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Impact of Mass Media on the Utilization of Maternal Healthcare Services in South Asia

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IMPACT OF MASS MEDIA ON THE UTILIZATION OF MATERNAL HEALTHCARE SERVICES IN SOUTH ASIA

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Abstract

Maternal mortality is a serious issue in the developing world due in part to inadequate care and awareness before, during, and after the pregnancy period. Appropriate information about maternal healthcare is essential to reduce maternal mortality. Mass media can be an influential source in disseminating knowledge and information on maternal healthcare. Therefore, this study examines the impact of mass media exposure (television, radio, and newspaper) and socioeconomic factors on maternal healthcare utilization in four South Asian countries: India, Bangladesh, Nepal, and Afghanistan. Analyses use the Demographic and Health Survey 2014-2016, a nationally representative survey of women aged 15-49 years. Maternal healthcare utilization is significantly higher among women exposed to mass media across countries, even after controlling for mother's, husband's, and household socioeconomic factors. Pregnant mothers who are exposed to mass media are 1.5 to 2.1 times more likely to receive antenatal care, 1.2 to 2 times more likely to deliver their babies by skilled birth attendants, and 1.3 to 1.5 times more likely to receive postpartum check-ups after their delivery across countries. Mother's educational attainment moderates the association between mass media and maternal healthcare in three of the four countries. Governmental and non-governmental organizations, as well as international organizations, can consider mass media as a key intervention in reducing maternal mortality.

Keywords: Mass Media, Women, Maternal Healthcare Services, Education, South Asia, Demographic and Health Survey

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Introduction

Although maternal mortality has decreased globally, it remains a major problem in developing countries (Alkema et al. 2016; Hill et al. 2018). According to a recent report of the World Health Organization (WHO), about 830 women die every day during the pregnancy period, and almost 99 percent of all maternal deaths occur in developing countries (WHO 2018). Maternal mortality is especially high in South Asia, with nearly one third of all maternal deaths occurring in South Asian countries (WHO 2018). Most of the mothers die due to lack of appropriate care and awareness during the pregnancy period. Access to appropriate healthcare provides the most effective health interventions for safer and healthier maternal and newborn survival (Acharya 2015). If pregnant women receive services during the three critical periods of pregnancy (antenatal, delivery, and postpartum), then they can avoid pregnancy-related complications and reduce maternal mortality and morbidity.

Antenatal care can be one of the key strategies in reducing maternal mortality. If pregnant women receive at least three or more antenatal visits, they can be screened and receive treatment for complications during the pregnancy period and also receive maternal nutritional counseling during the whole pregnancy period to get a healthier outcome (Acharya 2015). Another key strategy of maternal health services is having a skilled birth attendant during the delivery time since many pregnant women still go to traditional or unskilled birth attendants for their delivery (Uddin 2009). Finally, although postpartum care has received less attention, it is another influential strategy in reducing maternal mortality since complication and infection risks remain following childbirth.

Pregnant women need appropriate information about healthcare service at all three stages of pregnancy, and mass media (e.g., television, radio, and newspaper) can be an influential factor

in disseminating knowledge and information on maternal healthcare. Mass media plays a significant role in decision making for individuals, families, organizations, and governments, and it is also an important source of information regarding education and entertainment (Katz et al. 1973; Viswanath et al. 2007). It can help mothers understand the utilization of maternal healthcare by giving information through visual appealing, audio messages, and written report.

Mother's socioeconomic characteristics (e.g., age, education, place of residence, wealth status, and working status) have a significant role in utilizing maternal healthcare services. Maternal education can have a significant impact on the utilization of maternal healthcare services (Ahmed et Al. 2010; Weitzman 2017) since it can help mothers achieve the confidence to make decisions about their own health and it can help their husbands, in-laws, and other family members understand their pregnancy-related health issues (Singh et al. 2012). But still many mothers in South Asia are illiterate, so it would be very difficult to educate mothers for utilization of maternal healthcare within a very short period. Thus, exposure to mass media may be especially important to reach low-educated and illiterate mothers through disseminating maternal healthcare information on television, radio, and newspaper (Ghosh 2006).

This study examines the impact of mass media on the utilization of maternal healthcare services in South Asian countries, controlling for demographic and socioeconomic factors. For this purpose, this paper addresses the following research questions: Does mass media exposure increase maternal healthcare utilization in South Asian countries? Does mass media influence maternal healthcare use after controlling for the socioeconomic characteristics of the mother, her husband, and the household? Does the association between mass media and maternal healthcare vary by education?

Literature review

Maternal healthcare

Maternal health encompasses the health of the mother during pregnancy, delivery, and the postpartum period (Dairo and Owoyokun 2010; Uddin 2009). Negative health outcomes for the mother or infant, such as maternal deaths, can be reduced through utilizing maternal healthcare services such as antenatal visits, delivery by skilled birth attendants, and postpartum checkup. Maternal healthcare services are important for detecting pregnancy-related complications and reducing maternal mortality risk (Dairo and Owoyokun 2010). However, many of these services are insufficient in developing countries; almost 99 percent of all maternal deaths occur in developing countries and one-third of them occur in South Asia (WHO 2015). Mothers can reduce their risk of maternal death by utilizing maternal healthcare services at all three critical stages of the pregnancy period.

Antenatal care

Antenatal care is an early component of maternal healthcare since it works as an entry point to the utilization of maternal healthcare services throughout the pregnancy period. Antenatal care allows pregnant mothers to take regular checkup of their health and to screen for pregnancy-related complications. Previous studies show that antenatal care plays an important role in reducing maternal mortality since it instructs pregnant mothers about the birthing process and appropriate care for themselves and the infant before, during, and following birth (Regassa 2011; Saad-Haddad et al. 2016). The WHO advises pregnant mothers to take at least four antenatal care visits (Wang et al. 2011). However, only 65 percent of pregnant mothers in developing countries utilized antenatal care, compared with 97 percent of pregnant mothers in developed countries (Dairo and Owoyokun 2010).

Delivery by skilled birth attendants

Although the use of skilled birth attendants during delivery has increased globally (Adegoke and Van den Broek 2009), many mothers in developing countries do not deliver their babies with the assistance of skilled birth attendants (Prata et al. 2011; Gramham et al. 2001). Skilled birth attendants can prevent two-third of all maternal deaths since they have skills and training to address complications during delivery (Gramham et al. 2001). In developing countries, many births are still assisted by unskilled birth attendants who are mainly family members, such as mothers, mothers-in-law, other relatives, and neighbors. Many women either see pregnancy and childbirth as natural phenomena that should not require healthcare services, or they lack access to such services during pregnancy (Baral et al. 2010). For example, in Tanzania, Vietnam, Bangladesh, and Nepal, more than half of deliveries are assisted by unskilled birth attendants (Mpembeni et al. 2007; Baral et al. 2010; Wang et al. 2011).

Postpartum care

Postpartum care is also essential since most maternal deaths occur during the critical period immediately following delivery, within the first 24 hours or during the first week (Wang et al. 2011; WHO 2015). However, in many safe motherhood programs, postpartum care receives less attention than antenatal care and delivery by skilled birth attendants (Somefun and Ibisomi 2016; Wang et al. 2011). The utilization of postnatal care remains low in many developing countries (Dhakal 2007; Somefun 2016; WHO 2015). For instance, in Nepal, only 35 percent of mothers received postnatal care after the delivery (Dhakal et al. 2007) whereas nearly two-thirds of mothers (65 percent) in Nigeria did not utilize postnatal care (Somefun 2016). Lack of awareness is one of the main obstacles to postpartum care (Dhakal et al. 2007). Many mothers do not know that they should receive a postpartum checkup within the first 24 hours after the delivery and, more

generally, they are uninformed how to utilize postpartum care and from where they should receive postnatal visit.

Mass media

Women's exposure to mass media (watching TV, listening to the radio, and reading newspapers) can significantly promote their utilization of maternal healthcare services. Mass media entails written, broadcast, or spoken communication that reaches public audiences through different sources (Harcourt 2016). Mass media works as an important mechanism of integration into a society through offering information and entertainment (Katz et al. 1973; Viswanath et al. 2007). Media can disseminate information more quickly to larger audiences compared to passing information by individuals. For example, television can broadcast any news or information many times a day in a form of advertisement, entertainment, or short drama. Mass media can broadcast any types of campaign quickly and at relatively low cost (Sarrassat et al. 2015).

Mass media and health

Mass media works as an important source of health information since it broadcasts different types of public health campaigns in newspapers and other printed material, radio, and television (Randolph and Viswanath 2004). Mass media campaigns can influence individuals' knowledge, beliefs, attitudes, and behaviors (Sarrassat et al. 2015; Jahan et al. 2017). Odesanya (2015) infers that mass media expands the horizon of knowledge-based awareness and knowledge through the lens of attitudes and social behaviors and thus leads to positive public health outcomes. Since mass media campaigns are not only useful in disseminating information but also in changing public attitudes, mass media campaigns have the potential as an intervention that targets audiences' attitudes towards healthy behavioral changes at relatively low cost compared with other approaches (Randolph and Viswanath 2004; Sarrassat et al. 2015). Many countries using the

benefits of mass media have been successful in improving their targeted audiences' attitude towards healthy behavioral changes (Tabassum et al. 2018). Health communication campaigns using mass media reach target groups through disseminating significant health information and influence them towards healthy behavioral changes through the repetitive broadcast of health messages.

Mass media and maternal healthcare

Mass media can raise awareness about a serious issue like maternal mortality globally by disseminating maternal healthcare-related information and images between countries through international news broadcasts, television programming, new technologies, film, and music (Matos 2012). Viswanath and colleagues (2007) theorize that mass media can affect individual's attitudes, like mother's attitudes, towards healthy behavioral changes through the four functions of communication in health such as informational, instrumental, social control and communal. These four functions of media can bring up a whole picture of how mass media disseminates information about maternal healthcare to pregnant mothers, their family members as well as their society. First, the informational function suggests that mass media disseminates information about various aspects of health with disclosing the prevention-treatment strategies (Viswanath et al. 2007). Local television and radio can direct individual attention toward healthy behavioral changes through routinely broadcasting new drama and advertisement which cover discovery of new drugs, novel treatments, or even risk factors. For example, in Bangladesh, the TV drama series *Ujan Ganger Naiya* played a significant role in improving knowledge about maternal healthcare-related issues such as the importance of regular antenatal visits, birth preparedness, delivery by skilled birth attendants, postpartum check-ups, nutrition, and essential newborn care through entertaining the audience with dramatic stories set in a rural village (BBC 2014). Similarly, *Meena*, a cartoon drama

created by the United Nations Children's Fund (UNICEF) broadcasted on TV and radio in South Asian countries, showed the right way to give birth to a baby through entertaining mothers and their families.

Second, the instrumental function of media offers information, including announcement of dates, times, and places for screening, vaccination, or free healthcare, that encourages audiences to take practical action towards healthy behavior changes. This function of media can raise awareness among the public about the risk factors of any health problems with providing advice on preventive actions. In South Asian countries, an educational media campaign based on the safe motherhood by the United Nations Population Fund (UNFPA) included information about the symptoms of labor pain and where and who will be best for delivering a baby (Rahman et al. 2017).

Third, the social control function of media helps a larger audience soften the coercion level to any health problems through ideological acceptance.

Last, the communal function of media allows for social action in pursuit of health through generating a spirit of connectedness and reciprocity with the local community (Viswanath et al. 2007). For instance, television programs like the *Meena* cartoon and *Ujan Ganger Naiya* in Bangladesh and other South Asian countries targeted not only women of reproductive age but also targeted their other family members, like the mother-in-law, father-in-law, and husband by offering essential information about the right way of giving a birth. In developing countries, whether women have autonomy to make decisions on their reproductive healthcare depends on their partner's authority as well as their in-laws or other people's control in their family (Umar 2017; Bloom 2001). In patriarchal societies, husbands and mother's in-law often still believe in traditional birth practices and dominate and prevent women from visiting healthcare centers and withhold maternal healthcare without the consent of their husbands (Biswas et al. 2017). In this

regard, mass media campaigns can inform pregnant women and their other family members about maternal healthcare services and build a connection between them for pregnant mothers for delivering a baby in a right way instead of believing in traditional birth practice or myths.

Based on the four functions of media for health (Viswanath et al. 2007) and the importance of previous maternal health campaign, mass media can have a significant impact in utilizing maternal healthcare services, including antenatal care, delivery by skilled birth attendants, and postpartum care. However, few studies have examined mass media and maternal healthcare services in developing countries and most of them did not examine all three maternal healthcare services. In general, they found a significant relationship between mass media and maternal healthcare (Asp et al. 2014; Ghosh 2006; Uddin 2009; Zamawe, 2016). For example, in Bangladesh, Uddin (2009) finds that pregnant women exposed to mass media were more likely to use antenatal care than women who were not exposed to the mass media. Although this study represented a significant factor like mass media which has a greater impact on antenatal care utilization, this study did not examine delivery and postpartum care. In another study, Asp et al. (2014) indicate that exposure to mass media, especially reading newspapers, increases birth preparedness among rural women in Southwest Uganda. But this study just focused on rural women, so it cannot give us a general idea about the exposure to the mass media on the utilization of maternal health services. Ghosh (2006) also states that mothers' exposure to electronic mass media has a significant effect on the utilization of complete prenatal care service. He found the effect of exposure to mass media had a greater impact among women who lived in poor states where mass media had the potential to reach out to millions of illiterate and low privileged mothers in rural areas. This study only focused on prenatal care without considering delivery and postpartum care.

Based on the findings of previous studies on maternal health campaigns, this current study has taken the following hypothesis:

Hypothesis I: Mothers exposed to mass media are more likely to receive maternal healthcare.

Educational attainment, mass media, and maternal healthcare services

Maternal education has a positive impact on the utilization of maternal healthcare services (Afroja et al. 2018; Ameyaw et al. 2016; Chakraborty et al. 2003; Dhakal 2007; Mekonnen and Mekonnen 2003; Mpembani 2007; Uddin 2009; Baral 2010; Regassa 2011). Singh and colleagues (2012) identify a number of reasons why mother's education works as one of the significant factors in utilizing maternal healthcare. First, education helps their husband and other family members understand their health-related issues. Second, it can help mothers achieve the autonomy and confidence to make decisions about their own health as well as their child. Third, it helps mothers understand the quality of healthcare services and develop their ability to improve their health by seeking maternal healthcare services (Singh et al. 2012). For example, Weitzman (2017) finds that education helps reduce the probability of short birth spacing and unwanted pregnancies through increasing modern contraceptive use and helps prevent pregnancy-related complications through increasing women's antenatal healthcare visits and deliveries in formal healthcare centers. Ahmed et al. (2010) find that having a skilled birth attendant during delivery is five times higher for women who have complete education compared to less educated women. For example, in Namibia, mothers with no education were less likely to use antenatal and delivery care by professional healthcare personnel compared to mothers who had education (Rashid and Antai 2014).

However, exposure to the mass media may have a greater impact on the utilization of maternal healthcare among women with little or no formal education (Asp et al. 2014; Ghosh 2006; Uddin 2009; Zamawe 2016). In South Asian countries, many mothers are illiterate, so it would be

very hard and take a long time to educate them for the utilization of maternal healthcare services. Mass media can easily reach illiterate and low privileged mothers in rural areas (Ghosh 2006) and inform them about maternal healthcare services through disseminating information on television, radio, and newspapers or other printed materials. Based on this argument, this study has taken the following hypothesis:

Hypothesis II: Educational attainment will moderate the association between mass media and maternal healthcare, with low-educated mothers exhibiting a stronger association than high-educated mothers.

Socioeconomic correlates of mass media exposure and maternal healthcare

Most of the previous studies find that socioeconomic characteristics other than mother's education (e.g. mother's age, place of residence, wealth status, mother's employment, husband's education and husband's working status) are correlated with maternal healthcare services. Mother's age can function as a factor in gathering knowledge about and utilizing healthcare services (Chakraborty et al. 2003; Sunil et al. 2006; Uddin 2009; Baral et al. 2010; Regassa 2011). Specially, younger mothers have better knowledge of modern healthcare services than middle-aged and elder mothers (Chakraborty et al. 2003). For example, in Ghana, young mothers (15-19) were more likely to deliver their babies at health facilities than older mothers (45-49) who may think that they already have much experience how to deliver a baby (Ameyaw et al. 2016). However, the influence of age varies from one country to another. In Bangladesh, for example, middle aged mothers are more likely to use maternal healthcare services than other aged groups (Uddin 2009).

Mother's employment has a positive effect on the utilization of modern healthcare services (Regassa 2011; Dhakal et al. 2007; Chakraborty et al. 2003). Employed mothers increase their financial status and ability to afford quality healthcare services, and they play an active role in the

decision-making process about their own health as well as their family's health (Dhakal et al. 2007). For instance, in Nepal, mother's occupation was positively associated with receiving postnatal care (Dhakal et al. 2007). In contrast women with less labor force participation and lower income are less likely to receive prenatal care and delivery assistance (Sepehri et al. 2008).

Apart from the mother's characteristics, other familial factors may influence her use of maternal healthcare. Other studies show that women who live in urban areas are more likely to utilize maternal healthcare services compared with their rural counterparts (Ameyaw et al. 2018; Baral et al. 2010; Dairo et al. 2010; Sunil et al. 2006; Uddin 2009). Urban areas feature more nearby public or private hospitals available for mothers, whereas mothers in rural areas may have to travel long distances to access healthcare (Ameyaw et al. 2018). Household wealth status also has a significant impact on maternal healthcare services. Previous studies find that wealthier women were more likely to receive maternal healthcare services compared poor women. For example, in Nepal, wealthier women were more likely to deliver their baby at health facility (Baral et al. 2010). On the other hand, women from poor households were less interested to go for prenatal visits compared to the rich households (Sepehri et al. 2008).

Husband's education can also be a significant factor in utilizing maternal healthcare services in developing countries. Mullany and colleagues (2006) show that if husbands have proper education and knowledge regarding maternal healthcare seeking behaviors, they are more likely to encourage and support their wives to go for better healthcare treatments during their pregnancy. Since many husbands in developing countries do not have proper education, they tend to prevent their wives from taking maternal healthcare from male doctor during the pregnancy period. They may be concerned that if their wives are examined by male doctors, then their wives' body can be uncovered to male doctors. Therefore, illiterate partners mostly prefer female doctors for their

pregnant wives. For example, in Nepal, most of the pregnant mothers were more likely to deliver their babies by female birth attendants since their husbands and other family members mostly allow them to go to female birth attendants (Baral et al. 2010). Likewise, husband's occupation can be seen as one of the influential factors for the utilization of maternal healthcare services (Dhakal et al. 2007; Chakraborty et al. 2003). Many mothers in South Asian countries are housewives and depend on their husband's income for their livelihood as well as their healthcare. Therefore, husband's income can be considered as family income as well as social status as it helps mothers utilize the better healthcare for their own health (Dhakal et al. 2007; Chakraborty et al. 2003).

There is a lack of literature on the impact of mass media on the utilization of comprehensive maternal healthcare services in South Asian countries. Most previous studies focused on the impact of mother's demographic and socioeconomic characteristics on the utilization of maternal healthcare services. Although there are some studies on mass media and maternal healthcare, they did not see the impact of mass media on comprehensive maternal healthcare services such as antenatal, delivery, and postpartum care. Most of them measured maternal healthcare through only focusing on antenatal care, not on delivery and postpartum care, which will be other two important maternal healthcare services. Thus, the current study measures comprehensive maternal healthcare services based on all three categories such as antenatal, delivery, and postpartum care.

Methodology

Data

This study employed the Demographic and Health Survey (DHS) 2014-2016, which is a nationally representative survey of women aged 15-49 years. The DHS collects information on women's demographic and socioeconomic characteristics, fertility, health-seeking behavior, and maternal health service utilization. The sample for this study is limited to mothers who had at least one child in the last five years to measure the utilization of maternal healthcare service. Respondents missing on mass media, maternal healthcare, or control variables are listwise deleted.

I include DHS data for four South Asian countries (India, Bangladesh, Nepal, and Afghanistan) from the total eight South Asian countries. For these four countries, recent DHS waves are available that consistently measure mass media exposure, maternal healthcare utilization, and socioeconomic factors. In those four South Asian countries, maternal mortality ratio remains relatively high, ranging from 174 to 396 per 100,000 live births. These rates are higher than other South Asian countries, such as 30 and 68 per 100,000 live births in Sri Lanka and Maldives, respectively (WHO 2015). The diversity in historical context, level of development, health profiles, and location among these countries will allow me to determine whether the association between mass media exposure and maternal healthcare varies across contexts. Sample sizes are as follows: N = 190,898 in India, N = 6,855 in Bangladesh, N = 4,006 in Nepal, and N = 19,806 in Afghanistan.

Measures

The dependent variable is utilization of maternal healthcare services which has been measured based on following three response categories: antenatal care, delivery, and postpartum care. For the analysis, each of all three response categories are dichotomous variables. For example, DHS

asked women whether they had received antenatal care during their last pregnancy. We recoded the variable so that 1 = women received antenatal care and 0 = women did not receive any antenatal care. The delivery and postpartum care variables have been dichotomized in a similar way to indicate whether women delivered their babies by skilled birth attendants and whether women received any postpartum checkup after their delivery.

The key independent variable is exposure to the mass media which is measured by three forms of mass media: whether they watch TV, listen to the radio, or read newspapers. The mass media exposure variable was created by coding each form of mass media as a dichotomous variable, summing the three mass media variables, and then coding all non-zero values as exposed to mass media. Sensitivity analyses explored whether using the individual forms of mass media or the sum of mass media forms as the independent variable affects results. Control variables include mother's socioeconomic and demographic factors (age, education, and working status), her husband's characteristics (husband's education and husband's working status), and household factors (place of residence and wealth status).

Analytic Approach

Descriptive statistics present the percentage distributions for dependent, independent, and control variables. This study used multivariate logistic regression to examine the relationship between independent variables and dichotomous dependent variables. For each maternal healthcare outcome and country, model 1 is a baseline bivariate model that only includes mass media exposure. Model 2 introduces controls for mother's SES, husband's SES, and household characteristics. To further investigate whether the association between mass media and maternal healthcare varies by education, Model 3 maintains the control variables of Model 2 and adds mass media-by-education interaction terms. All analyses apply survey weights.

Results

Descriptive statistics

Table 1 shows percentages of exposure to each form of mass media, including watching TV, listening to the radio, and reading the newspaper. Watching television is the most common form of mass media in each country. Two-thirds of the mothers in South Asia watch TV, except Afghanistan whereas 52.1 percent do not watch TV. In Nepal and Afghanistan, radio is the second most popular form of media: 52.9 and 37.9 percent of mothers listen to the radio, respectively. In India and Nepal, reading newspapers is the second most common form of media, with 34.9 and 24.5 percent of mothers in India and Nepal reading newspapers, respectively. When the three forms of mass media exposure are combined (Table 2), we find that more than 60 percent of the mothers in South Asia are exposed to any form of mass media.

First, this study presents background information of mothers through univariate analysis (Table 2). In all four countries, most of the mothers are of middle aged (25-34) groups, except Bangladesh whereas 48.3 percent are young aged mothers. On the other hand, very few mothers are of older aged (35-49) groups in all four South Asian countries. Regarding place of residence, more than 70 percent of women live in rural areas, except Nepal where over half of mothers live in urban areas. In the case of education, in Afghanistan, more than 80 percent of mothers do not have any formal education; on the other hand, almost 50 percent of mothers have completed secondary education in India and Bangladesh, and 33.6 percent of mothers have secondary education in Nepal. Similarly, more than 50 percent of husbands had no education in Afghanistan whereas in the other three countries (India, Bangladesh, and Nepal) more than 70 percent of husbands had at least primary education. Regarding working status, more than 70 percent of mothers in South Asian countries do not work, except in Nepal where more than 50 percent of mothers are employed. On the other hand, almost 100 percent of their husbands in all four countries

are employed. For household's wealth status, in South Asian countries, more than 40 percent of mothers are from poor households whereas almost 20 and 40 percent of mothers are from middle and rich households, respectively.

Table 2 also includes the percentage of women who received the three important factors of maternal healthcare services: antenatal, delivery, and postpartum care. Antenatal care was least common in Afghanistan, where almost 40 percent of the mothers didn't receive any antenatal care. In Bangladesh and India, 21.5 and 16.6 percent of mothers didn't take antenatal care during their last pregnancy. Similarly, almost 50 percent of mothers in Bangladesh and Afghanistan didn't deliver their babies by skilled birth attendants as well as in Nepal whereas still 34.8 percent of the mothers delivered their babies by unskilled birth attendants. Regarding postpartum care, in all four South Asian countries, more than 50 percent of mothers didn't take any postpartum checkup after their delivery.

Bivariate and multivariate analysis

Logistic regression is used to measure whether mass media has any impacts on the utilization of maternal healthcare services. Results are presented as odds ratios in three nested models. The first model shows the bivariate impacts of mass media on the maternal healthcare utilization on the three dependent variables (antenatal care, delivery, and postpartum care). The second model determines whether the association between mass media and maternal healthcare utilization remains statistically significant while controlling for mother's education and confounding variables. The third model has added interaction terms of mass media and education to see whether the association between mass media and maternal healthcare varies by education.

India

The first model (Table 3) shows a statistically significant association between mass media and each maternal healthcare utilization outcome in India. Mothers who are exposed to the mass media are 4 times more likely to receive antenatal care. Similarly, pregnant mothers those who have access to the mass media are 3.9 times more likely to deliver their babies by skilled birth attendants and 1.2 more likely to take postpartum care after their delivery compared with mothers not exposed to mass media in India.

The second model shows the results after controlling for mother's socioeconomic factors. Odd ratios of all variables in Model 2 have been reduced after controlling for mother's socioeconomic factors. Even after this, the odds ratios for mass media exposure has retained a statistically significant association with the dependent variables. This means that, mass media is an important predictor of maternal healthcare utilization in India, net of the mother's and husband's characteristics. In the second model, mothers exposed to mass media are 1.9 times more likely to receive antenatal care and 1.5 times more likely to deliver their babies by skilled birth attendants, and so it shows a statistically significant association despite reducing some compared with the first model. Similarly, for postpartum care, mothers who are exposed to the mass media are 1.5 times more likely to take postpartum care though their odd ratio has increased compared with the first model. However, mother's socioeconomic variables are also significantly associated with maternal healthcare. Regarding age, young (15-24) mothers are 1.8 and 1.6 times more likely to receive antenatal care and deliver their babies by skilled birth attendants than older women. Similarly, for mother's place of residence, women in urban areas report higher levels of birth attendants during delivery and postpartum care (but not antenatal care) than their rural counterparts. Regarding education, when mother's educational level increases from primary to higher level, their maternal

healthcare services utilization increases: they are 1.6 to 3 times more likely to receive antenatal care and 1.3 to 4 times more likely to deliver their babies by skilled birth attendants than women with no formal schooling. Similarly, mothers with highly educated husbands are 1.6 times more likely to deliver their babies by skilled birth attendants. Mothers who are employed are 1.2 and 1.4 times more likely to receive antenatal and postpartum care. Likewise, mothers with employed husbands are 1.5 and 1.4 times more likely to receive antenatal and postpartum care. Regarding wealth status, mothers from richest households are 2.4 times more likely to receive antenatal care and 2.7 times more likely to deliver their babies by skilled birth attendants.

The third model (Table 3) examines whether the association between mass media and maternal healthcare varies by education by adding interaction terms of mass media and education. Mothers with no education exposed to mass media are 2.1 times more likely to receive antenatal care, 1.5 times more likely to deliver their babies by skilled birth attendants, and 1.6 times more likely to take postpartum checkup after their delivery than mothers with education. Interaction terms indicate that, compared with women with no education, the effect of mass media on antenatal care is weaker for mothers with secondary and higher education and the effect of mass media on postpartum care is weaker among mothers with secondary schooling. So, exposure to media can easily reach illiterate mothers and encourage them in utilizing maternal healthcare services in India.

Bangladesh

Similarly, in Bangladesh, exposure to mass media is significantly associated with maternal healthcare. The first model in Table 4 shows that exposure to mass media has a significant impact on maternal healthcare utilization in Bangladesh. Even after controlling for other socioeconomic

characteristics, mothers exposed to mass media are 1.6 times more likely to receive antenatal care, 1.2 times more likely to deliver their babies by skilled birth attendants, and 1.5 times more likely to take postpartum care after their delivery. Unlike India, younger (15-24) mothers are less likely to receive maternal healthcare services (antenatal and delivery care) than older (35-49) mothers in Bangladesh. Mothers who live in urban areas are 1.3 to 1.4 times more likely to receive antenatal or delivery care comparing with mothers who live in rural areas. Mother's education, working status, and wealth status also have significant impact on the utilization of maternal healthcare services in Bangladesh. Mothers with higher education are 3 times more likely to receive antenatal care, 4.9 times more likely to deliver their babies by skilled birth attendants, and 2 times more likely to take postpartum care than mothers with no education. Mothers from the richest households are 1.5 to 2.7 times more likely to receive maternal healthcare services (antenatal, delivery, and postpartum care) than mothers from poorest households. When mass media-by-education interactions are added in the third model, the first order terms show that mothers with no education exposed to the mass media are 1.6 to 2 times more likely to receive antenatal, delivery, and postpartum care than mothers with primary and secondary education in Bangladesh. Interaction terms indicate that, compared to mothers with no education, the association between mass media and having a skilled birth attendant is weaker among mothers with primary education and the association between mass media and postpartum care is weaker among mothers with secondary education. So, like India, exposure to mass media in Bangladesh can easily reach illiterate mothers and motivate them to utilize maternal healthcare services.

Nepal

In Nepal, exposure to the mass media has also a significant impact on maternal healthcare utilization. The first model (Table 5) shows that exposure to mass media is positively associated with maternal healthcare utilization in Nepal. In the second model (see Table 5), even after controlling for mother's all other socioeconomic characteristics, mothers exposed to mass media are 1.5 times more likely to receive antenatal care, 1.2 times more likely to deliver their babies by skilled birth attendants, and 1.4 times more likely to take postpartum care after their delivery. Younger (15-24) mothers are 2.6 and 1.5 times more likely to receive antenatal and delivery care than older (35-49) mothers in Nepal. This age pattern differs from that observed in Bangladesh, where maternal healthcare tends to be higher among older mothers. Mothers who live in urban areas are 1.2 and 1.5 times more likely to receive antenatal and deliver care comparing with mothers who live in rural areas. Whereas mothers with higher education are 1.5 to 10 times more likely to receive maternal healthcare services (antenatal, delivery, and postpartum care) than mothers with no education. Likewise, mothers with highly educated husbands are 1.4 and 1.5 times more likely to deliver their babies by skilled birth attendants and take postpartum care after their delivery. But mother's and husband's working status in Nepal are not significantly associated with maternal healthcare. Whereas mother's wealth status is positively associated with maternal healthcare. In model 3, none of the mass media-by-education interaction terms are statistically significant. So, unlike India and Bangladesh, mother's education does not moderate the association between exposure to mass media and maternal healthcare at any of the three stages of pregnancy in Nepal.

Afghanistan

Finally, in Afghanistan, media exposure (Table 6) is also positively associated with maternal healthcare. In the second model, even after controlling for socioeconomic characteristics, mothers exposed to mass media are more likely to receive maternal healthcare services compared with mothers not exposed to mass media. Mothers exposed to mass media are 2 times more likely to receive antenatal and delivery care and 1.3 times more likely to take postpartum care after their delivery. Like Bangladesh, younger (15-24) mothers in Afghanistan are less likely to receive antenatal and delivery care than older (35-49) mothers. Mothers who live in urban areas are positively associated with maternal healthcare. Mother's education and wealth status have also significant impact on the utilization of maternal healthcare services in Afghanistan. Mothers with higher education are 3 to 12 times more likely to receive antenatal care, deliver their babies by skilled birth attendants, or receive postpartum care than mothers with no education. Mothers from richest households are 1.2 and 3 times more likely to receive antenatal and delivery care than mothers from poorest households. The interactions in the third model find a different pattern than the other countries. Compared with mothers with no formal education, the association between mass media and using a skilled birth attendant is stronger among women with primary and secondary education. This finding contrasts with India and Bangladesh, where the returns of mass media on maternal healthcare tended to be highest among the especially vulnerable population of uneducated mothers.

Discussion

This paper examines the impact of mass media on the utilization of maternal healthcare services in South Asian countries, controlling for socioeconomic factors. Although previous studies have investigated mass media and maternal healthcare, they did not consider the impact of mass media on comprehensive maternal healthcare services such as antenatal, delivery, and postpartum care. Most studies focused on antenatal care without devoting sufficient attention to delivery and postpartum care. This paper is the first to measure maternal healthcare services at all three critical stages of the pregnancy period within a developing context defined by insufficient maternal healthcare and subsequent elevated levels maternal mortality risk.

Bivariate and multivariate analyses show that mass media has a positive impact on the utilization of maternal healthcare services in South Asia. Bivariate models find a significant association between mass media and maternal healthcare: mothers who are exposed to mass media are 1.1 to 4.5 times more likely to receive maternal healthcare services in South Asian countries. This finding supports the first hypothesis. After controlling for demographic and socioeconomic characteristics of the mother, husband, and household, mothers exposed to mass media are 1.5 to 2.1 times more likely to receive antenatal care, 1.2 to 2 times more likely to deliver their babies by skilled birth attendants, and 1.3 to 1.5 times more likely to take postpartum care after their delivery. When controls are added, the association between mass media exposure and maternal healthcare utilization is attenuated but remains significant for every country and healthcare combination. Similar results are seen in studies by Asp et al. (2014), Ghosh (2006), Uddin (2009), and Zamawe (2016), though they didn't focus on comprehensive maternal healthcare services before, during, and after childbirth. Asp et al. (2014), for example, found that exposure to mass media had a significant impact on increasing the birth preparedness among rural women in Southwest Uganda.

Likewise, Uddin (2009) found that mass media exposure was significantly associated with antenatal care utilization in Bangladesh.

This paper finds that the association between mass media and maternal healthcare varies by educational attainment in three of the four countries, which partially supports the second hypothesis. In India and Bangladesh, mothers with no education have a stronger association between mass media and maternal healthcare services than mothers with education. Among mothers who have education, they already have knowledge about science and biology; therefore, media exposure cannot play as significant a role for educated mothers in India and Bangladesh. However, in these two countries, media exposure easily reaches illiterate mothers, and encourages them more in receiving maternal healthcare services. This similar finding is also seen in a study done by Ghosh (2006), where exposure to the mass media had an important role to reach out to vulnerable populations of illiterate and low privileged mothers in rural areas.

In contrast, in Afghanistan, mothers with education exposed to mass media are more likely to receive maternal healthcare, deliver their babies by skilled birth attendants, compared to mothers with no education exposed to mass media. In Afghanistan, more than 80 percent of mothers do not have education. Many women still live in religiously conservative and male dominated society (Umar 2017; Biswas, et al. 2017; Bloom 2001). Therefore, their own family members and their husbands may not allow or encourage them to attain education and may have control over women's media exposure. Moreover, their husbands, in-laws, and other family members may tend to prevent them from taking maternal healthcare from male doctor during the pregnancy period (Biswas et al. 2017). They may be concerned that if their wives are examined by male doctors, then their wives' body can be uncovered to male doctors. Therefore, in Afghanistan, whenever mothers have education and media exposure together, they are more likely to deliver their babies by skilled birth

attendants. Mother's educational attainment and media exposure help them know more about the importance of maternal healthcare services and the harmful effects of religious prejudice and traditional birth practices through disseminating maternal healthcare-related information by education and mass media.

In Nepal, the mass media-by-education interactions are not statistically significant for any of the maternal healthcare outcomes. In other words, education does not moderate the association between mass media exposure and maternal healthcare utilization in Nepal. In sum, the second hypothesis is not supported in Nepal, but it is supported in India, Bangladesh, and Afghanistan.

This study has four notable limitations. First, this study only focused on South Asian countries, so findings may not be generalized to other developing countries. Future research should also focus on Sub-Saharan Africa to see the impact of mass media on maternal healthcare since this region is also characterized by high levels of maternal mortality (Alkema et al. 2016). Second, DHS data as a cross-sectional survey can have both recall bias and reporting bias since DHS asked women to retrospectively report pregnancy-related information such as prenatal and delivery care for births that actually happened in the five years before the survey. As a result, women may not recall their past events properly. Third, this DHS data did not collect information on the exposure to the internet and social networking sites (e.g., Facebook, Twitter, etc.) that can also impact utilization of maternal healthcare services. Fourth, women were not asked about the quality of the healthcare they received. For example, how was their antenatal and delivery care that they received during their last pregnancy, which can have a greater impact on the utilization of maternity healthcare.

Conclusion

Despite these limitations, this study has several strengths. First, this study's data, which have been taken from DHS, are nationally representative surveys with comprehensive information regarding maternal healthcare services. Mass media exposure, maternal healthcare utilization, and socioeconomic factors are measured in similar fashion across countries which allows for cross-country comparisons. Second, this study can have a greater impact in reducing maternal mortality and morbidity since mass media can help campaign maternal healthcare related information in many developing countries. For example, WHO and UNICEF can broadcast maternal healthcare related information such as taking antenatal visits, receiving healthcare at delivery, and taking at least one postpartum check-up that a pregnant woman can know through watching TV, listening to the radio, and reading newspapers. Third, through this study, mass media not only helps governments, NGOs, international organizations (e.g., WHO, UNICEF, and UNAIDS) disseminate maternal healthcare-related information, but also any other health messages of the harmful effects of smoking, drinking alcohol, AIDS, and so on.

In sum, exposure to mass media with other socioeconomic factors has a very significant impact on the utilization of maternal healthcare services in South Asia. Mass media has a vital role in increasing knowledge and information of health-related messages. Importantly, media exposure has an especially significant role in reaching illiterate mothers and encouraging them to maternal healthcare services. Through this study, policymakers, health providers, and different kinds of health organizations can implement mass media campaigns to disseminate maternal health messages and motivate pregnant women to receive maternal healthcare service. In this way, exposure to mass media can play a significant role in reducing maternal mortality in developing countries.

References

Acharya, D., Khanal, V., Singh, J. K., Adhikari, M., & Gautam, S. (2015). Impact of mass media on the utilization of antenatal care services among women of a rural community in Nepal. *BMC research notes*, 8(1), 345.

Afroja, S., Rahman, M., & Islam, L. (2018). Women's autonomy and reproductive healthcare-seeking behavior in Bangladesh: Further analysis of the 2014 Bangladesh Demographic and Health Survey. *Biomedical statistics and informatics*, *3*(2), 22.

Ahmed, S., Creanga, A. A., Gillespie, D. G., & Tsui, A. O. (2010). Economic status, education, and empowerment: implications for maternal health service utilization in developing countries. *PloS one*, 5(6), e11190.

Alkema, L., Chou, D., Hogan, D., Zhang, S., Moller, A. B., Gemmill, A., ... & Say, L. (2016). Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. *The Lancet*, *387*(10017), 462-474.

Ameyaw, E. K., Tanle, A., Kissah-Korsah, K., & Amo-Adjei, J. (2016). Women's health decision-making autonomy and skilled birth attendance in Ghana. *International journal of reproductive medicine*, *2016*.

Asp, G., Pettersson, K. O., Sandberg, J., Kabakyenga, J., & Agardh, A. (2014). Associations between mass media exposure and birth preparedness among women in southwestern Uganda: a community-based survey. *Global health action*, 7(1), 22904.

Baral, Y. R., Lyons, K., Skinner, J., & Van Teijlingen, E. R. (2010). Determinants of skilled birth attendants for delivery in Nepal. *Kathmandu university medical journal*, *8*(31), 325-32.

British Broadcasting Corporation. (2014). TV drama on maternal and newborn health in Bangladesh - Media Action. [online] Available at: https://www.bbc.co.uk/mediaaction/where-we-work/asia/bangladesh/mch [Accessed from 7 June 2019]

Chakraborty, N., Islam, M. A., Chowdhury, R. I., Bari, W., & Akhter, H. H. (2003). Determinants of the use of maternal health services in rural Bangladesh. *Health promotion international*, *18*(4), 327-337.

Dairo, M. D., & Owoyokun, K. E. (2010). Factors affecting the utilization of antenatal care services in Ibadan, Nigeria. *Benin journal of postgraduate medicine*, *12*(1).

Dhakal, S., Chapman, G. N., Simkhada, P. P., Van Teijlingen, E. R., Stephens, J., & Raja, A. E. (2007). The utilization of postnatal care among rural women in Nepal. *BMC pregnancy and childbirth*, 7(1), 19.

Ghosh, D. (2006). Effect of mothers' exposure to electronic mass media on knowledge and use of prenatal care services: a comparative analysis of Indian states. *The professional geographer*, 58(3), 278-293.

Graham, W. J., Bell, J. S., & Bullough, C. H. (2001). Can skilled attendance at delivery reduce maternal mortality in developing countries? *Safe motherhood strategies: a review of the evidence*.

Harcourt. (2016). Accessed from https://www.cliffsnotes.com/study-guides/sociology/contemporary-mass-media/the-role-and-influence-of-mass-media

Hill, K., Johnson, P., Singh, K., Amuzu-Pharin, A., & Kharki, Y. (2018). Using census data to measure maternal mortality: A review of recent experience. *Demographic Research*, *39*, 337-364.

Jahan, Y., Rahman, S. A., Chowdhury, A. S., Chowdhury, S., Huq, K. E., & Moshiur, M. (2017). Trends in mass media exposure upon women: A review of Bangladesh Demographic and Health Survey. *Global journal of medicine and public health* 6(2): 1-13.

Katz, E., Haas, H., & Gurevitch, M. (1973). On the use of the mass media for important things. *American sociological review*, 164-181.

Matos, C. (2012). Globalization and the mass media. In: *Encyclopedia of globalization*. Oxford: Wiley-Blackwell.

Mekonnen, Y., & Mekonnen, A. (2003). Factors influencing the use of maternal healthcare services in Ethiopia. *Journal of health, population, and nutrition*, 374-382.

Mpembeni, R. N., Killewo, J. Z., Leshabari, M. T., Massawe, S. N., Jahn, A., Mushi, D., & Mwakipa, H. (2007). Use pattern of maternal health services and determinants of skilled care during delivery in Southern Tanzania: implications for achievement of MDG-5 targets. *BMC pregnancy and childbirth*, *7*(1), 29.

Mullany, B. C., Becker, S., & Hindin, M. J. (2006). The impact of including husbands in antenatal health education services on maternal health practices in urban Nepal: results from a randomized controlled trial. *Health education research*, *22*(2), 166-176.

Odesanya, A., Hassan, S., & Olaluwoye, D. (2015). Mass media and maternal health care: A critical discourse. *New media and mass communication*, 34, 63-71.

Prata, N., Passano, P., Rowen, T., Bell, S., Walsh, J., & Potts, M. (2011). Where there are (few) skilled birth attendants. *Journal of health, population, and nutrition*, *29*(2), 81.

Rahman, M., Curtis, S. L., Chakraborty, N., & Jamil, K. (2017). Women's television watching and reproductive health behavior in Bangladesh. *SSM-population health*, *3*, 525-533.

Rai, R. K., Singh, P. K., & Singh, L. (2012). Utilization of maternal health care services among married adolescent women: insights from the Nigeria Demographic and Health Survey, 2008. *Women's health issues*, *22*(4), e407-e414.

Randolph, W., & Viswanath, K. (2004). Lessons learned from public health mass media campaigns: marketing health in a crowded media world. *Annual review of public health*, *25*, 419-437.

Rashid, M., & Antai, D. (2014). Socioeconomic position as a determinant of maternal healthcare utilization: a population-based study in Namibia. *Journal of research in health sciences*, *14*(3), 187-192.

Regassa, N. (2011). Antenatal and postnatal care service utilization in southern Ethiopia: a population-based study. *African health sciences*, *11*(3).

Saad-Haddad, G., DeJong, J., Terreri, N., Restrepo-Méndez, M. C., Perin, J., Vaz, L., ... & Bryce, J. (2016). Patterns and determinants of antenatal care utilization: analysis of national survey data in seven countdown countries. *Journal of global health*, *6*(1).

Sarrassat, S., Meda, N., Ouedraogo, M., Some, H., Bambara, R., Head, R., ... & Cousens, S. (2015). Behavior change after 20 months of a radio campaign addressing key lifesaving family behaviors for child survival: midline results from a cluster randomized trial in rural Burkina Faso. *Global Health: Science and practice*, *3*(4), 557-576.

Sepehri, A., Sarma, S., Simpson, W., & Moshiri, S. (2008). How important are individual, household and commune characteristics in explaining utilization of maternal health services in Vietnam? *Social science & medicine*, 67(6), 1009-1017.

Singh, P. K., Rai, R. K., Alagarajan, M., & Singh, L. (2012). Determinants of maternity care services utilization among married adolescents in rural India. *PloS One*, *7*(2), e31666.

Somefun, O. D., & Ibisomi, L. (2016). Determinants of postnatal care non-utilization among women in Nigeria. *BMC research notes*, *9*(1), 21.

Sunil, T. S., Rajaram, S., & Zottarelli, L. K. (2006). Do individual and program factors matter in the utilization of maternal care services in rural India? A theoretical approach. *Social science & medicine*, *62*(8), 1943-1957.

Tabassum, R., Froeschl, G., Cruz, J. P., Colet, P. C., Dey, S., & Islam, S. M. S. (2018). Untapped aspects of mass media campaigns for changing health behaviour towards non-communicable diseases in Bangladesh. *Globalization and health*, *14*(1), 7.

Uddin, M. F. (2009). Impact of Mass Media on Antenatal Care (ANC) Utilization in Bangladesh. Organized by Institute for Population and Social Research (IPSR), Mahidol University, 149.

Viswanath, K., Ramanadhan, S., & Kontos, E. Z. (2007). Mass media. In *Macrosocial determinants of population health* (pp. 275-294). Springer, New York, NY.

Wang, W., Alva, S., Wang, S., & Fort, A. (2011). Levels and trends in the use of maternal health services in developing countries. *DHS comparative reports* No. 26. Calverton, MD, USA: ICF Macro.

Weitzman, A. (2017). The effects of women's education on maternal health: Evidence from Peru. *Social science & medicine*, *180*, 1-9.

World Health Organization. (2018). Maternal mortality. Accessed from http://www.who.int/news-room/fact-sheets/detail/maternal-mortality

Zamawe, C. O., Banda, M., & Dube, A. N. (2016). The impact of a community driven mass media campaign on the utilisation of maternal healthcare services in rural Malawi. *BMC pregnancy and childbirth*, *16*(1), 21.

Table 1: Percent distribution of forms of the mass media

Variables	India	Bangladesh	Nepal	Afghanistan
Watching TV				
No	28.6 (28.4, 28.8)	40.8 (39.7, 42.0)	35.6 (34.1, 37.1)	52.1 (51.4, 52.8)
Yes	71.4 (71.2, 71.6)	59.2 (58.1, 60.4)	64.4 (62.9, 65.9)	47.9 (47.2, 48.6)
Listening radio				
No	86.2 (86.0, 86.4)	95.1 (94.6, 95.6)	47.1 (45.5, 48.6	62.1 (61.4, 62.8)
Yes	13.8 (13.7, 14.0)	4.9 (4.4, 5.4)	52.9 (51.4, 54.5)	37.9 (37.3, 38.6)
Reading newspaper				
No	65.1 (64.9, 65.4)	85.5 (84.7, 86.4)	75.5 (74.2, 76.9)	94.8 (94.5, 95.11)
Yes	34.9 (34.6, 35.1)	14.5 (13.7, 15.3)	24.5 (23.2, 25.8)	5.2 (4.9, 5.5)

Source: Demographic Health Survey

Table 2: Percent distribution of mother's socioeconomic characteristics

Variables	India	Bangladesh	Nepal	Afghanistan
Exposure to mass media				
No	24.6 (24.4, 24.8)	37.5 (36.4, 38.7)	21.4 (20.1, 22.6)	33.4 (32.8, 34.1)
Yes	75.4 (75.2, 75.6)	62.5 (61.4, 63.6)	78.6 (77.4, 79.9)	66.6 (65.9, 67.2)
Mother's age				
15-24	34.7 (34.5, 35.0)	48.3 (47.1, 49.5)	40.2 (38.6, 41.7)	29.6 (29.0, 30.3)
25-34	55.9 (55.7, 56.1)	43.7 (42.6, 44.8)	50.9 (49.3, 52.4)	46.2 (45.5, 46.9)
35-49	9.4 (9.2, 9.5)	8.0 (7.4, 8.6)	9.0 (8.1, 9.9)	24.2 (23.6, 24.8)
Place of residence				
Rural	70.3 (70.1, 70.5)	73.8 (72.8, 74.9)	44.4 (42.3, 45.9)	76.8 (76.2, 77.4)
Urban	29.7 (29.5, 29.9)	26.2 (25.2, 27.2)	55.6 (54.1, 57.2)	23.2 (22.7, 23.8)
Mother's education				
No education	27.6 (27.4, 27.8)	15.9 (15.0, 16.8)	31.4 (30.0, 32.9)	82.9 (82.4, 83.5)
Primary	13.4 (13.3, 13.6)	27.6 (26.6, 28.7)	19.4 (18.2, 20.7)	8.1 (7.8, 8.5)
Secondary	46.9 (46.7, 47.2)	46.7 (45.6, 47.9)	33.6 (32.2, 35.1)	7.3 (6.9, 7.7)
Higher	12.0 (11.8, 12.1)	9.7 (9.0, 10.4)	15.5 (14.4, 16.6)	1.7 (1.5, 1.8)
Husband's education				
No education	16.4 (16.0, 16.9)	25.4 (24.4, 26.4)	13.7 (12.6, 14.8)	57.6 (56.9, 58.3)
Primary	13.9 (13.6, 14.3)	29.8 (28.7, 30.9)	21.4 (20.1, 22.7)	14.8 (14.3, 15.3)
Secondary	54.1 (53.8, 54.8)	30.9 (29.8, 32.0)	46.3 (44.8, 47.9)	21.2 (20.6, 21.8)
Higher	15.3 (14.9, 15.7)	13.9 (13.1, 14.8)	18.6 (17.4, 19.8)	6.4 (6.1, 6.8)
Mother's work status				
Not working	78.1 (77.7, 78.6)	71.6 (70.5, 72.6)	38.7 (37.2, 40.3)	87.3 (86.9, 87.8)
Working	21.9 (21.4, 22.4)	28.4 (27.3, 29.5)	61.3 (59.8, 62.8)	12.7 (12.2, 13.15)
Husband's work status				
Not working	4.5 (4.2, 4.7)	0.6 (0.4, 0.8)	2.3 (1.9, 2.8)	0.0
Working	95.5 (95.3, 95.8)	99.4 (99.2, 99.6)	97.7 (97.2, 98.3)	100.0
Wealth status				
Poor	44.5 (44.3, 44.8)	40.2 (39.1, 41.4)	41.5 (40.0, 43.1)	40.1 (39.4, 40.8)
Middle	19.9 (19.7, 20.1)	19.6 (18.7, 20.6)	21.6 (20.3, 22.9)	20.5 (19.9, 21.0)
Rich	35.6 (35.4, 35.8)	40.1 (39.0, 41.3)	36.9 (35.4, 38.4)	39.4 (38.7, 40.1)
Antenatal care				
No	16.6 (16.5, 16.8)	21.5 (20.3, 22.6)	5.9 (5.2, 6.6)	38.9 (38.2, 39.6)
Yes	83.4 (83.2, 83.5)	78.5 (77.4, 79.7)	94.1 (93.4, 94.8)	61.1 (60.4, 61.8)
Delivery by skilled birth attendants				
No	16.6 (16.5, 16.8)	46.6 (45.1, 48.0)	34.8 (33.3, 36.3)	46.0 (45.3, 46.7)
Yes	83.4 (83.2, 83.6)	53.4 (52.0, 54.9)	65.2 (63.7, 66.7)	54.0 (53.3, 54.7)
Postpartum care				
No	78.5 (78.2, 78.8)	55.3 (53.5, 57.1)	79.6 (78.4, 80.9)	84.4 (83.7, 85.0)
Yes	21.5 (21.2, 21.8)	44.7 (42.9, 46.5)	20.4 (19.2, 21.7)	15.6 (15.0, 16.2)

Source: Demographic Health Survey

Table 3: Odds ratios of mass media on maternal healthcare in India (N = 190,898)

	Antenatal care			Delivery care			Postpartum care		
Variables	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Mass media	4.51***	1.94***	2.06***	3.86***	1.54***	1.53***	1.21***	1.46***	1.58***
Mother's age									
15-24		1.82***	1.81***		1.57***	1.57***		0.91	0.90
25-34		1.46***	1.46***		1.36***	1.36***		0.97	0.96
35-49 (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Place of residence									
Rural (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Urban		1.08	1.08		1.10**	1.10**		0.86**	0.85**
Mother's education									
No education (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Primary		1.58***	1.57***		1.31***	1.33***		1.38***	1.34**
Secondary		2.03***	2.28***		1.80***	1.72***		1.09	1.33**
Higher		3.09***	9.40***		4.07***	7.54***		0.95***	1.36
Husband's education									
No education (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Primary		1.41***	1.41***		1.09*	1.09*		0.87**	0.86**
Secondary		1.22***	1.22***		1.40***	1.40***		0.79***	0.78***
Higher		1.29**	1.30**		1.63***	1.64***		0.79**	0.79***
Mother's work status									
Not working (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Working		1.16***	1.16***		0.86***	0.87***		1.43***	1.43***
Husband's work status									
Not working (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Working		1.52***	1.53***		1.02	1.02		1.38**	1.38**
Wealth status									
Poor (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Middle		1.59***	1.60***		1.78***	1.78***		0.98	0.99
Rich		2.44***	2.50***		2.73***	2.72***		0.76***	0.78***
Mass media × Primary			0.98			0.98			1.02
Mass media × Secondary			0.83**			1.06			0.75**
Mass media × Higher			0.30**			0.53			0.65
Nagelkerke R^2	0.11	0.18	0.18	0.09	0.18	0.18	0.00	0.03	0.03

Source: Demographic Health Survey
Note: * p < 0.10, **p < 0.05, ***p < 0.001

Table 4: Odds ratios of mass media on maternal healthcare in Bangladesh (N = 6,855)

	Antenatal care			Delivery care			Postpartum care		
Variables	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Mass media	4.09***	1.65***	1.65**	2.77***	1.19**	1.57**	1.75***	1.49***	1.95***
Mother's age									
15-24		0.69**	0.69**		0.77*	0.78		1.01	1.00
25-34		0.75*	0.75*		0.76*	0.77*		0.88	0.89
35-49 (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Place of residence									
Rural (ref.)		1.00	1.00		1.00	1.00		1.00	1,00
Urban		1.36**	1.35		1.34***	1.34***		1.18	1.16
Mother's education									
No education (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Primary		1.55***	1.50**		1.60***	2.00***		1.10	1.10
Secondary		2.69***	2.88***		2.08***	2.14***		0.95	1.24
Higher		3.82***	2.84**		4.94***	4.26***		2.03**	2.49**
Husband's education									
No education (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Primary		1.11	1.11		1.14	1.15		0.87	0.87
Secondary		1.43**	1.44**		1.56***	1.57***		1.03	1.04
Higher		2.30***	2.31***		2.65***	2.65***		0.72*	0.73*
Mother's work status									
Not working (ref.)		1.000	1.00		1.00	1.00		1.00	1.00
Working		1.05	1.05		0.87*	0.87*		1.81***	1.82***
Husband's work status									
Not working (ref.)		1.00	1.00		1.00	1.00		1.000	1.00
Working		1.15	1.17		0.49	0.48		2.21**	2.24
Wealth status									
Poor (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Middle		1.48***	1.47***		1.15	1.17		0.97	0.96
Rich		2.70***	2.71***		2.10***	2.10***		1.46***	1.46***
Mass media × Primary			1.10			0.58*			0.95
Mass media × Secondary			0.89			0.84			0.59**
Mass media × Higher			1.47			1.02			0.65
Nagelkerke R^2	0.12	0.22	0.22	0.08	0.22	0.22	0.03	0.07	0.71

Source: Demographic Health Survey

Note: * p < 0.10, **p < 0.05, ***p < 0.001

Table 5: Odds ratios of mass media on maternal healthcare in Nepal (N = 4,006)

	Antenatal care			Delivery care			Postpartum care		
Variables	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Mass media	2.99***	1.50**	1.39*	2.60***	1.24**	1.17*	1.85***	1.41**	1.48**
Mother's age									
15-24		2.58***	2.60***		1.52**	1.53**		0.88	0.87
25-34		1.40*	1.40*		1.06	1.07		0.91	0.90
35-49 (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Place of residence									
Rural (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Urban		1.21	1.20		1.54***	1.54***		1.01	1.01
Mother's education									
No education (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Primary		1.38*	1.21		1.41***	1.41*		0.86	0.77
Secondary		3.10***	2.50*		2.44***	2.15***		0.96	1.32
Higher		10.37***	2.17		6.49***	1.25		1.48**	1.85
Husband's education									
No education (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Primary		1.14	1.14		1.05	1.05		1.28	1.28
Secondary		1.25	1.26		1.25**	1.26**		1.12	1.12
Higher		1.74	1.73		1.38**	1.37**		1.49**	1.48**
Mother's work status									
Not working (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Working		0.96	0.95		0.88	0.88		1.15	1.16*
Husband's work status									
Not working (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Working		1.48	1.48		1.12	1.13		1.24	1.22
Wealth status									
Poor (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Middle		2.92***	2.92***		2.54***	2.53***		1.51***	1.51***
Rich		2.11***	2.11***		3.08***	3.07***		1.67***	1.69***
Mass media × Primary			1.23			1.02			1.14
Mass media × Secondary			1.32			1.18			0.70
Mass media × Higher			5.91			5.80			0.78
Nagelkerke R^2	0.04	0.17	0.17	0.05	0.27	0.27	0.01	0.05	0.05

Source: Demographic Health Survey

Note: * p < 0.10, **p < 0.05, ***p < 0.001

Table 6: Odds Ratios of mass media on maternal healthcare in Afghanistan (N = 19,806)

	Antenatal care			Delivery care			Postpartum care		
Variables	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Mass media	2.64***	2.13***	2.13***	3.46***	1.99***	1.87***	1.12**	1.25***	1.24***
Mother's age									
15-24		0.87***	0.87***		0.99	1.00		1.17**	1.18**
25-34		0.84***	0.84***		0.89**	0.89**		1.19**	1.20**
35-49 (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Place of residence									
Rural (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Urban		1.08*	1.09*		1.75***	1.75***		0.77**	0.76**
Mother's education									
No education (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Primary		1.59***	1.68***		2.02***	1.33**		1.34**	1.24
Secondary		2.19***	1.77***		2.42***	1.09		1.42**	1.35
Higher		7.20***	—[a]		12.78***	—[a]		3.60***	—[a]
Husband's education									
No education (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Primary		1.40***	1.40***		1.48***	1.49***		1.12	1.12
Secondary		1.34***	1.34***		1.76***	1.76***		0.75***	0.75***
Higher		1.37**	1.37***		1.97***	1.96***		0.97	0.97
Mother's work status									
Not working (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Working		1.01	1.01		0.94	0.94		0.65***	0.65***
Wealth status									
Poor (ref.)		1.00	1.00		1.00	1.00		1.00	1.00
Middle		0.99	0.99		1.65***	1.65***		0.75***	0.75***
Rich		1.20***	1.19***		3.44***	3.40***		0.68***	0.68***
Mass media × Primary			0.93			1.80***			1.11
Mass media × Secondary			1.29			2.73***			1.07
Mass media × Higher			—[a]			—[a]			—[a]
Nagelkerke R^2	0.07	0.11	0.11	0.11	0.29	0.29	0.00	0.02	0.02

Source: Demographic Health Survey

Notes: * p < 0.10, **p < 0.05, ***p < 0.001. [a] cell sizes are too small among high-educated mothers to estimate reliable odd ratios in model 3.
We exclude husband's work status because all husbands are employed.