers from India and Bangladesh. Within India, 5,742 Muslim mothers and 30,331 Non-Muslim mothers were included in the analysis. Within Bangladesh, 4,083 Muslim mothers and 358 Non-Muslim mothers were included in the analysis. Controlling for this study's contextual, predisposing, enabling, and need variables, the interaction effect between country and religion was found to be insignificant for the three MHU outcomes (Table 15).

Table 15: Adjusted interaction between country and religion for appropriate ANC, SBA Use, and institutional Delivery among Muslim mothers in India and Bangladesh [Secondary]

Outcome	Appropriate ANC (N=39,751)	SBA Use (N =40,116)	Institutional Delivery (N=40,123)
Country x Religion	0.89	0.98	1.19
Main Effects			
Country (Ref = Bangladesh)			
India	2.38***	2.28***	1.63*
Religion (Ref = Non-Muslim)			
Muslim	1.11	0.83	0.78

Multivariate Odds Ratios were calculated by modelling each outcome with all covariates. Survey weights were incorporated within the multivariate analysis.
Adjusted associations were calculated by controlling for community education, community media exposure, community autonomy, community wealth, age, birth order, maternal education, husband's education, media exposure, autonomy, wanted pregnancy, location, wealth index, and lost pregnancy.

Chapter 5

5 Discussion

5.1 Summary

This study utilized the 2005-06 National Family and Health Survey – 3rd edition (NFHS-3) of India, the 2012-13 Pakistan Demographic Health Survey (PDHS), and 2014 Bangladesh Demographic Health Survey (BDHS) to examine maternal healthcare utilization (MHU). The primary objective of this study assessed if there was equity in receipt of appropriate antenatal care (ANC), skilled birth attendant use (SBA use), and having institutional delivery among Muslim mothers from India, Pakistan, and Bangladesh. The secondary aim of this study was to assess if country of residence modified the effect of religion on the three MHU outcomes.

5.2 Overview of Findings

Primary Objective

This study revealed inequity in MHU among Muslim mothers in India, Pakistan, and Bangladesh. For ease, Figure 8 provides one graph of the predicted probabilities for appropriate ANC visits, SBA use, and institutional delivery in the three countries.

Secondary Objective

The secondary objective of this study examined whether country of residence modified the effect of religion on MHU between Muslim and Non-Muslim women from Bangladesh and India, recalling that the dataset for Pakistan, because it a Muslim majority country, did not distinguish religion and therefore was excluded from this secondary analysis. The interaction effect between country and religion was insignificant

for receipt of appropriate ANC, SBA use, and institutional delivery, suggesting that country does not modify the effect between religion and MHU.

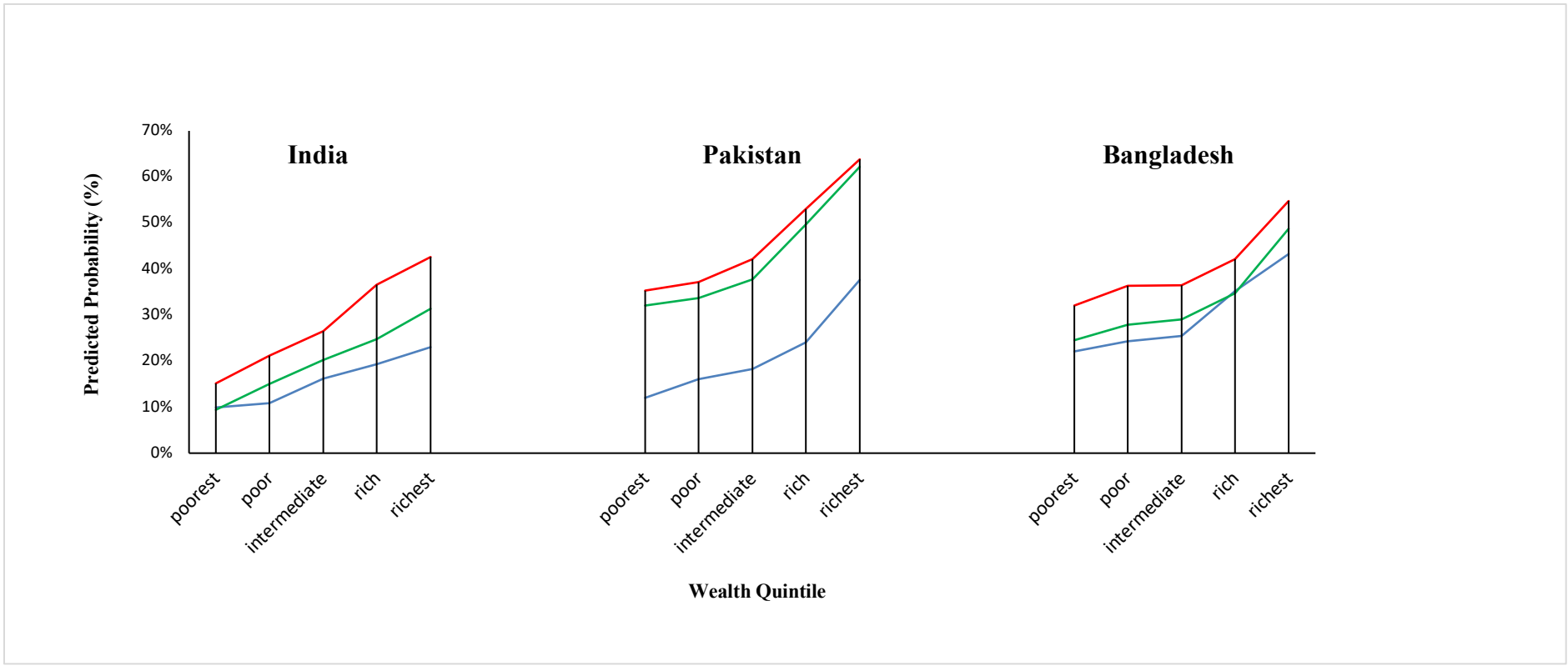


Figure 8: Predicted probability of appropriate ANC, SBA use, and institutional delivery in India, Pakistan, and Bangladesh. Blue lines represent appropriate ANC; Red lines represent SBA use; Green lines represent institutional delivery.

5.3 Primary Objective

Equity in Maternal Healthcare Utilization among Muslim Mothers in India

This study revealed substantial poor-rich gaps in appropriate ANC, SBA use, and institutional delivery among Muslim mothers in India. As seen in Figure 8, Muslim mothers in the richest wealth quintile had the highest probabilities of the three MHU outcomes, with the probability of appropriate ANC, SBA use, and institutional delivery steadily decreasing for Muslim mothers from lower wealth quintiles. These results are consistent with other research examining inequity in MHU in India (Ghosh, 2015; Prusty et al., 2015; Saxena et al., 2013; Singh et al., 2013b). Overall, this study's results along with previous research underscores the urgent need for equitable provision of maternal healthcare in the country.

There is no doubt that India has seen significant progress in reducing maternal mortality in the country (National Institute of Public Cooperation and Child Development, 2015). However, inequities remain, and in the context of this study, it is clear that despite progress, maternal healthcare utilization (MHU) continues to be more common in higher economic groups in India.

Interestingly, it was also observed that the predicted probabilities for appropriate ANC across all wealth quintiles were considerably lower than SBA use and institutional delivery in the country (Figure 8). Similar trends were observed in Pakistan and Bangladesh. As opposed to SBA use and institutional delivery, which require only one contact with the healthcare system, a mother was only considered to have received appropriate ANC if she utilized at least four ANC visits within this study (four contact

points). This may be a likely contributing factor to the lower predicted probabilities of appropriate ANC across the five wealth quintiles in the two countries compared to the other two outcomes.

From a policy perspective, improved public healthcare financing is critical to ensuring the availability of quality maternal health services to economically disadvantaged groups. Yet, compared to the WHO's proposed 5% target for public healthcare expenditure, India had only invested 1.1% of its GDP to public health financing in 2005 (WHO, 2009; World Bank, 2017a). Public financing for healthcare can be characterized as either effecting change from the supply-side (e.g. provision of additional services) or from the demand-side (e.g. voucher programs that provide reductions in out-of-pocket costs) (Balarajan et al., 2011).

Ultimately, the low levels of public financing have resulted in demand-side issues such as high levels of out-of-pocket expenditures, which in turn, has made MHU relatively inaccessible to economically disadvantaged groups in the country (Singh et al., 2013b). For example, Bonu et al. 2009 noted that the cost of antenatal care, institutional delivery, and postnatal care among mothers in the poorest deciles often exceeded their household's annual capacity to pay (See Bonu et al. 2009, Figure 1) . The issue of economic inequity is further compounded with limited reach of health services to economically disadvantaged populations and lower quality of care within the public sector (Balarajan et al., 2011).

In fact, studies conducted in India have described many supply-side deficiencies in public healthcare services such as shortages in healthcare providers, high degrees of absenteeism

among providers, unpredictable working hours, and poor working environments (Balarajan et al., 2011; Banerjee et al., 2004; Karvande et al., 2016; Kumar, 2010; Muralidharan et al., 2011). Invariably, the poor often bypass public service providers to seek maternal healthcare from private vendors due to perceived higher quality, further perpetuating the poverty cycle (O'Donnell, 2007; Peters et al., 2002). Taken together, factors including low public financing, increased out-of-pocket costs, and low quality of services, are likely explanations for the limited access of maternal healthcare among Indian Muslim mothers from lower wealth quintiles in this study.

To help circumvent demand-side financial barriers when accessing maternal healthcare, the Indian government implemented the cash-incentive Janani Suraksha Yojana (JSY) initiative (see 2.1.11 for further details) from 2005 to 2006 (Boateng & Rajan, 2011). Given NFHS-3 data collection occurred in parallel with the JSY roll-out, it is unlikely any results would have been reflected in the NFHS-3. Since the NFHS-3, there is evidence that the JSY initiative resulted in narrowing the equity gap in some states (Vellakkal et al., 2017). However, supply-side issues related to poor accessibility to health facilities, deficiencies in the availability of emergency obstetric services, continued out-of-pocket expenditures, poor availability of health staff and resources, and lack of funding to public healthcare facilities continue to impede service delivery (Malini et al., 2008; Randive et al., 2014; Singh et al., 2013b; Vellakkal et al., 2017). India's JSY initiative can play an important role in reducing the equity gap in MHU; however, to have full effect, it must be supported with simultaneous improvements in quality of care, increased services availability, and reductions in out-of-pocket costs.

Equity in Maternal Healthcare Utilization among Muslim Mothers in Pakistan

This study also revealed substantial rich-poor gaps in appropriate ANC, SBA use, and institutional delivery in Pakistan. As seen in Figure 8, there was a relatively flat plateau in predicted probabilities for the three MHU outcomes among mothers in the bottom three quintiles and substantially higher predicted probabilities for appropriate ANC, SBA use, and institutional delivery among mothers in rich and richest wealth quintile. Results of this study fall in line with other studies elucidating the presence of inequity in MHU in Pakistan (Mahmood & Bashir, 2012; Malik & Ashraf, 2016).

Mahmood and Bashir (2012) noted a small reduction in inequity for institutional delivery within the public sector between 1990-91 and 2006-07. Similarly, Malik and Ashraf (2016) found a reduction in inequity, within the public sector, for hospital-based delivery and postnatal care from 2007-08 to 2010-11. A reversal in the use of antenatal care consultation in the public sector was also found, where it shifted from being underutilized by the poor to being over utilized by the poor. (Malik & Ashraf, 2016).

Consistent with Malik and Ashraf (2016) and Mahmood and Bashir (2012), the relatively narrow equity gap among Muslim mothers in the bottom three quintiles found in this study is a likely testament to the continued efforts of Pakistan's government to reduce supply-side barriers through increased provision of publically available maternal health services in the country (Khan et al., 2012).

The main initiative for these efforts is the Maternal Newborn and Child Health Program (MNCH), begun in 2005. The MNCH aimed to improve access to high quality maternal

newborn and child health services through increased provision of community midwives, comprehensive emergency obstetric services, and basic emergency obstetric services in the country (Government of Pakistan, 2006). An evaluation of the MCCH found, that while the program has had some effect, there are still deficits in the number of facilities providing comprehensive and basic emergency obstetric and neonatal care. Furthermore, the evaluation noted issues with the quality of obstetric care in facilities and various cultural and logistic barriers marring successful delivery of services by community midwives (Technical Resource Facility, 2013).

Additionally, like India, out-of-pocket-expenditures in Pakistan account for a significant portion of healthcare financing, with nearly 55% of total healthcare expenditures being paid out-of-pocket (World Bank, 2017b). A demand-side maternal voucher scheme (Sehat Voucher Scheme) was piloted in two districts in Southern Punjab during 2008 to 2009 to address out-of-pocket costs (Jehan et al., 2012). Despite garnering some popularity, the Voucher Scheme has yet to spread to the national scale (Jehan et al., 2012), and based on this study's results, further efforts are needed to reduce inequity in MHU in the country.

Equity in Maternal Healthcare Utilization among Muslim Mothers in Bangladesh

Similar to India and Pakistan, the results from this study also revealed substantial poor-rich gaps in appropriate ANC, SBA use, and institutional delivery in Bangladesh. However, dissimilar to India and Pakistan, as seen in Figure 8, there was a relatively flat plateau in the predicted probability for SBA use and institutional delivery among mothers from the poorest all the way through to the rich quintile. A similar trend was also noted

for appropriate ANC; however, compared to SBA use and institutional delivery, a sharper rise in predicted probability was observed for mothers in both the rich and the richest quintile.

These results are consistent with other research elucidating the presence of inequity in MHU within the country (Anwar et al., 2008; Pulok et al., 2016; Zere et al., 2013). Pulok et al. 2016 pooled the 2004, 2007, and 2011 Bangladesh Demographic Health Surveys to estimate trends in inequity for antenatal and delivery services in the country. The results indicated a substantial narrowing of the equity gap for receipt of appropriate ANC, SBA use, and institutional delivery from 2004 to 2011 (Pulok et al. 2016, Figure 1). Overall, Pulok et al. 2016 substantiate the relatively narrow equity gaps noted in this study. This narrowing of the equity gap is likely indicative of the successes of Bangladesh's wide-scale, targeted interventions in the form of both supply-side expansion of maternal health services and of the demand-side incentive schemes.

Like India and Pakistan, out-of-pocket expenditures account for a significant portion of healthcare financing, with nearly 67% of health care expenditures out-of-pocket (World Bank, 2017b). To ensure proper access to healthcare services and reduce demand-side barriers, public healthcare facilities often receive government subsidies to allow proper access to maternal healthcare care by offering services 'free' or at a discounted rate (Ahmed & Khan, 2011b). Although financing mechanisms have been in place in the country for a period of time, women from impoverished households often face significant demand-side barriers when accessing maternal health services (Ahmed & Khan, 2011b). In fact, studies have documented various out-of-pocket costs incurred by mothers when

utilizing supposedly ‘free’ maternal health services in the country (Afsana, 2004; Nahar & Costello, 1998; Rahman et al., 2013).

Recognizing such demand-side obstacles, in 2007, the Government of Bangladesh initiated the Maternal Health Voucher Scheme (MHVS) to reduce financial barriers faced by women accessing maternal health services in the country (Ahmed & Khan, 2011a). Recent evaluations of the program found it to be strongly associated with an increased uptake of ANC care, SBA use, and institutional delivery (Ahmed & Khan, 2011a; Das, 2015; Hatt et al., 2010). As a result of the program’s reported success, the MHVS has been officially implemented under the umbrella of the country’s Health Population and Nutrition Sector Development Plan (HPNSDP, 2011-2016). The MHVS is currently implemented in approximately 53 upazilas in Bangladesh. Under the HPNSDP (2011-2016), the coverage of Bangladesh’s MHVS will expand an additional 20 upazilas annually (Ministry of Health and Family Welfare et al., 2015).

From a supply-side perspective, since 1994, the Government of Bangladesh had begun the process of strengthening its comprehensive emergency obstetric care services (CEmONC) within the country’s public sector (NIPORT et al., 2012). In 1999, CEmONC was only available within 81% of district hospitals, 18% of upazila health complexes, and 27% of maternal and child welfare centers (NIPORT/ Bangladesh et al., 2003). By 2010, Bangladesh had expanded its CEmONC to 100% of district hospitals, and 31% of upazila health complexes and 72% of maternal child and welfare centers (NIPORT et al., 2012). Based on this study’s results, it is plausible that such efforts have not only led to increased access to maternal healthcare, but actual reductions in inequity as well.

It is important to recognize that Bangladesh has one of the largest Non-Governmental Organization (NGO) sectors in the world, and the strong collaborative partnerships of various NGOs with the government have supported an array of initiatives geared towards enhancing healthcare accessibility to Bangladesh's poor (Ministry of Health and Family Welfare et al., 2015). Under a vanguard of NGOs, microcredit loans were first introduced in 1980 and offered collateral free loans to impoverished women in the country (Adams et al., 2013). Between 1981 and 2010, there was an exponential increase in female microfinance membership, with an estimated 33 million female members in 2010 (Adams et al., 2013). Pulok et al. 2016 noted microfinance to be significantly associated with increased antenatal care. Further, microfinance has enhanced women's ability to access higher quality of care (Amin et al., 2010).

Microfinance is one of the many initiatives various NGO initiatives have undertaken to improve the maternal milieu in Bangladesh. Various NGO organizations have also deployed nearly 100,000 community health volunteers and established over 1000 health clinics and delivery centers in the country (Ministry of Health and Family Welfare et al., 2015).

Overall, the findings from this study do reveal the state of inequity to be narrowest among Muslim mothers in Bangladesh compared to those from India and Pakistan. Although it is not possible to conclusively delineate the reasons why, the country's own efforts concerning both supply-side and demand-side issues, along with strong integration of NGOs may be defining factors.

Other Significant Findings

The discussion of significant variables are presented in order according to Table 14.

Contextual Variables

For research investigating influences of MHU within the developing world, the examination of contextual correlates on MHU has been increasing in frequency (Achia & Mageto, 2015; Antai, 2009; Aremu et al., 2012; Babalola & Fatusi, 2009; Babalola, 2014; Kruk et al., 2010; Osorio et al., 2014; Ram & Singh, 2006; Sagna & Sunil, 2012; Stephenson et al., 2006; Stephenson & Elfstrom, 2012; Yebyo et al., 2014).

Increased community education was found to be significantly associated with appropriate ANC, SBA use, and institutional delivery in India, appropriate ANC in Pakistan, and SBA use in Bangladesh. It is possible that individual mothers, irrespective of educational attainment, may be more motivated to seek maternity care services if exposed to others who hold positive attitudes toward the importance of MHU.

Community media exposure was found to be significantly associated with increased odds of appropriate ANC and SBA use in India, SBA use in Pakistan, and appropriate ANC in Bangladesh. At the community level, it is plausible that media campaigns may influence changes in behavior in one's social network such that a woman might be influenced to seek maternity care services even if she is not directly exposed to the messaging from the media campaign itself (Wakefield et al., 2010).

Increased community wealth was found to significantly increase appropriate ANC, SBA use, and institutional delivery in India and SBA use and institutional delivery in Bangladesh. Women residing in communities of lower poverty may face fewer structural

barriers when accessing healthcare such as greater availability of health services and healthcare providers (Gresenz et al., 2000; Mistry et al., 2009). With respect to the association between the contextual variables and MHU in the three countries, three unusual findings were noted, all with the outcome of appropriate ANC.

First, increasing community media exposure was found to significantly decrease the odds of appropriate ANC in Pakistan. This study's definition of community media exposure was based on the aggregate frequency at which women in a community were exposed to media. Although it is not possible to decipher the exact reason for this relationship, it is possible that increased exposure to adverse media content may have had a contributing role to the decreased ANC among Muslim mothers. This was the case for Pakistan's polio vaccination program, where radical Islamic attitudes within parts of the country often led to exposure to misleading and erroneous media campaigning against the use of vaccines (International Media Support, 2009). In the context of this study, it is possible that community level media interventions were delivered in a context that reinforced negative attitudes towards the receipt of ANC, such that a mother may have been averse to utilize appropriate ANC even if she was not directly exposed to the messaging from the media campaign itself.

Second, this study found increased community wealth to significantly decrease appropriate antenatal care in Bangladesh. Although there is no clear explanation for this counter-intuitive finding, it is possible that the country's large NGO sector may be a key factor. Bangladesh has one of the largest NGO presences in the world and its contribution to improving the health of poor people in the country is well documented (Bhuiya & Chowdhury, 2002; Chowdhury et al., 2013; Mercer et al., 2004). It is possible that the

deliberate and targeted provision of ANC by NGOs within low wealth communities may have created a paradoxical scenario in which mothers from high wealth communities become less likely to utilize ANC as compared to those from low wealth communities.

Third, community autonomy was associated with decreased odds of appropriate ANC among Muslim mothers in India. Within India, caste, autonomy, and religion overlap, with approximately 40% of the Muslim community belonging to 'other backward castes' (Sanneving et al., 2013; Upadhyay, 2010). Additionally, India is a Hindu majority and Muslim minority country. As a result, it is likely that Muslim households are also a minority within a community. It is possible that increased community autonomy may reflect an underlying social stratification in which high autonomy communities are disproportionately made of Non-Muslim women of higher castes and Muslim women of lower standing. This dichotomy may have negatively impacted a Muslim mother's ability to utilize appropriate ANC. However, future research is needed to validate this hypothesis.

It must be noted that community variables were designed by aggregating individual information for all individuals in a primary sampling unit (PSU). One of the main limitations of incorporating community variables into an analysis is that the DHS does not directly measure community characteristics; rather, community variables are created by aggregating individual data within a PSU. Therefore, PSU boundaries may not coincide with true community boundaries in some cases.

Individual Variables

Women's age was found to be positively associated with increased appropriate ANC, SBA use, and institutional delivery in India, and SBA use and institutional delivery in Pakistan and Bangladesh. These results are consistent with other population-based studies (Amoakoh-Coleman et al., 2015; Aremu et al., 2012; Babalola & Fatusi, 2009; Babalola, 2014; Das et al., 2010; Jat et al., 2011; Kamal et al., 2015a; Osorio et al., 2014; Pallikadavath et al., 2004b). It is possible that older age may serve as a proxy for an individual's 'life experience' such that older women have more knowledge and awareness about the need for MHU during pregnancy (Rai, 2015).

Higher birth order was found to significantly decrease the odds of the three MHU outcomes among Muslim women from India, Pakistan, and Bangladesh. These results are consistent with other studies examining MHU in Asia and South Africa (Anwar et al., 2004; Babalola & Fatusi, 2009; Mukherjee & Chandra, 2014; Singh et al., 2014; Worku et al., 2013), supporting the theory that mothers invest less in their own maternal health when bearing children of higher birth orders (Makate, 2016). One hypothesis may be that women of lower parity tend to be more cautious regarding their pregnancy which may motivate them to utilize MHU more than women of higher parity (Raj et al., 2009; Singh et al., 2012c). Another potential explanation could be that women of higher parity hold a belief that they do not require appropriate maternity care due to an increased confidence from past successful pregnancies (Mukherjee & Chandra, 2014; Singh et al., 2012b; Singh et al., 2012c).

Consistent with other studies examining MHU in the general population, maternal education was a significant determining factor for MHU among Muslim mothers (Baral

et al., 2012; Moyer & Mustafa, 2013; Pavalavalli & Ramesh, 1997; Simkhada et al., 2008; Tey & Lai, 2013). In addition to the correlation of wealth with increased education, increased education may also provide Muslim mothers with the necessary information regarding obstetric risk during pregnancy and overall ability to utilize maternal healthcare appropriately (Chakraborty et al., 2003). A noteworthy finding was that the majority of Muslim mothers in Bangladesh had a secondary or higher education as compared to Muslim mothers in India and Pakistan who were uneducated by majority. It is possible that this may contributed to the narrower equity gap in MHU compared to Muslim mothers in India and Pakistan.

In line with other findings, this study found a positive association between husband's education and increased MHU among Muslim women in India, Pakistan, and Bangladesh (Arokiasamy & Pradhan, 2013; Gabrysch & Campbell, 2009; Jat et al., 2011; Pallikadavath et al., 2004b; Rai, 2015; Singh et al., 2014; Singh et al., 2012b; Singh et al., 2012c). Increased educational attainment among husbands could mirror the same educational benefits as seen in women and lead to greater male involvement in MHU. In fact, research has shown husband involvement to be a key player in MHU (Upadhyay et al., 2014; Wai et al., 2015). This could be through the form of providing transportation, providing financial support, and providing emotional support during childbirth (Carter, 2002; Story et al., 2012).

Like formal educational, the impact of mass media exposure on MHU cannot go unnoticed. The results from this study are consistent with results from other studies suggesting that increased media exposure is positively associated with appropriate ANC, SBA use, and institutional delivery among Muslim mothers from the three countries

(Agha & Carton, 2011; Babalola & Fatusi, 2009; Islam & Odland, 2011; Mengesha et al., 2013; Tey & Lai, 2013; Thind et al., 2008; Yadav & Kesarwani, 2016; Zamawe et al., 2016). Wakefield and colleagues suggest that mass media can operate through both direct and indirect pathways to influence health behavior change (Wakefield et al., 2010). Specifically, in the context of maternal health, various national mass media campaigns could directly influence maternal health behavior change by activating cognitive or emotional responses (Wakefield et al., 2010). Indirectly, media campaigns can also elicit interpersonal discussion regarding maternal health issues within one's social community in order to reinforce positive maternal health behavior change (Wakefield et al., 2010).

Interestingly, the results of this study's analysis revealed autonomy to be significantly associated with appropriate ANC in Pakistan only. This finding is consistent with previous research, conducted in Pakistan and in other countries, establishing autonomy as a determinant of MHU (Adhikari, 2016; Agha & Carton, 2011; Bayu et al., 2015; Haque et al., 2012; Saleem & Bobak, 2005; Singh et al., 2012a; Situ, 2013; Speizer et al., 2014; Woldemicael & Tenkorang, 2010). Overall, this study's results add further support for the notion that provision of authority to a mother's decision-making ability does have substantive effects on her ability to access maternal health services. Unfortunately, there remains no validated measure regarding the operationalization of women's empowerment in the literature (Ahmed et al., 2010), and there exists considerable variation in the effect of various proxy measures on MHU (Kc & Neupane, 2016). It is possible that other non-significant associations may have been a result of controlling for other factors related to autonomy such as maternal education and wealth index.

This study revealed urban locations to be significantly associated with institutional delivery in India and appropriate ANC in Pakistan. Fotso (2007) postulates that urban areas can better facilitate public health campaigns, such as those related to immunization and maternal and child health programs. Decreased MHU among rural women could also be attributed to lack of roads, adequate transportation, and longer travel distances to health facilities (Carter, 2010; Sarker et al., 2016). In Pakistan, Majrooh et al. 2014 noted substantial drop-out rates after the first ANC visit due to poor quality of services among rural mothers in the state of Punjab in Pakistan. Consistent with the findings of this study, it is possible that lower quality of maternal healthcare within rural areas may also be a contributing factor to the urban advantage in both countries. Future research should focus on identifying effective methods to increase healthcare access and quality for rural populations. It is worth mentioning that the prevalence of rural women was highest among Bangladesh Muslims (68%) as compared to Muslim mothers from India (51%) and Pakistan (56%). Given that the predicted probability for appropriate ANC, SBA use, and institutional delivery was considered for only rural mothers in the three countries, this difference may have contributed to some of the observed variation across countries.

Lost pregnancy was found to be significantly associated with increased odds of SBA use in India and all three MHU outcomes in Pakistan. It is likely that women who have experienced prior lost pregnancies would have gained awareness regarding the life-threatening consequences of inadequate MHU and subsequently would be more motivated to utilize maternal healthcare during subsequent pregnancies (Kebede et al., 2016).

5.4 Secondary Objective

An interaction term between religion and country was used to test whether differing socioeconomic and political circumstances in India and Bangladesh modified the effect of religion on MHU between Muslim and Non-Muslim mothers in the two countries. The interaction was found to be not significant for the three outcomes.

It is possible that there was no true interaction between country and religion on MHU in this study. The time periods between the 2005-06 NFHS-3 and 2014 BDHS differed significantly. Future research should re-examine this objective once the fourth edition of the Indian NFHS-3 becomes available.

As described in section 2.6, empirical studies conducted in India have shown mixed results, with some describing Muslim mothers having a lower odds of MHU compared to Non-Muslims in some states (Navaneetham & Dharmalingam, 2002), while other studies suggesting the opposite effect (Jat et al., 2011; Thind et al., 2008). This state-wide variation in India suggests that the level of country may simply be too large and variable of a geography in which to examine potential interactions with religion.

5.5 Strengths and Limitations

The major strength of this study is its examination of MHU *within* a religious group. In the context of research examining MHU in South Asia, a single religion variable has traditionally been used to control, with this one variable, for beliefs and attitudes that may influence maternal health seeking behavior (Anwar et al., 2015; Bashar et al., 2012; Hossain & Hoque, 2015; Kabir, 2007; Shahabuddin et al., 2015; Walton & Brown, 2012; Yadav & Kesarwani, 2016). Use of a religion variable in this way makes the implicit

assumption that the effect of religion (in this case, Islam) on MHU is uniform across participants in the same way as are more specifically defined constructs such as education level and wealth index. This supposes that there is no variation within the construct of religion and this may be misleading because it can mask important variation within Muslim women.

Using Andersen's conceptual framework and newer DHS data, a major strength of this study is that it provided direct evidence that MHU among Muslim women is far from homogeneous (Ganle, 2015), but rather shaped by wealth status as well as other variables such as education, consistent with Andersen's model. Given such variation, it is important to acknowledge the possibility that the effect of Islam on MHU may in fact be a marker for various upstream or downstream determinants of access to care. Future research should strongly consider placing religion within a broader socio-cultural and political framework when evaluating the effect of religion on MHU.

It is hoped that this research will encourage policy-makers to design healthcare system interventions that reduce the gap in equity among women within Muslim communities in these three countries. Further, it is hoped that researchers and policy-makers will not use religion as a sole explanation for inequity and will understand the need to look further within the Muslim community for solutions.

To my knowledge, only two studies explored MHU among Muslim women in India (Mukherjee & Chandra, 2014; Rai, 2015). Both studies utilized multivariate logistic regression and revealed wealth index to be a significant determinant of MHU independent of other sociodemographic characteristics. My findings are consistent with

those found in Rai (2015) and Mukherjee and Chandra (2014), that economic inequity exists in MHU within Islam in India. However, this study improves on this work in two important ways. First, this study controlled for contextual community variables as suggested by Andersen's model. Context is increasingly recognized as important in these kinds of analyses (Achia & Mageto, 2015; Antai, 2009; Aremu et al., 2012; Babalola & Fatusi, 2009; Babalola, 2014; Kruk et al., 2010; Osorio et al., 2014; Ram & Singh, 2006; Sagna & Sunil, 2012; Stephenson et al., 2006; Stephenson & Elfstrom, 2012; Yebyo et al., 2014), but no study was found on MHU in Muslim women that controlled for these factors.

The second improvement over previous work is the use of predicted probabilities to explore the effect of wealth index on MHU. Predicted probabilities are one means to take the results out of the realm of merely statistical to describe the reality for a Muslim woman whom is typical in each of these countries. This makes the results more applicable to each country and therefore more meaningful to policy-makers.

Despite this study's unique contributions to the body of literature, it is not without its limitations. First, this study utilized data from the 2005-06 National Family and Health Survey (NFHS-3), 2012-13 Pakistan Demographic Health Survey (PDHS), and 2014 Bangladesh Demographic Health Survey (BDHS). Though Demographic Health Surveys offer invaluable information about the context of health in the developing world, data collection relies heavily upon respondent memories of past events. Consequently, recall and social desirability pose inherent limitations.

Secondly, compared to the 2014 BDHS and 2005-06 NFHS-3 surveys, the 2012-13 PDHS was not nationally representative. The sample for the 2012-13 PDHS represented the population excluding those from Azad Kashmir, Federally Administered Tribal Areas (FATAS), and military restricted and protected areas of Pakistan; thus, the results from this study are not generalizable to the whole Pakistani population.

Third, it should be noted that the cross-sectional dataset limits inferences of causality with respect to the associations found in this study. As such, I am unable to conclude, for example, that belonging to higher wealth quintiles causes Muslim mothers to receive at least four appropriate ANC, use a SBA, and have an institutional delivery. As discussed previously, the DHS also limits researchers to the operationalization of certain variables including various community constructs.

Fourth, the results of this study should be interpreted with a degree of caution due to varying time periods of the NFHS-3, PDHS, and BDHS. Data from the NFHS-3 are quite old. It is possible that India has made progress in reducing inequity since then. Future research should repeat this study once new data are available to assess whether India has reduced the equity gap in MHU among Muslim mothers.

Lastly, a definite limitation of this research is how religion is measured within the DHS. Religion is a multidimensional construct with religious affiliation being one of many aspects (Koenig et al., 2012); a respondent may identify as being Muslim but the strength of her religious involvement may vary. Country-specific results from this study could be, in part, a product of unmeasured heterogeneity within this religious population.

It should also be noted that, in the context of this study, no differentiation was made on the various branches of Islam. Sunni and Shia Islam are the two major branches within Islam. The differences between these two branches are mainly rooted in historical disagreements over the succession of Prophet Mohamed who died in the 632 AD (Koenig, 2014). Though these differences can be complicated, Sunni and Shia Islam share many commonalities. (Koenig, 2014). For this reason, it was unlikely that this unmeasured factor had any bearings on the results of this study.

5.6 Conclusion and Policy Implication

This work describes one of the first studies to explore inequity in appropriate ANC, SBA use, and institutional delivery among Muslim mothers from India, Pakistan, and Bangladesh. A policy brief highlighting this study's results can be found in Appendix G.

From a policy perspective, improvements in maternal health are grounded in the tenet of ensuring equitable access to healthcare. Within the context of this study, the main interventions to improve equity have focused on both supply and demand side factors such as the expansion of maternal healthcare services or reductions of financial costs through the implementation of maternal voucher schemes.

Ultimately, to effectively improve equity in MHU in South Asia, countries should learn from each other, by sharing their successes and failures. Policy makers should examine the evidence from South Asian countries that have marked reductions in inequity. Evidence suggests that reductions in inequity focuses on both supply and demand sides of maternal healthcare. In the context of this study, the successes of Bangladesh's recent efforts to reduce inequity through its expansion of maternal health services, its widely-

known maternal voucher program, and strong NGO partnerships offer lessons for policy-makers in India and Pakistan.

To conclude, it must be noted that the structural determinants of equity are inextricably linked and not only dependent on wealth. Increased education provides women with greater opportunities to increase their household's overall economic status and increased economic ability provides women with more opportunity to access education. In the case of Bangladesh, the marked progress in reducing the equity gap is not only a result of the country's initiatives to reduce MHU cost and increase access through demand and supply side interventions, but also due to their efforts to increase the educational status and overall empowerment of women in the country (Ministry of Health and Family Welfare et al., 2015). Ultimately, to reduce inequity in MHU, effective strategies must be considered across all dimensions that affect women's equity within the population.

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Appendices

Appendix A: Sampling procedure and response rates for the 2005-06 Indian National Family and Health Survey – 3rd Edition

States were first stratified into urban and rural areas respectively. Among rural areas, the 2001 Indian Census of villages acted as the sampling frame with villages being the enumeration area and primary sampling unit (PSU). The probability proportional to size (PPS) technique was used for the selection of the village Enumeration Area (EA) at the first stage. A minimum of 50 households per EA was required for sampling. Small villages with 5-49 households were combined with a nearby village to ensure the appropriate rural primary sampling unit specific household minimum was met. Additionally, rural PSUs with less than 5 households were excluded from the rural sampling frame. This only comprised 0.02% of the rural sampling frame and so was not expected to disturb any estimates. During the second stage, selected EAs served as the sampling frame in which households were randomly selected (IIPS/India & Macro Int., 2007).

Among urban areas, the sampling frame was a list of all wards within cities and/or towns. PPS method was then used to randomly select a sample of wards, defined as a township or large area. Wards were then further divided into enumeration blocks (containing an average of 200 households) and served as the sampling frame for the second stage of sampling. Within selected wards, one enumeration block was randomly selected using PPS technique. This served as the final sampling frame from which households were randomly sampled. It should be noted that this specific urban sampling design was only applied in states for which no city-specific sampling (slum vs non-slum) were planned. A

separate two stage sampling design was implemented for eight cities (Chennai, Delhi, Hyderabad, Indore, Kolkata, Meerut, Mumbai, and Nagpur) with city-specific sampling plans. In total, 124,385 of 131,596 selected women were successfully interviewed. This corresponded to a total national response rate of 95% (93% urban and 96% rural) (IIPS/India & Macro Int., 2007).

Appendix B: Sampling procedure and response rates for the 2012-13 Pakistan Demographic Health Survey

The 2012-13 PDHS was a two-stage stratified sampling design. The sampling frame for the PDHS consisted of all urban and rural areas within Pakistani provinces and Gilgit Baltistan as described by the 1998 Pakistan Population Census. Provinces were first stratified into geographic region (urban/rural). Within urban areas, all cities and towns were further divided into enumeration blocks consisting of 200 to 250 households; these enumeration blocks served as the PSU in urban areas. In rural areas, villages were treated as the PSU. Villages with a population greater than 2000 were split into equal blocks, and only one was chosen randomly for sampling. Using the PPS technique, a total of 500 PSUs was randomly sampled, consisting of 248 urban and 252 rural areas. This served as the sampling frame for which households were randomly via a systematic sampling technique with a random start. To provide statistically reliable estimates, each selected EA consisted on average of 28 households. In total, 14,569 women (6964 urban and 7605 rural areas) were chosen for sampling, of which 13,558 were successfully interviewed. This corresponded to a 93% total response rate (91% urban and 94% rural). The principal reason for non-response was that respondents were not at home despite multiple attempts to contact them (NIPS/Pakistan & ICF Int., 2013).

Appendix C: Sampling procedure and response rates for the 2014 Bangladesh Demographic Health Survey

The 2014 BDHS was a two-stage stratified sampling design. The sampling frame consisted of EAs prepared by the 2011 Bangladesh Population and Housing Census. The primary sampling unit was an EA which was designed to contain an average of 113 households. To obtain the EAs, Bangladesh was first divided into seven administrative regions: Barisal, Chittagong, Dhaka, Khulna, Rajshahi, Rangpur, and Sylhet. Each region was further divided into rural and urban. Urban regions were further stratified into city corporations or 'other than city corporations' before EAs were sampled. Using the PPS, a total of 600 EAs were randomly sampled consisting of 207 urban areas and 393 rural areas. This served as the sampling frame from which households were systematically sampled. To provide statistically reliable estimates, an average of 30 households were sampled from each selected EA. In total, 18,245 women (6324 urban women and 11921 rural women) were chosen for sampling, of which 17,863 women were successfully interviewed. This corresponded to a 98% total response rate. The principal reason for non-response was, despite multiple attempts, were that respondents were not at home (NIPORT et al., 2016).

Appendix D: Bivariate and multivariate results for India (Primary Objective).

Table 16: Appropriate ANC according to sociodemographic characteristics among Muslim mothers in India

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
≥ 4 ANC visits	2417	(42.7%)	3246	(57.3%)		Lower limit	Upper Limit
Contextual Variables							
Community Education							
Low (REF)	597	(24.7%)	2250	(69.3%)	-	-	-
Intermediate	896	(37.1%)	824	(25.4%)	4.34***	3.28	5.76
High	924	(38.2%)	172	(5.3%)	32.01***	22.36	45.82
Community Media Exposure							
Low (REF)	468	(19.4%)	2090	(64.4%)	-	-	-
Intermediate	919	(38.0%)	856	(26.4%)	4.86***	3.49	6.78
High	1030	(42.6%)	300	(9.2%)	21.97***	15.28	31.58
Community Autonomy							
Low (REF)	969	(40.1%)	1526	(47.0%)	-	-	-
Intermediate	882	(36.5%)	996	(30.7%)	1.57**	1.13	2.20
High	566	(23.4%)	724	(22.3%)	2.15**	1.33	3.49
Community Wealth							
Low (REF)	408	(16.9%)	1882	(58.0%)	-	-	-
Intermediate	870	(36.0%)	954	(29.4%)	4.89***	3.59	6.67
High	1139	(47.1%)	410	(12.6%)	16.73***	11.46	24.42
Predisposing Variables							
Age (mean ± SD)	26.5	± 5.1	27.5	± 6.3	0.96***	0.95	0.97
Birth Order (mean ± SD)	2.5	± 1.5	3.8	± 2.4	0.68***	0.65	0.71
Maternal Education							
No Education (REF)	617	(25.5%)	2171	(66.9%)	-	-	-
Primary	313	(12.9%)	486	(15.0%)	3.30***	2.59	4.21
Secondary or Higher	1487	(61.5%)	589	(18.2%)	12.78***	10.22	15.99
Husband's Education							
No Education (REF)	359	(15.0%)	1502	(47.0%)	-	-	-
Primary	308	(12.9%)	647	(20.2%)	2.97***	2.28	3.88
Secondary or Higher	1729	(72.2%)	1050	(32.8%)	8.91***	6.92	11.47
Media Exposure							
Low (REF)	417	(17.3%)	1869	(57.6%)	-	-	-
Intermediate	1006	(41.6%)	957	(29.5%)	4.44***	3.62	5.46
High	994	(41.1%)	420	(12.9%)	11.65***	9.10	14.92
Autonomy							
None (REF)	671	(27.8%)	878	(27.1%)	-	-	-
Low	402	(16.6%)	552	(17.0%)	0.97	0.77	1.22
Intermediate	436	(18.0%)	626	(19.3%)	1.04	0.80	1.36
High	907	(37.5%)	1189	(36.6%)	1.17	0.94	1.46
Wanted Pregnancy							
Not Wanted (REF)	263	(10.9%)	641	(19.7%)	-	-	-
Wanted	2154	(89.1%)	2605	(80.3%)	2.31***	1.81	2.94
Enabling Variables							
Location							

Table 16: Appropriate ANC according to sociodemographic characteristics among Muslim mothers in India

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
Rural (REF)	882	(36.5%)	2026	(62.4%)	-	-	-
Urban	1535	(63.5%)	1220	(37.6)	3.80***	2.80	5.16
Wealth Index							
Poorest (REF)	69	(2.9%)	785	(24.2%)	-	-	-
Poor	174	(7.2%)	827	(25.5%)	1.77*	1.14	2.73
Intermediate	418	(17.3%)	780	(24.0%)	4.38***	2.97	6.45
Rich	851	(35.2%)	612	(18.9%)	13.73***	9.09	20.75
Richest	905	(37.4%)	242	(7.5%)	35.04***	22.34	54.96
Need Variables							
Lost Pregnancy							
No (REF)	2110	(87.3%)	2768	(85.3%)	-	-	-
Yes	307	(12.7%)	478	(14.7%)	0.72**	0.59	0.89

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the bivariate analysis.

Table 17: Multivariate logistic regression of appropriate ANC among Muslim mothers in India

Variable	Adjusted OR	95% CI
Contextual Variables		
Community Education		
Low (REF)	-	-
Intermediate	1.48*	(1.002 - 2.19)
High	4.54***	(2.68 - 7.69)
Community Media Exposure		
Low (REF)	-	-
Intermediate	1.2	(0.82 - 1.76)
High	2.20***	(1.39 - 3.50)
Community Autonomy		
Low (REF)	-	-
Intermediate	1.02	(0.75 - 1.40)
High	0.62*	(0.43 - 0.90)
Community Wealth		
Low (REF)	-	-
Intermediate	1.45*	(1.01 - 2.09)
High	1.24	(0.68 - 2.26)
Predisposing Variables		
Age (mean ± SD)	1.04**	(1.02 - 1.07)
Birth Order (mean ± SD)	0.74***	(0.68 - 0.82)
Maternal Education		
No Education (REF)	-	-
Primary	1.79***	(1.32 - 2.42)
Secondary or Higher	2.19***	(1.67 - 2.88)
Husband's Education		
No Education (REF)	-	-
Primary	1.66**	(1.20 - 2.29)
Secondary or Higher	1.96***	(1.48 - 2.60)
Media Exposure		
Low (REF)	-	-
Intermediate	1.54***	(1.21 - 1.97)
High	1.95***	(1.45 - 2.61)
Autonomy		
None (REF)	-	-
Low	0.94	(0.71 - 1.24)
Intermediate	1.08	(0.81 - 1.45)
High	1.07	(0.83 - 1.38)
Wanted Pregnancy		
Not Wanted (REF)	-	-
Wanted	0.86	(0.62 - 1.19)
Enabling Variables		
Location		
Rural (REF)	-	-
Urban	1.00	(0.73 - 1.38)

Table 17: Multivariate logistic regression of appropriate ANC among Muslim mothers in India

Variable	Adjusted OR	95% CI
Wealth Index		
Poorest (REF)	-	-
Poor	1.1	(0.70 - 1.75)
Intermediate	1.75**	(1.15 - 2.67)
Rich	2.17***	(1.39 - 3.37)
Richest	2.71***	(1.62 - 4.53)
Need Variables		
Lost Pregnancy		
No (REF)	-	-
Yes	0.87	(0.66 - 1.15)

**p<0.05, **p<0.01, ***p<0.001*

Multivariate Odds Ratios were calculated by modelling each outcome with all covariates. Survey weights were incorporated within the multivariate analysis.

Table 18: SBA use according to sociodemographic characteristics among Muslim mothers in India

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
SBA Use	2900	(50.5%)	2838	(49.5%)		Lower Limit	Upper Limit
Contextual Variables							
Community Education							
Low (REF)	816	(28.1%)	2059	(72.6%)	-	-	-
Intermediate	1051	(36.2%)	679	(23.9%)	3.72***	2.80	4.93
High	1033	(35.6%)	100	(3.5%)	38.01***	23.06	62.67
Community Media Exposure							
Low (REF)	694	(23.9%)	1890	(66.6%)	-	-	-
Intermediate	1100	(37.9%)	702	(24.7%)	4.32***	3.11	6.01
High	1106	(38.1%)	246	(8.7%)	18.49***	13.04	26.22
Community Autonomy							
Low (REF)	1136	(39.2%)	1382	(48.7%)	-	-	-
Intermediate	1081	(37.3%)	833	(29.4%)	1.55**	1.13	2.14
High	683	(23.6%)	623	(22.0%)	2.45***	1.50	3.99
Community Wealth							
Low (REF)	518	(17.9%)	1786	(62.9%)	-	-	-
Intermediate	1086	(37.4%)	772	(27.2%)	4.97***	3.79	6.52
High	1296	(44.7%)	280	(9.9%)	20.55***	13.48	31.33
Predisposing Variables							
Age (mean ± SD)	26.6	± 5.2	27.6	± 6.4	0.97***	0.96	0.98
Birth Order (mean ± SD)	2.6	± 1.8	3.9	± 2.4	0.74***	0.71	0.78
Maternal Education							
No Education (REF)	843	(29.1%)	1968	(69.3%)	-	-	-
Primary	381	(13.1%)	430	(15.2%)	2.25***	1.80	2.81
Secondary or Higher	1676	(57.8%)	440	(15.50%)	9.17***	7.24	11.60
Husband's Education							
No Education (REF)	514	(17.9%)	1360	(48.6%)	-	-	-
Primary	426	(14.8%)	545	(19.5%)	2.25***	1.81	2.81
Secondary or Higher	1931	(67.3%)	892	(31.9%)	5.92***	4.81	7.28
Media Exposure							
Low (REF)	651	(22.4%)	1665	(58.7%)	-	-	-
Intermediate	1190	(41.0%)	797	(28.1%)	3.72***	3.06	4.51
High	1059	(36.5%)	376	(13.3%)	6.90***	5.38	8.85
Autonomy							
None (REF)	797	(27.5%)	767	(27.0%)	-	-	-
Low	478	(16.5%)	493	(17.4%)	0.87	0.70	1.07
Intermediate	520	(17.9%)	559	(19.7%)	0.95	0.74	1.21
High	1103	(38.1%)	1019	(35.9%)	1.19	0.96	1.48
Wanted Pregnancy							
Not Wanted (REF)	332	(11.4%)	578	(20.4%)	-	-	-
Wanted	2568	(88.6%)	2260	(79.6%)	2.27***	1.81	2.85
Enabling Variables							
Location							
Rural (REF)	1044	(36.0%)	1909	(67.3%)	-	-	-
Urban	1856	(64.0%)	929	(32.7%)	4.50***	3.27	6.19
Wealth Index							
Poorest (REF)	109	(3.8%)	754	(26.6%)	-	-	-

Table 18: SBA use according to sociodemographic characteristics among Muslim mothers in India

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
Poor	250	(8.6%)	758	(26.7%)	2.04***	1.52	2.73
Intermediate	510	(17.6%)	692	(24.4%)	4.06***	3.00	5.50
Rich	1023	(35.3%)	466	(16.4%)	14.52***	10.57	19.95
Richest	1008	(34.8%)	168	(5.9%)	37.23***	24.59	56.36
Need Variables							
Lost Pregnancy							
No (REF)	2510	(86.6%)	2435	(85.8%)	-	-	-
Yes	390	(13.4%)	403	(14.2%)	0.97	0.79	1.18

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the bivariate analysis.

Table 19: Multivariate logistic regression of SBA use among Muslim mothers in India

Variable	Adjusted OR	95% CI
Contextual Variables		
Community Education		
Low (REF)	-	-
Intermediate	1.34	(0.96 - 1.88)
High	5.06***	(2.82 - 9.07)
Community Media Exposure		
Low (REF)	-	-
Intermediate	1.11	(0.80 - 1.55)
High	1.61*	(1.03 - 2.51)
Community Autonomy		
Low (REF)	-	-
Intermediate	1.03	(0.79 - 1.34)
High	0.85	(0.59 - 1.22)
Community Wealth		
Low (REF)	-	-
Intermediate	1.71***	(1.25 - 2.36)
High	1.70	(1.00 - 2.90)
Predisposing Variables		
Age (mean $\pm$ SD)	1.04**	(1.02 - 1.07)
Birth Order (mean $\pm$ SD)	0.81***	(0.75 - 0.87)
Maternal Education		
No Education (REF)	-	-
Primary	1.28	(0.98 - 1.67)
Secondary or Higher	1.84***	(1.44 - 2.35)
Husband's Education		
No Education (REF)	-	-
Primary	1.35*	(1.04 - 1.74)
Secondary or Higher	1.43**	(1.14 - 1.78)
Media Exposure		
Low (REF)	-	-
Intermediate	1.32*	(1.05 - 1.66)
High	0.98	(0.74 - 1.30)
Autonomy		
None (REF)	-	-
Low	0.77	(0.60 - 1.00)
Intermediate	0.87	(0.66 - 1.15)
High	1.00	(0.78 - 1.27)
Wanted Pregnancy		
Not Wanted (REF)	-	-
Wanted	1.25	(0.96 - 1.64)
Enabling Variables		
Location		
Rural (REF)	-	-
Urban	1.23	(0.90 - 1.67)

Table 19: Multivariate logistic regression of SBA use among Muslim mothers in India

Variable	Adjusted OR	95% CI
Wealth Index		
Poorest (REF)	-	-
Poor	1.50*	(1.10 - 2.06)
Intermediate	2.01***	(1.45 - 2.80)
Rich	3.24***	(2.26 - 4.63)
Richest	4.15***	(2.64 - 6.51)
Need Variables		
Lost Pregnancy		
No (REF)	-	-
Yes	1.33*	(1.01 - 1.75)

**p<0.05, **p<0.01, ***p<0.001*

Multivariate Odds Ratios were calculated by modelling each outcome with all covariates. Survey weights were incorporated within the multivariate analysis.

Table 20: Institutional delivery according to sociodemographic characteristics among Muslim mothers in India

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
Institutional Delivery	2568	(44.7%)	3172	(55.3%)			
Contextual Variables							
Community Education							
Low (REF)	621	(24.2%)	2255	(71.1%)	-	-	-
Intermediate	946	(36.8%)	784	(24.7%)	4.44***	3.28	6.00
High	1001	(39.0%)	133	(4.2%)	42.80***	26.16	70.01
Community Media Exposure							
Low (REF)	527	(20.5%)	2057	(64.8%)	-	-	-
Intermediate	989	(38.5%)	814	(25.7%)	5.20***	3.62	7.46
High	1052	(41.0%)	301	(9.5%)	21.08***	14.71	30.23
Community Autonomy							
Low (REF)	1010	(39.3%)	1508	(47.5%)	-	-	-
Intermediate	970	(37.8%)	945	(29.8%)	1.58**	1.12	2.21
High	588	(22.9%)	719	(22.7%)	2.45**	1.44	4.15
Community Wealth							
Low (REF)	364	(14.2%)	1940	(61.2%)	-	-	-
Intermediate	968	(37.7%)	890	(28.1%)	6.14***	4.57	8.24
High	1236	(48.1%)	342	(10.8%)	26.15***	17.10	39.98
Predisposing Variables							
Age (mean ± SD)	26.6	± 5.1	27.5	± 6.3	0.97***	0.96	0.98
Birth Order (mean ± SD)	2.5	± 1.6	3.8	± 2.4	0.71***	0.68	0.74
Maternal Education							
No Education (REF)	648	(25.2%)	2164	(68.2%)	-	-	-
Primary	341	(13.3%)	470	(14.8%)	2.73***	2.15	3.47
Secondary or Higher	1579	(61.5%)	538	(17.0%)	11.13***	8.69	14.25
Husband's Education							
No Education (REF)	401	(15.8%)	1473	(47.1%)	-	-	-
Primary	362	(14.2%)	610	(19.5%)	2.48***	1.97	3.13
Secondary or Higher	1782	(70.0%)	1042	(33.3%)	7.08***	5.68	8.83
Media Exposure							
Low (REF)	512	(19.9%)	1804	(56.9%)	-	-	-
Intermediate	1055	(41.1%)	933	(29.4%)	4.07***	3.31	5.00
High	1001	(39.0%)	435	(13.7%)	8.10***	6.25	10.51
Autonomy							
None (REF)	701	(27.3%)	863	(27.2%)	-	-	-
Low	430	(16.8%)	542	(17.1%)	0.91	0.72	1.14
Intermediate	458	(17.8%)	622	(19.6%)	1.01	0.77	1.32
High	977	(38.1%)	1145	(36.1%)	1.23	0.97	1.55
Wanted Pregnancy							
Not Wanted (REF)	272	(10.6%)	638	(20.1%)	-	-	-
Wanted	2295	(89.4%)	2534	(79.9%)	2.58***	2.01	3.31
Enabling Variables							
Location							
Rural (REF)	849	(33.1%)	2105	(66.4%)	-	-	-
Urban	1719	(66.9%)	1067	(33.6%)	5.19***	3.73	7.21
Wealth Index							
Poorest (REF)	63	(2.5%)	800	(25.2%)	-	-	-

Table 20: Institutional delivery according to sociodemographic characteristics among Muslim mothers in India

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
Poor	185	(7.2%)	823	(25.9%)	2.41***	1.68	3.46
Intermediate	431	(16.8%)	772	(24.3%)	5.49***	3.77	8.01
Rich	921	(35.9%)	568	(17.9%)	18.94***	12.93	27.76
Richest	968	(37.7%)	209	(6.6%)	53.67***	34.34	83.91
Need Variables							
Lost Pregnancy							
No (REF)	2239	(87.2%)	2708	(85.4%)	-	-	-
Yes	329	(12.8%)	464	(14.6%)	0.86	0.70	1.06

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the bivariate analysis.

Table 21: Multivariate logistic regression of institutional delivery among Muslim mothers in India

Variable	Adjusted OR	95% CI
Contextual Variables		
Community Education		
Low (REF)	-	-
Intermediate	1.41*	(1.001 - 1.99)
High	5.15***	(2.88 - 9.20)
Community Media Exposure		
Low (REF)	-	-
Intermediate	1.15	(0.81 - 1.63)
High	1.53	(0.94 - 2.48)
Community Autonomy		
Low (REF)	-	-
Intermediate	0.91	(0.68 - 1.22)
High	0.66	(0.44 - 1.00)
Community Wealth		
Low (REF)	-	-
Intermediate	1.89***	(1.32 - 2.71)
High	1.94*	(1.05 - 3.60)
Predisposing Variables		
Age (mean $\pm$ SD)	1.06***	(1.03 - 1.09)
Birth Order (mean $\pm$ SD)	0.75***	(0.69 - 0.82)
Maternal Education		
No Education (REF)	-	-
Primary	1.51**	(1.13 - 2.02)
Secondary or Higher	2.02***	(1.58 - 2.59)
Husband's Education		
No Education (REF)	-	-
Primary	1.39*	(1.06 - 1.81)
Secondary or Higher	1.52***	(1.21 - 1.91)
Media Exposure		
Low (REF)	-	-
Intermediate	1.27	(0.99 - 1.63)
High	1.03	(0.76 - 1.39)
Autonomy		
None (REF)	-	-
Low	0.79	(0.57 - 1.08)
Intermediate	0.95	(0.71 - 1.27)
High	1.06	(0.82 - 1.37)
Wanted Pregnancy		
Not Wanted (REF)	-	-
Wanted	1.26	(0.94 - 1.69)
Enabling Variables		
Location		
Rural (REF)		
Urban	1.45*	(1.01 - 2.07)

Table 21: Multivariate logistic regression of institutional delivery among Muslim mothers in India

Variable	Adjusted OR	95% CI
Wealth Index		
Poorest (REF)	-	-
Poor	1.71**	(1.18 - 2.48)
Intermediate	2.45***	(1.63 - 3.67)
Rich	3.17***	(2.06 - 4.86)
Richest	4.40***	(2.65 - 7.30)
Need Variables		
Lost Pregnancy		
No (REF)	-	-
Yes	1.17	(0.88 - 1.55)

**p<0.05, **p<0.01, ***p<0.001*

Multivariate Odds Ratios were calculated by modelling each outcome with all covariates. Survey weights were incorporated within the multivariate analysis.

Appendix E: Bivariate and multivariate results for Pakistan (Primary Objective).

Table 22: Appropriate ANC according to sociodemographic characteristics among Muslim mothers in Pakistan

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
≥ 4 ANC visits	2838	(38.5%)	4529	(61.5%)		Lower Limit	Upper Limit
Contextual Variables							
Community Education							
Low (REF)	475	(16.7%)	2298	(50.7%)	-	-	-
Intermediate	884	(31.1%)	1556	(34.4%)	2.53***	2.03	3.14
High	1479	(52.1%)	675	(14.9%)	9.41***	7.21	12.27
Community Media Exposure							
Low (REF)	916	(32.3%)	2424	(53.5%)	-	-	-
Intermediate	643	(22.7%)	1198	(26.5%)	1.42*	1.07	1.89
High	1279	(45.1%)	907	(20.0%)	2.90***	2.12	3.96
Community Autonomy							
Low (REF)	646	(22.8%)	2075	(45.8%)	-	-	-
Intermediate	1003	(35.3%)	1457	(32.2%)	2.40***	1.84	3.13
High	1189	(41.9%)	997	(22.0%)	3.04***	2.28	4.07
Community Wealth							
Low (REF)	553	(19.5%)	2174	(48.0%)	-	-	-
Intermediate	818	(28.8%)	1713	(37.8%)	2.04***	1.62	2.57
High	1467	(51.7%)	642	(14.2%)	8.94***	6.89	11.60
Predisposing Variables							
Age (mean ± SD)	29.1	± 6.0	29.9	± 6.7	0.98***	0.97	0.99
Birth Order (mean ± SD)	3.1	± 2.1	4.2	± 2.6	0.81***	0.79	0.84
Maternal Education							
No Education (REF)	830	(29.2%)	3243	(71.6%)	-	-	-
Primary	445	(15.7%)	603	(13.3%)	2.59***	2.09	3.21
Secondary or Higher	1563	(55.1%)	683	(15.1%)	8.70***	7.07	10.71
Husband's Education							
No Education (REF)	442	(15.6%)	1815	(40.2%)	-	-	-
Primary	302	(10.7%)	701	(15.5%)	1.44**	1.14	1.81
Secondary or Higher	2083	(73.7%)	2001	(44.3%)	3.67***	3.00	4.49
Media Exposure							
Low (REF)	927	(32.7%)	2910	(64.3%)	-	-	-
Intermediate	1615	(56.9%)	1509	(33.3%)	3.11***	2.64	3.66
High	294	(10.4%)	109	(2.4%)	8.10***	5.78	11.35
Autonomy							
None (REF)	1081	(38.2%)	2401	(53.1%)	-	-	-
Low	398	(14.1%)	509	(11.3%)	1.70***	1.37	2.10
Intermediate	370	(13.1%)	391	(8.6%)	1.98***	1.52	2.57
High	983	(34.7%)	1220	(27.0%)	1.45***	1.23	1.72
Wanted Pregnancy							
Not Wanted (REF)	219	(7.7%)	475	(10.5%)	-	-	-
Wanted	2615	(92.3%)	4045	(89.5%)	1.51***	1.20	1.91

Table 22: Appropriate ANC according to sociodemographic characteristics among Muslim mothers in Pakistan

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
Enabling Variables							
Location							
Rural (REF)	1100	(38.8%)	3036	(67.0%)	-	-	-
Urban	1738	(61.2%)	1493	(33.0%)	4.72***	3.76	5.92
Wealth Index							
Poorest (REF)	217	(7.6%)	1388	(30.6%)	-	-	-
Poor	338	(11.9%)	1126	(24.9%)	1.83***	1.43	2.34
Intermediate	448	(15.8%)	956	(21.1%)	2.99***	2.32	3.86
Rich	700	(24.7%)	712	(15.7%)	6.69***	5.22	8.58
Richest	1135	(40.0%)	347	(7.7%)	23.54***	17.92	30.91
Need Variables							
Lost Pregnancy							
No (REF)	2103	(74.1%)	3453	(76.2%)	-	-	-
Yes	735	(25.9%)	1076	(23.8%)	1.09	0.94	1.26

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the bivariate analysis.

Table 23: Multivariate logistic regression of appropriate ANC among Muslim mothers in Pakistan

Variable	Adjusted OR	95% CI
Contextual Variables		
Community Education		
Low (REF)	-	-
Intermediate	1.17	(0.89 - 1.54)
High	1.67**	(1.16 - 2.38)
Community Media Exposure		
Low (REF)	-	-
Intermediate	0.70**	(0.56 - 0.87)
High	0.76*	(0.60 - 0.98)
Community Autonomy		
Low (REF)	-	-
Intermediate	1.13	(0.88 - 1.45)
High	1.08	(0.82 - 1.42)
Community Wealth		
Low (REF)	-	-
Intermediate	0.96	(0.73 - 1.27)
High	1.22	(0.84 - 1.77)
Predisposing Variables		
Age (mean $\pm$ SD)	1.01	(0.99 - 1.03)
Birth Order (mean $\pm$ SD)	0.89***	(0.84 - 0.94)
Maternal Education		
No Education (REF)	-	-
Primary	1.39**	(1.09 - 1.78)
Secondary or Higher	2.16***	(1.72 - 2.72)
Husband's Education		
No Education (REF)	-	-
Primary	0.91	(0.70 - 1.18)
Secondary or Higher	1.24*	(1.004 - 1.52)
Media Exposure		
Low (REF)	-	-
Intermediate	1.29**	(1.08 - 1.53)
High	2.03***	(1.38 – 3.00)
Autonomy		
None (REF)	-	-
Low	1.33*	(1.04 - 1.70)
Intermediate	1.41*	(1.06 - 1.87)
High	1.19	(1.00 - 1.43)
Wanted Pregnancy		
Not Wanted (REF)	-	-
Wanted	1.31	(0.99 - 1.73)
Enabling Variables		
Location		
Rural (REF)	-	-
Urban	1.36**	(1.10 - 1.69)

Table 23: Multivariate logistic regression of appropriate ANC among Muslim mothers in Pakistan

Variable	Adjusted OR	95% CI
Wealth Index		
Poorest (REF)	-	-
Poor	1.39*	(1.08 - 1.81)
Intermediate	1.64***	(1.24 - 2.17)
Rich	2.32***	(1.70 - 3.16)
Richest	4.39***	(3.03 - 6.37)
Need Variables		
Lost Pregnancy		
No (REF)	-	-
Yes	1.44***	(1.21 - 1.72)

**p<0.05, **p<0.01, ***p<0.001*

Multivariate Odds Ratios were calculated by modelling each outcome with all covariates. Survey weights were incorporated within the multivariate analysis.

Table 24: SBA use according to sociodemographic characteristics among Muslim mothers in Pakistan

Variable	SBA N (%)		No SBA N (%)		Unadjusted OR	95% CI	
SBA Use	4181	(56.8%)	3183	(43.2%)		Lower Limit	Upper Limit
Contextual Variables							
Community Education							
Low (REF)	1034	(24.7%)	1740	(54.7%)	-	-	-
Intermediate	1359	(32.5%)	1079	(33.9%)	1.83***	1.37	2.45
High	1788	(42.8%)	364	(11.4%)	6.49***	4.62	9.11
Community Media Exposure							
Low (REF)	1457	(34.8%)	1880	(59.1%)	-	-	-
Intermediate	1051	(25.1%)	788	(24.8%)	1.55**	1.12	2.14
High	1673	(40.0%)	515	(16.2%)	3.42***	2.51	4.66
Community Autonomy							
Low (REF)	1169	(28.0%)	1556	(48.9%)	-	-	-
Intermediate	1477	(35.3%)	982	(30.9%)	1.92***	1.35	2.73
High	1535	(36.7%)	645	(20.3%)	2.29***	1.59	3.29
Community Wealth							
Low (REF)	1011	(24.2%)	1716	(53.9%)	-	-	-
Intermediate	1452	(34.7%)	1077	(33.8%)	2.06***	1.53	2.77
High	1718	(41.1%)	390	(12.3%)	5.92***	4.17	8.40
Predisposing Variables							
Age (mean $\pm$ SD)	29.2	$\pm$ 6.2	30.2	$\pm$ 6.6	0.97***	0.97	0.98
Birth Order (mean $\pm$ SD)	3.3	$\pm$ 2.2	4.4	$\pm$ 2.6	0.82***	0.80	0.85
Maternal Education							
No Education (REF)	1645	(39.3%)	2428	(76.3%)	-	-	-
Primary	659	(15.8%)	389	(12.2%)	1.99***	1.61	2.46
Secondary or Higher	1877	(44.9%)	366	(11.5%)	6.94***	5.50	8.76
Husband's Education							
No Education (REF)	856	(20.5%)	1397	(44.0%)	-	-	-
Primary	497	(11.9%)	505	(15.9%)	1.39**	1.14	1.69
Secondary or Higher	2813	(67.5%)	1276	(40.2%)	3.34***	2.83	3.96
Media Exposure							
Low (REF)	1663	(39.8%)	2166	(68.1%)	-	-	-
Intermediate	2175	(52.0%)	954	(30.0%)	2.62***	2.18	3.15
High	341	(8.2%)	62	(2.0%)	8.41***	5.48	12.91
Autonomy							
None (REF)	1755	(42.1%)	1727	(54.3%)	-	-	-
Low	545	(13.1%)	362	(11.4%)	1.34*	1.07	1.68
Intermediate	493	(11.8%)	269	(8.5%)	1.34*	1.03	1.73
High	1380	(33.1%)	822	(25.8%)	1.19	0.98	1.45
Wanted Pregnancy							
Not Wanted (REF)	361	(8.6%)	336	(10.6%)	-	-	-
Wanted	3818	(91.4%)	2842	(89.4%)	1.42**	1.11	1.82
Enabling Variables							
Location							
Rural (REF)	1916	(45.8%)	2213	(69.5%)	-	-	-

Table 24: SBA use according to sociodemographic characteristics among Muslim mothers in Pakistan

Variable	SBA N (%)		No SBA N (%)		Unadjusted OR	95% CI	
Urban	2265	(54.2%)	970	(30.5%)	3.17***	2.38	4.22
Wealth Index							
Poorest (REF)	470	(11.2%)	1135	(35.7%)	-	-	-
Poor	654	(15.6%)	806	(25.3%)	1.41*	1.05	1.89
Intermediate	764	(18.3%)	640	(20.1%)	2.29***	1.66	3.17
Rich	992	(23.7%)	422	(13.3%)	4.94***	3.52	6.95
Richest	1301	(31.1%)	180	(5.7%)	13.76***	9.04	20.94
Need Variables							
Lost Pregnancy							
No (REF)	3139	(75.1%)	2410	(75.7%)	-	-	-
Yes	1042	(24.9%)	773	(24.3%)	0.99	0.87	1.14

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the bivariate analysis.

Table 25: Multivariate logistic regression of SBA use among Muslim mothers in Pakistan

Variable	Adjusted OR	95% CI
Contextual Variables		
Community Education		
Low (REF)	-	-
Intermediate	0.87	(0.63 - 1.21)
High	1.14	(0.67 - 1.95)
Community Media Exposure		
Low (REF)	-	-
Intermediate	0.99	(0.72 - 1.35)
High	1.43*	(1.03 - 1.98)
Community Autonomy		
Low (REF)	-	-
Intermediate	1.18	(0.85 - 1.63)
High	1.15	(0.80 - 1.66)
Community Wealth		
Low (REF)	-	-
Intermediate	1.13	(0.80 - 1.60)
High	1.06	(0.58 - 1.94)
Predisposing Variables		
Age (mean $\pm$ SD)	1.02*	(1.0002 - 1.03)
Birth Order (mean $\pm$ SD)	0.87***	(0.83 - 0.91)
Maternal Education		
No Education (REF)	-	-
Primary	1.14	(0.93 - 1.41)
Secondary or Higher	1.95***	(1.51 - 2.52)
Husband's Education		
No Education (REF)	-	-
Primary	0.99	(0.80 - 1.22)
Secondary or Higher	1.41***	(1.18 - 1.69)
Media Exposure		
Low (REF)	-	-
Intermediate	1.31**	(1.09 - 1.57)
High	2.14***	(1.36 - 3.35)
Autonomy		
None (REF)	-	-
Low	1.06	(0.81 - 1.39)
Intermediate	0.97	(0.73 - 1.27)
High	1.00	(0.83 - 1.20)
Wanted Pregnancy		
Not Wanted (REF)	-	-
Wanted	1.1	(0.85 - 1.42)
Enabling Variables		
Location		
Rural (REF)	-	-
Urban	1.07	(0.73 - 1.57)

Table 25: Multivariate logistic regression of SBA use among Muslim mothers in Pakistan

Variable	Adjusted OR	95% CI
Wealth Index		
Poorest (REF)	-	-
Poor	1.08	(0.81 - 1.44)
Intermediate	1.33	(0.96 - 1.84)
Rich	2.07***	(1.44 - 2.96)
Richest	3.23***	(1.99 - 5.24)
Need Variables		
Lost Pregnancy		
No (REF)	-	-
Yes	1.21*	(1.03 - 1.41)

**p<0.05, **p<0.01, ***p<0.001*

Multivariate Odds Ratios were calculated by modelling each outcome with all covariates. Survey weights were incorporated within the multivariate analysis.

Table 26: Institutional delivery according to sociodemographic characteristics among Muslim mothers in Pakistan

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
Institutional Delivery	3913	(53.0%)	3465	(47%)		Lower Limit	Upper Limit
Contextual Variables							
Community Education							
Low (REF)	956	(24.4%)	1823	(52.6%)	-	-	-
Intermediate	1242	(31.7%)	1204	(34.7%)	1.67***	1.26	2.22
High	1715	(43.8%)	438	(12.6%)	5.84***	4.18	8.14
Community Media Exposure							
Low (REF)	1380	(35.3%)	1966	(56.7%)	-	-	-
Intermediate	949	(24.3%)	894	(25.8%)	1.37*	1.01	1.87
High	1584	(40.5%)	605	(17.5%)	3.12***	2.30	4.24
Community Autonomy							
Low (REF)	1067	(27.3%)	1662	(48.0%)	-	-	-
Intermediate	1356	(34.7%)	1107	(31.9%)	1.88***	1.36	2.61
High	1490	(38.1%)	696	(20.1%)	2.41***	1.71	3.40
Community Wealth							
Low (REF)	950	(24.3%)	1782	(51.4%)	-	-	-
Intermediate	1301	(33.2%)	1236	(35.7%)	1.85***	1.39	2.47
High	1662	(42.5%)	447	(12.9%)	5.75***	4.12	8.04
Predisposing Variables							
Age (mean ± SD)	29.2	± 6.2	30.1	± 6.6	0.98***	0.97	0.99
Birth Order (mean ± SD)	3.2	± 2.2	4.4	± 2.6	0.82***	0.80	0.85
Maternal Education							
No Education (REF)	1478	(37.8%)	2604	(75.2%)	-	-	-
Primary	620	(15.8%)	430	(12.4%)	1.94***	1.58	2.39
Secondary or Higher	1815	(46.4 %)	431	(12.4%)	6.86***	5.50	8.57
Husband's Education							
No Education (REF)	769	(19.7%)	1489	(43.0%)	-	-	-
Primary	468	(12.0%)	535	(15.5%)	1.49***	1.22	1.82
Secondary or Higher	2662	(68.3%)	1435	(41.5%)	3.31***	2.78	3.93
Media Exposure							
Low (REF)	1513	(38.7%)	2327	(67.2%)	-	-	-
Intermediate	2067	(52.9%)	1064	(30.7%)	2.66***	2.23	3.18
High	331	(8.5%)	73	(2.1%)	7.62***	5.14	11.31
Autonomy							
None (REF)	1625	(41.6%)	1866	(53.9%)	-	-	-
Low	521	(13.3%)	386	(11.1%)	1.37**	1.11	1.68
Intermediate	461	(11.8%)	301	(8.7%)	1.34*	1.05	1.71
High	1298	(33.2%)	909	(26.3%)	1.21*	1.006	1.46
Wanted Pregnancy							
Not Wanted (REF)	326	(8.3%)	371	(10.7)	-	-	-
Wanted	3583	(91.7%)	3090	(89.3)	1.57***	1.23	1.99
Enabling Variables							
Location							
Rural (REF)	1750	(44.7%)	2392	(69.0)	-	-	-
Urban	2163	(55.3%)	1073	(31.0)	3.24***	2.47	4.25

Table 26: Institutional delivery according to sociodemographic characteristics among Muslim mothers in Pakistan

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
Wealth Index							
Poorest (REF)	433	(11.1%)	1174	(33.9%)	-	-	-
Poor	594	(15.2%)	870	(25.1%)	1.35*	1.03	1.78
Intermediate	689	(17.6%)	720	(20.8%)	2.09***	1.54	2.84
Rich	924	(23.6%)	491	(14.2%)	4.65***	3.38	6.41
Richest	1273	(32.5%)	210	(6.1%)	13.86***	9.38	20.46
Need Variables							
Lost Pregnancy							
No (REF)	2924	(74.7%)	2636	(76.1%)	-	-	-
Yes	989	(25.3%)	829	(23.9%)	1.05	0.92	1.19

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the bivariate analysis.

Table 27: Multivariate logistic regression of institutional delivery among Muslim mothers in Pakistan

Variable	Adjusted OR	95% CI
Contextual Variables		
Community Education		
Low (REF)	-	-
Intermediate	0.76	(0.55 - 1.07)
High	0.93	(0.55 - 1.58)
Community Media Exposure		
Low (REF)	-	-
Intermediate	0.89	(0.66 - 1.20)
High	1.3	(0.93 - 1.82)
Community Autonomy		
Low (REF)	-	-
Intermediate	1.21	(0.89 - 1.65)
High	1.3	(0.91 - 1.85)
Community Wealth		
Low (REF)	-	-
Intermediate	1.07	(0.75 - 1.53)
High	1.11	(0.63 - 1.94)
Predisposing Variables		
Age (mean $\pm$ SD)	1.02*	(1.004 - 1.04)
Birth Order (mean $\pm$ SD)	0.86***	(0.82 - 0.91)
Maternal Education		
No Education (REF)	-	-
Primary	1.17	(0.95 - 1.43)
Secondary or Higher	2.08***	(1.62 - 2.66)
Husband's Education		
No Education (REF)	-	-
Primary	1.07	(0.87 - 1.32)
Secondary or Higher	1.39***	(1.16 - 1.65)
Media Exposure		
Low (REF)	-	-
Intermediate	1.34**	(1.12 - 1.60)
High	1.99**	(1.30 - 3.06)
Autonomy		
None (REF)	-	-
Low	1.07	(0.85 - 1.34)
Intermediate	0.93	(0.71 - 1.21)
High	1.00	(0.84 - 1.18)
Wanted Pregnancy		
Not Wanted (REF)	-	-
Wanted	1.27	(0.99 - 1.63)
Enabling Variables		
Location		
Rural (REF)	-	-
Urban	1.11	(0.78 - 1.58)

Table 27: Multivariate logistic regression of institutional delivery among Muslim mothers in Pakistan

Variable	Adjusted OR	95% CI
Wealth Index		
Poorest (REF)	-	-
Poor	1.08	(0.82 - 1.41)
Intermediate	1.28	(0.93 - 1.76)
Rich	2.09***	(1.46 - 2.99)
Richest	3.49***	(2.20 - 5.52)
Need Variables		
Lost Pregnancy		
No (REF)	-	-
Yes	1.29**	(1.11 - 1.51)

**p<0.05, **p<0.01, ***p<0.001*

Multivariate Odds Ratios were calculated by modelling each outcome with all covariates. Survey weights were incorporated within the multivariate analysis.

Appendix F: Bivariate and multivariate results for Bangladesh (Primary Objective).

Table 28: Appropriate ANC according to sociodemographic characteristics among Muslim mothers in Bangladesh

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
≥ 4 ANC visits	1,293	(31.7%)	2,784	(68.2%)		Lower limit	Upper limit
Contextual Variables							
Community Education							
Low (REF)	337	(26.1%)	1151	(41.3%)	-	-	-
Intermediate	402	(31.1%)	869	(31.2%)	1.47*	1.01	2.16
High	554	(42.8%)	764	(27.4%)	2.22***	1.52	3.25
Community Media Exposure							
Low (REF)	338	(26.1%)	1207	(43.4%)	-	-	-
Intermediate	433	(33.5%)	964	(34.6%)	1.99***	1.47	2.71
High	522	(40.4%)	613	(22.0%)	3.27***	2.45	4.36
Community Autonomy							
Low (REF)	375	(29.0%)	1143	(41.1%)	-	-	-
Intermediate	417	(32.3%)	839	(30.1%)	1.44*	1.06	1.97
High	501	(38.7%)	802	(28.8%)	1.76***	1.30	2.38
Community Wealth							
Low (REF)	304	(23.5%)	1136	(40.8%)	-	-	-
Intermediate	381	(29.5%)	960	(34.5%)	1.18	0.79	1.74
High	608	(47.0%)	688	(24.7%)	2.62***	1.79	3.84
Predisposing Variables							
Age (mean ± SD)	24.3	± 5.4	24.6	± 5.9	0.99	0.97	1.01
Birth Order (mean ± SD)	1.8	± 1.05	2.3	± 1.5	0.74***	0.69	0.80
Maternal Education							
No Education (REF)	78	(6.0%)	457	(16.4%)	-	-	-
Primary	238	(18.4%)	890	(32.0%)	1.59	0.94	2.69
Secondary or Higher	977	(75.6%)	1,437	(51.6%)	3.96***	2.60	6.05
Husband's Education							
No Education (REF)	173	(13.4%)	768	(27.6%)	-	-	-
Primary	291	(22.5%)	941	(33.8%)	1.67**	1.23	2.29
Secondary or Higher	828	(64.1%)	1074	(38.6%)	3.58***	2.47	5.19
Media Exposure							
Low (REF)	385	(29.8%)	1601	(57.5%)	-	-	-
Intermediate	729	(56.4%)	1084	(38.9%)	2.69***	2.13	3.40
High	179	(13.8%)	99	(3.6%)	6.02***	3.44	10.52
Autonomy							
None (REF)	307	(23.7%)	807	(29.0%)	-	-	-
Low	201	(15.5%)	466	(16.7%)	1.24	0.97	1.59
Intermediate	201	(15.5%)	386	(13.9%)	1.23	0.94	1.63
High	584	(45.2%)	1125	(40.4%)	1.29*	1.06	1.57
Wanted Pregnancy							
Not Wanted (REF)	73	(5.6%)	361	(13.0%)	-	-	-
Wanted	1220	(94.4%)	2423	(87.0%)	1.87*	1.02	3.45

Table 28: Appropriate ANC according to sociodemographic characteristics among Muslim mothers in Bangladesh

Variable	Yes N (%)		No N (%)		Unadjusted OR	95% CI	
Enabling Variables							
Location							
Rural (REF)	701	(54.2%)	2086	(74.9%)	-	-	-
Urban	592	(45.8%)	698	(25.1%)	2.38***	1.82	3.10
Wealth Index							
Poorest (REF)	129	(10.0%)	705	(25.3%)	-	-	-
Poor	164	(12.7%)	612	(22.0%)	1.35	0.93	1.95
Intermediate	199	(15.4%)	575	(20.7%)	2.03***	1.43	2.89
Rich	334	(25.8%)	536	(19.3%)	3.27***	2.24	4.77
Richest	467	(36.1%)	356	(12.8%)	6.42***	4.18	9.87
Need Variables							
Lost Pregnancy							
No (REF)	1095	(84.7%)	2460	(88.4%)	-	-	-
Yes	198	(15.3%)	324	(11.6%)	1.22	0.93	1.59

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the bivariate analysis.

Table 29: Multivariate logistic regression of appropriate ANC among Muslim mothers in Bangladesh

Variable	Adjusted OR	95% CI
Contextual Variables		
Community Education		
Low (REF)	-	-
Intermediate	0.84	(0.60 - 1.18)
High	0.92	(0.65 - 1.29)
Community Media Exposure		
Low (REF)	-	-
Intermediate	1.65**	(1.21 - 2.25)
High	1.79**	(1.24 - 2.57)
Community Autonomy		
Low (REF)	-	-
Intermediate	1.13	(0.86 - 1.48)
High	1.09	(0.80 - 1.47)
Community Wealth		
Low (REF)	-	-
Intermediate	0.67*	(0.47 - 0.95)
High	0.63*	(0.40 - 0.97)
Predisposing Variables		
Age (mean ± SD)	1.03	(0.996 - 1.07)
Birth Order (mean ± SD)	0.78*	(0.65 - 0.95)
Maternal Education		
No Education (REF)	-	-
Primary	1.26	(0.87 - 1.83)
Secondary or Higher	1.87***	(1.29 - 2.71)
Husband's Education		
No Education (REF)	-	-
Primary	1.16	(0.87 - 1.55)
Secondary or Higher	1.34	(0.92 - 1.96)
Media Exposure		
Low (REF)	-	-
Intermediate	1.44**	(1.12 - 1.86)
High	1.87	(0.97 - 3.59)
Autonomy		
None (REF)	-	-
Low	1.16	(0.89 - 1.51)
Intermediate	1.1	(0.83 - 1.45)
High	1.15	(0.92 - 1.43)
Wanted Pregnancy		
Not Wanted (REF)	-	-
Wanted	1.02	(0.51 - 2.06)
Enabling Variables		
Location		
Rural (REF)	-	-
Urban	1.27	(0.96 - 1.68)
Wealth Index		
Poorest (REF)	-	-

Table 29: Multivariate logistic regression of appropriate ANC among Muslim mothers in Bangladesh

Variable	Adjusted OR	95% CI
Poor	1.13	(0.83 - 1.54)
Intermediate	1.2	(0.85 - 1.71)
Rich	1.92*	(1.15 - 3.19)
Richest	2.69***	(1.65 - 4.40)
Need Variables		
Lost Pregnancy		
No (REF)	-	
Yes	1.28	(0.91 - 1.80)

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the multivariate analysis.

Table 30: SBA use according to sociodemographic characteristics among Muslim mothers in Bangladesh

Variable	SBA Use N (%)		No SBA Use N (%)		Unadjusted OR	95% CI	
SBA Use	1795	(44.0%)	2288	(56.0%)			
Contextual Variables						Lower Limit	Upper Limit
Community Education							
Low (REF)	386	(21.5%)	1104	(48.3%)	-	-	-
Intermediate	582	(32.4%)	689	(30.1%)	2.50***	1.91	3.27
High	827	(46.1%)	495	(21.6%)	4.67***	3.55	6.13
Community Media Exposure							
Low (REF)	480	(26.7%)	1068	(46.7%)	-	-	-
Intermediate	611	(34.0%)	786	(34.4%)	1.69***	1.27	2.24
High	704	(39.2%)	434	(19.0%)	3.74***	2.77	5.05
Community Autonomy							
Low (REF)	554	(30.9%)	964	(42.1%)	-	-	-
Intermediate	549	(30.6%)	710	(31.0%)	1.31	0.94	1.83
High	692	(38.6%)	614	(26.8%)	1.75**	1.26	2.45
Community Wealth							
Low (REF)	356	(19.8%)	1087	(47.5%)	-	-	-
Intermediate	593	(33.0%)	748	(32.7%)	2.31***	1.75	3.04
High	846	(47.1%)	453	(19.8%)	5.39***	4.10	7.10
Predisposing Variables							
Age (mean ± SD)	24.3	± 5.5	24.8	± 6.0	0.98	0.97	1.00
Birth Order (mean ± SD)	1.8	± 1.1	2.5	± 1.6	0.67***	0.61	0.73
Maternal Education							
No Education (REF)	96	(5.3%)	440	(19.2%)	-	-	-
Primary	329	(18.3%)	799	(34.9%)	2.16***	1.60	2.92
Secondary or Higher	1370	(76.3%)	1049	(45.9%)	6.32***	4.66	8.56
Husband's Education							
No Education (REF)	210	(11.7%)	733	(32.1%)	-	-	-
Primary	426	(23.7%)	806	(35.2%)	1.87***	1.44	2.42
Secondary or Higher	1158	(64.6%)	748	(32.7%)	5.45***	4.20	7.06
Media Exposure							
Low (REF)	577	(32.1%)	1412	(61.7%)	-	-	-
Intermediate	998	(55.6%)	817	(35.7%)	2.79***	2.11	3.69
High	220	(12.3%)	59	(2.6%)	5.95***	3.33	10.62
Autonomy							
None (REF)	453	(25.2%)	661	(28.9%)	-	-	-
Low	294	(16.4%)	374	(16.3%)	1.23	0.98	1.55
Intermediate	266	(14.8%)	322	(14.1%)	1.31*	1.02	1.67
High	782	(43.6%)	931	(40.7%)	1.23	1.00	1.53
Wanted Pregnancy							
Not Wanted (REF)	129	(7.2%)	305	(13.3%)	-	-	-
Wanted	1666	(92.8%)	1983	(86.7%)	2.01***	1.49	2.72
Enabling Variables							
Location							
Rural (REF)	1010	(56.3%)	1780	(77.8%)	-	-	-
Urban	785	(43.7%)	508	(22.2%)	2.74***	2.17	3.46

Table 30: SBA use according to sociodemographic characteristics among Muslim mothers in Bangladesh

Variable		SBA Use N (%)		No SBA Use N (%)		Unadjusted OR	95% CI	
Wealth Index								
	Poorest (REF)	155	(8.6%)	681	(29.8%)	-	-	-
	Poor	235	(13.1%)	542	(23.7%)	1.81***	1.39	2.38
	Intermediate	322	(17.9%)	452	(19.8%)	2.73***	1.73	4.31
	Rich	463	(25.8%)	408	(17.8%)	4.57***	3.29	6.34
	Richest	620	(34.5%)	205	(9.0%)	12.28***	8.87	16.99
Need Variables								
Lost Pregnancy								
	No (REF)	1555	(86.6)	2005	(87.6%)	-	-	-
	Yes	240	(13.4)	283	(12.4%)	1.04	0.83	1.30

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the bivariate analysis.

Table 31: Multivariate logistic regression of SBA use among Muslim mothers in Bangladesh

Variable	Adjusted OR	95% CI
Contextual Variables		
Community Education		
Low (REF)	-	-
Intermediate	1.3	(0.99 - 1.70)
High	1.54**	(1.14 - 2.07)
Community Media Exposure		
Low (REF)	-	-
Intermediate	1.13	(0.89 - 1.43)
High	1.31	(0.97 - 1.77)
Community Autonomy		
Low (REF)	-	-
Intermediate	0.93	(0.73 - 1.20)
High	1.02	(0.78 - 1.33)
Community Wealth		
Low (REF)	-	-
Intermediate	1.27	(0.96 - 1.69)
High	1.57**	(1.12 - 2.22)
Predisposing Variables		
Age (mean ± SD)	1.07***	(1.03 - 1.10)
Birth Order (mean ± SD)	0.63***	(0.55 - 0.71)
Maternal Education		
No Education (REF)	-	-
Primary	1.67*	(1.11 - 2.51)
Secondary or Higher	2.29***	(1.49 - 3.54)
Husband's Education		
No Education (REF)	-	-
Primary	1.18	(0.93 - 1.50)
Secondary or Higher	1.75***	(1.33 - 2.29)
Media Exposure		
Low (REF)	-	-
Intermediate	1.03	(0.78 - 1.36)
High	1.26	(0.73 - 2.16)
Autonomy		
None (REF)	-	-
Low	1.09	(0.86 - 1.38)
Intermediate	1.13	(0.88 - 1.46)
High	1.1	(0.87 - 1.37)
Wanted Pregnancy		
Not Wanted (REF)	-	-
Wanted	0.83	(0.59 - 1.17)
Enabling Variables		
Location		

Table 31: Multivariate logistic regression of SBA use among Muslim mothers in Bangladesh

Variable	Adjusted OR	95% CI
Rural (REF)	-	-
Urban	1.07	(0.82 - 1.41)
Wealth Index		
Poorest (REF)	-	-
Poor	1.21	(0.93 - 1.57)
Intermediate	1.22	(0.80 - 1.84)
Rich	1.54**	(1.14 - 2.08)
Richest	2.55***	(1.84 - 3.55)
Need Variables		
Lost Pregnancy		
No (REF)	-	-
Yes	1.1	(0.84 - 1.45)

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the multivariate analysis.

Table 32: Institutional delivery according to sociodemographic characteristics in Bangladesh

Variable	Institutional Delivery N (%)		No Institutional Delivery N (%)		Unadjusted OR	95% CI	
Institutional Delivery	1,606	(39.3%)	2,476	(60.7%)		Lower Limit	Upper Limit
Contextual Variables							
Community Education							
Low (REF)	346	(21.5%)	1144	(46.2%)	-	-	-
Intermediate	528	(32.9%)	743	(30.0%)	2.39***	1.80	3.18
High	732	(45.6%)	589	(23.8%)	3.93***	2.93	5.26
Community Media Exposure							
Low (REF)	425	(26.5%)	1122	(45.3%)	-	-	-
Intermediate	544	(33.9%)	853	(34.5%)	1.72***	1.30	2.28
High	637	(39.7%)	501	(20.2%)	3.59***	2.64	4.88
Community Autonomy							
Low (REF)	471	(29.3%)	1047	(42.3%)	-	-	-
Intermediate	493	(30.7%)	766	(30.9%)	1.40	0.996	1.98
High	642	(40.0%)	663	(26.8%)	1.88***	1.35	2.62
Community Wealth							
Low (REF)	300	(18.7%)	1142	(46.1%)	-	-	-
Intermediate	514	(32.0%)	827	(33.4%)	2.13***	1.59	2.86
High	792	(49.3%)	507	(20.5%)	5.41***	4.00	7.32
Predisposing Variables							
Age (mean ± SD)	24.5	± 5.6	24.6	± 5.9	0.99	0.98	1.01
Birth Order (mean ± SD)	1.8	± 1.1	2.4	± 1.6	0.68***	0.63	0.74
Maternal Education							
No Education (REF)	93	(5.8%)	443	(17.9%)	-	-	-
Primary	287	(17.9%)	841	(34.0%)	1.95***	1.44	2.65
Secondary or Higher	1226	(76.3%)	1192	(48.1%)	5.35***	3.92	7.30
Husband's Education							
No Education (REF)	186	(11.6%)	757	(30.6%)	-	-	-
Primary	374	(23.3%)	858	(34.7%)	1.77***	1.37	2.30
Secondary or Higher	1045	(65.1%)	860	(34.8%)	4.88***	3.74	6.38
Media Exposure							
Low (REF)	480	(29.9%)	1509	(60.9%)	-	-	-
Intermediate	917	(57.1%)	897	(36.2%)	2.91***	2.16	3.92
High	209	(13.1%)	70	(2.8%)	6.42***	3.61	11.42
Autonomy							
None (REF)	397	(24.7%)	717	(29.0%)	-	-	-
Low	261	(16.3%)	407	(16.4%)	1.23	0.98	1.55
Intermediate	243	(15.1%)	345	(13.9%)	1.40*	1.09	1.81
High	705	(43.9%)	1007	(40.7)	1.25*	1.00	1.56
Wanted Pregnancy							
Not Wanted (REF)	113	(7.0%)	321	(13.0)	-	-	-
Wanted	1493	(93.0%)	2155	(87.0)	1.86***	1.35	2.55
Enabling Variables							
Location							
Rural (REF)	864	(53.8%)	1925	(77.7)	-	-	-

Table 32: Institutional delivery according to sociodemographic characteristics in Bangladesh

Variable	Institutional Delivery N (%)		No Institutional Delivery N (%)		Unadjusted OR	95% CI	
Urban	742	(46.2%)	551	(22.3)	2.99***	2.38	3.76
Wealth Index							
Poorest (REF)	125	(7.8%)	711	(28.7)	-	-	-
Poor	192	(12.0%)	584	(23.6)	1.73***	1.32	2.26
Intermediate	271	(16.9%)	503	(20.3)	2.65***	1.67	4.21
Rich	422	(26.3%)	449	(18.1)	4.58***	3.25	6.45
Richest	596	(37.1%)	229	(9.2)	12.83***	9.09	18.11
Need Variables							
Lost Pregnancy							
No (REF)	1379	(85.9%)	2180	(88.0)	-	-	-
Yes	227	(14.1%)	296	(12.0)	1.15	0.92	1.43

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the bivariate analysis.

Table 33: Multivariate logistic regression of institutional delivery among Muslim mothers in Bangladesh

Variable	Adjusted OR	95% CI
Contextual Variables		
Community Education		
Low (REF)	-	-
Intermediate	1.24	(0.94 - 1.64)
High	1.26	(0.90 - 1.75)
Community Media Exposure		
Low (REF)	-	-
Intermediate	1.16	(0.90 - 1.50)
High	1.2	(0.87 - 1.66)
Community Autonomy		
Low (REF)	-	-
Intermediate	1.02	(0.77 - 1.35)
High	1.1	(0.83 - 1.46)
Community Wealth		
Low (REF)	-	-
Intermediate	1.21	(0.88 - 1.67)
High	1.54*	(1.01 - 2.35)
Predisposing Variables		
Age (mean ± SD)	1.08***	(1.04 - 1.12)
Birth Order (mean ± SD)	0.61***	(0.53 - 0.70)
Maternal Education		
No Education (REF)	-	-
Primary	1.58*	(1.02 - 2.46)
Secondary or Higher	2.11**	(1.32 - 3.37)
Husband's Education		
No Education (REF)	-	-
Primary	1.15	(0.90 - 1.47)
Secondary or Higher	1.57**	(1.19 - 2.06)
Media Exposure		
Low (REF)	-	-
Intermediate	1.08	(0.81 - 1.45)
High	1.4	(0.82 - 2.39)
Autonomy		
None (REF)	-	-
Low	1.09	(0.84 - 1.41)
Intermediate	1.21	(0.93 - 1.60)
High	1.06	(0.85 - 1.33)
Wanted Pregnancy		
Not Wanted (REF)	-	-
Wanted	0.81	(0.57 - 1.16)
Enabling Variables		
Location		
Rural (REF)	-	-
Urban	1.17	(0.85 - 1.61)
Wealth Index		
Poorest (REF)	-	-

Table 33: Multivariate logistic regression of institutional delivery among Muslim mothers in Bangladesh

Variable	Adjusted OR	95% CI
Poor	1.19	(0.92 - 1.54)
Intermediate	1.26	(0.83 - 1.90)
Rich	1.64**	(1.21 - 2.21)
Richest	2.92***	(2.04 - 4.18)
Need Variables		
Lost Pregnancy		
No (REF)	-	-
Yes	1.21	(0.91 - 1.60)

**p<0.05, **p<0.01, ***p<0.001*

Bivariate Odds Ratios were calculated by modelling each outcome against individual. Survey weights were incorporated within the multivariate analysis.

Appendix G: Policy Brief

MATERNAL HEALTHCARE UTILIZATION AMONG MUSLIM MOTHERS FROM INDIA, PAKISTAN, AND BANGLADESH: IS THERE EQUITY?

Rohin J. Krishnan

INTRODUCTION:

To date, research on maternal healthcare utilization (MHU) among Muslim mothers has largely focused on religious differences, with most showing that Muslim women fare worse than their Non-Muslim counterparts on many indicators of appropriate maternal healthcare use. It must be noted that research controlling for religion in this way makes the implicit assumption that the effect of religion (in this case, Islam) on MHU is uniform across mothers in the same way as are more specifically defined constructs such as education level and wealth index. This supposes that there is no variation within the construct of religion and this may be misleading because it can mask important variation within Muslim women. Unfortunately, little research exists elucidating patterns of MHU within this religious population, especially within India, Pakistan, and Bangladesh where the largest number of Muslims reside. This thesis attempts to fill this research gap.

APPROACH AND RESULTS

This study utilized data from the 2005-06 Indian National Family and Health Survey -3rd Edition, 2012-13 Pakistan Demographic Health Survey, and 2014 Bangladesh Demographic Health Survey to assess if there is equity in MHU among Muslim mothers in India, Pakistan, and Bangladesh. The results revealed that household wealth index and education were important correlates of receipt of at least four antenatal care visits, use of skilled birth attendant use, and institutional delivery among Muslim mothers in the three countries. Further analysis revealed a narrower equity gap of MHU among Muslim mothers in Bangladesh as compared to Muslim mothers in India and Pakistan.

CONCLUSION

This work describes one of the first studies to explore inequity in appropriate ANC, SBA use, and institutional delivery among Muslim mothers from India, Pakistan, and Bangladesh. A major finding of this work is that MHU among Muslim women is far from homogeneous but rather shaped by wealth status as well as other variables such as education, consistent with Andersen's model.

POLICY IMPLICATION

Given the results of this study, policy-makers should realize that religion is not a sole explanation of inequity for MHU and understand the need to look further within Muslim communities for solutions. Policy makers should acknowledge the socioeconomic deprivation of some (but not all) Muslim communities across the three countries and continue to:

1) Design supply-side and demand-side healthcare system interventions that reduce the gap in equity among women within Muslim communities in these three countries.

2) Use the successes of neighboring countries to target the needs of Muslim mothers and reduce inequity.

    I. The successes of Bangladesh's recent efforts to reduce inequity through its expansion of maternal health services, its widely-known maternal voucher program, and strong NGO partnerships offer lessons for policy-makers in India and Pakistan.

    II. The successes of Pakistan's Lady Health Worker program may offer lessons for analogous community health worker programs (i.e. India's Accredited Social Health Activist (ASHA) Program). Research has shown that Pakistan's Lady Health Worker program has considerably accelerated improvements in MHU within Muslim communities (Jalal, 2011; Zhu et al., 2014).

Compared to India, Pakistan is an Islamic majority country composed of its strictly hierarchal society that is typically shaped by traditional Islamic culture. Compared to ASHAs, the majority of whom are Hindu, Lady Health Workers, who are Muslim by majority, have the unique ability to navigate traditional Islamic culture to positively engage Muslim mothers in their community (Bajpai & Dholakia, 2011; Peer for Progress, 2013).

It is recommended that policy makers in Muslim minority countries such as India (or others) better diversify the religious composition of their community health workforce to better engage Muslim communities within their respective countries.

Appendix H: Summary of previous studies reporting religious differences in MHU among Muslim mothers in India and Bangladesh

Table 34: Summary of previous studies exploring religious differences in MHU among Muslim mothers in India and Bangladesh

Author	Country	Data Set	Setting	Effect of Religion on MHU
(Yadav & Kesarwani, 2016)	India	NFHS-3	National	Muslim mothers had significantly lower odds of SBA use compared to Hindu mothers (OR: 0.88, 95% CI: 0.78, 0.99). No significant differences were observed for ANC and postnatal care.
(Singh et al., 2014)	India	DLHS-3	Urban India	Muslims had significantly lower odds of full antenatal care (OR: 0.73, 95% CI: 0.57,0.93) and SBA use (OR: 0.76, 95% CI: 0.60,0.95) compared to Hindu mothers; however, the results also revealed that Muslims had significantly higher odds of postnatal care compared to Hindu mothers (OR: 1.55, 95% CI: 1.20, 2.0).
(Singh et al., 2012c)	India	NFHS-3	Rural India	Muslims had significantly lower odds of SBA use compared to Hindu mothers (OR: 0.65, 95% CI: 0.51, 0.83). There was no significant difference between Hindus and Muslims with respect to full ANC and postnatal care.

(Pallikadavath et al., 2004b)	India	NFHS-2	Bihar, Rajasthan, Uttar Pradesh, Madhya Pradesh	Muslim mothers had significantly higher odds of having an ANC checkup compared to Hindu mothers in Madhya Pradesh (OR=4.9, $p < 0.01$). No significant difference in the receipt of at least one ANC checkup among Muslim and Hindu mothers in Bihar, Rajasthan, and Uttar Pradesh;
(Navaneetham & Dharmalingam, 2002)	India	NFHS	Karnataka, Kerala, Tamil Nadu, Andhra Pradesh	Compared to Hindus, Muslims in Karnataka had significantly higher odds of SBA (OR: 1.46, SE: 0.24), while Muslim mothers in Kerala had significantly lower odds of SBA use (OR: 0.27, SE: 0.09). Lastly, Muslim mothers in Kerala had significantly lower odds of institutional delivery compared to Hindu mothers (OR 0.29, SE 0.08).
(Jat et al., 2011)	India	DLHS-3	Madhya Pradesh	Muslim mothers had significantly higher odds of ANC (OR: 1.52, 95% CI: 1.16, 1.97) and SBA use (OR: 1.26, 95% CI: 1.01, 1.56) compared to Non-Muslim mothers; no significant difference was found for religion and postnatal care.
(Pallikadavath et al., 2004a)	India	NFHS-2	Rural Madhya Pradesh	Muslim mothers had significantly higher odds of ANC compared to Hindu mothers (OR: 4.9, $p < 0.01$).

(Thind et al., 2008)	India	NFHS-2	Maharashtra	Muslim mothers had lesser odds of delivering at home compared to Hindu mothers (OR: 0.57, $p < 0.05$ for Home vs. Public; OR: 0.50, $p < 0.05$ for Home vs. Private).
(Anwar et al., 2015)	Bangladesh	1993-94, 1996-97, 1999-2000, 2004, 2007, and 2011 BDHS	National	Non-Muslims had significantly higher odds of receiving any ANC (OR: 1.10, 95% CI: 1.01, 1.19) and institutional delivery (OR: 1.73, 95% CI: 1.48, 2.02).
(Bashar et al., 2012)	Bangladesh	2007 BDHS	National	Non-Muslim mothers had 42% higher odds of SBA use compared to Muslim mothers (OR 1.42, 95% CI: 1.16, 1.74). Upon stratification based on location (urban or rural), Non-Muslim mothers had significantly higher odds of SBA use compared to Muslims irrespective of whether the respondent resides in an urban (OR: 1.60, 95% CI: 1.16, 2.20) or rural location (OR: 1.56, 95% CI: 1.17, 2.07)
(Hossain & Hoque, 2015)	Bangladesh	2011 BDHS	National	Muslim mothers are less likely to seek increasingly consecutive ANC visits as compared to Non-Muslim mothers
(Kamal et al., 2013)	Bangladesh	2007 BDHS	National	Non-Muslim mothers had a 79% higher odds of institutional delivery compared to

				Muslim mothers (OR: 1.79, 95% CI: 1.27, 2.51).
(Kamal, 2012)	Bangladesh	2006 BUHS	Urban Slums	Non-Muslims had significantly higher odds of antenatal care (OR: 4.12, 95% CI: 1.96-8.63), SBA use (OR: 3.86, 95% CI: 2.41, 6.18), institutional delivery (OR: 2.80, 95% CI: 1.69, 4.65), and postnatal care (OR: 2.65, 95% CI: 1.69, 4.17)
(Kamal et al., 2015b)	Bangladesh	2007 BDHS	Rural Bangladesh	Muslims had significantly lesser odds to utilize a SBA compared to Non-Muslims (OR: 0.71, 95% CI: 0.50, 1.00) (Kamal et al., 2015b)
(Kabir, 2007)	Bangladesh	2004 BDHS	Rural Bangladesh	Muslim mothers had a 51% lower odds of SBA use compared to Hindu mothers (OR 0.49, 95% CI: 0.35, 0.67)
(Anwar et al., 2004)	Bangladesh	2004 BDHS	Matlab	Non-Muslims had a 76% higher odds of SBA use compared to Muslim mothers (OR 1.76, 95% CI: 1.54, 2.02)

Curriculum Vitae

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