Adapting the Andersen-Newman Framework for Postnatal Healthcare Utilization: A Socioeconomic Perspective from Punjab, Pakistan

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Abstract

The study explores the impact of socioeconomic factors on the utilization of postnatal healthcare services for mothers and newborns in Punjab, Pakistan, using data from the Multiple Indicator Cluster Survey (MICS6). The findings indicate that variables such as the mother's age, place and type of delivery, exposure to mass media, and wealth status significantly affect the use of postnatal care. However, the mother's area of residence does not have a significant influence on the postnatal care of newborns. The study highlights socioeconomic inequalities as a critical barrier to accessing postnatal healthcare services. To meet international commitments aimed at reducing maternal and newborn mortality, it is imperative to design targeted interventions for women from disadvantaged socioeconomic backgrounds. These efforts should include the provision of affordable healthcare services and awareness through mass media campaigns.

Keywords: Postnatal care, Mass media, Healthcare utilization, Punjab, Pakistan.

JEL classification: I10, I12, P36, D82.

Introduction

According to an estimate, 2.4 million newborns and almost 287,000 mothers died in 2020 during the postnatal period; accounting for approximately 6,700 newborns and 800 mothers' deaths daily. Almost 1 million newborns died on the very first day of their lives in 2019 (WHO, 2022a, 2023). United Nations launched a roadmap of 15 years (2016-2030) as a part of the 2030 sustainable development goals agenda known as the Global Strategy for Women's, Children, and Adolescents' Health with the aim to eliminate avoidable deaths, ensure healthy lives, and fostering an enabling environment (Every Women Every Child, 2015). Target 3.1 of Sustainable Development Goals 3 (SDG3) aims at reducing the maternal mortality rate (MMR) to less than 70 per 100,000 live births by 2030, and Target 3.2 focus on curtailing newborn mortality rate as low as 12 per 1000 live births in all countries by 2030 (United Nations, 2022).

The socioeconomic disparities have a significant impact on access to postnatal care (PNC) services for mothers and newborns. Postnatal period refers to the period that starts immediately after the birth of baby and it lasts up to 6 weeks after the birth. According to World Health Organization (WHO, 2022b), the postnatal period is very critical for both mothers and the newborns. Effective and timely postnatal care (PNC) can have a substantial impact on maternal and newborn's survival (Dasgupta et al., 2023; Dol et al., 2023; Kim et al., 2019). Inadequate postnatal health checks continue to be a significant problem around the world, resulting in a considerable number of maternal and newborns deaths (Lam et al., 2019; Macicame et al., 2023).

Despite a lot of efforts taken by the global community, newborn and maternal mortality remains a grave issue around the world as newborn mortality has increased from 40 % in 1990 to almost 47% in 2020, and almost 287,000 mothers died in 2020 due to maternal morbidity. The developing countries have the highest mortality rates. Sub-Saharan Africa experienced the highest newborn mortality (43%) and maternal mortality (70%) rates while South Asia took the second spot. Most of the deaths could have been avoided through the provision of adequate and equitable postnatal and antenatal care as recommended by WHO (Masaba & Mmusi-Phetoe, 2020; Mohamed et al., 2022; WHO, 2022a, 2023). Among South Asian economies, India, Pakistan, Bangladesh, and Afghanistan are listed as top countries globally with highest

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newborn mortality rates (WHO, 2023). In comparison to the neighboring countries, Pakistan demonstrated slower progress in improving the health outcomes (Aziz et al., 2020; Bhutta & Hafeez, 2015; Hafeez et al., 2023). In 2020, Pakistan had a maternal mortality rate of 154 per 100,000 live births, resulting in a total of 9,800 maternal deaths (WHO, 2023). Pakistan was spotted at number 3 globally in newborn mortality with an estimated 244,000 newborns deaths showing a mortality rate of 40.4 per thousand live births (WHO, 2022a). A study by Dasgupta et al. (2023) claimed that the highest deaths of neonates occurred in Pakistan. Even within Pakistan, significant disparities exist in the maternal mortality ratio among provinces (Khan & Hussain, 2020). In 2019, Punjab recorded a mortality rate of 157/100,000 live births, KPK experienced a rate of 165 deaths/100,000 live births, Sindh reported a maternal mortality rate of 224 deaths/100,000 live births, and Balochistan exhibited the highest mortality rate with 298 maternal deaths/100,000 live births. According to the survey, only 69% of mothers received postnatal health care in Pakistan in 2019 (NIPS, 2020). Socioeconomic inequalities had contributed to non-utilization of adequate postnatal health care services in Pakistan (Anindya et al., 2021; Saira et al., 2021).

Socioeconomic disparities adversely affect one's ability to afford not only luxury goods and services, but also essential items and services such as healthcare. Punjab is widely recognized as one of the most developed and prosperous regions in Pakistan, particularly in comparison to other provinces. However, upon closer inspection, it becomes evident that the region struggles with significant inequalities in healthcare, especially in postnatal services. Only 23% mothers received the postnatal care in Punjab, Pakistan.(NIPS, 2020). Punjab, being the most populous region in Pakistan, holds significant importance for understanding healthcare practices. Its findings can offer broader insights into postnatal care across similar socio-economic contexts. Therefore, it is necessary to determine the socioeconomic factors that could be associated with access to postnatal healthcare services for mothers and newborns in Punjab. Overcoming such socioeconomic disparities can potentially improve postnatal healthcare which may play a vital role in reducing the maternal and newborn mortality rates. In this paper, the authors aim to investigate the factors that influence the utilization of postnatal healthcare services for mothers and newborns in Punjab, Pakistan. The socioeconomic inequality in postnatal care (PNC) is compared based on the mother's age, area of residence, level of education, type of delivery, place of delivery, exposure to media (television), and wealth status. The main hypothesis of this research is that socioeconomic factors affect the utilization of postnatal care for mothers and newborns. This study contributes to existing literature by adapting the Andersen-Newman Framework for Healthcare Utilization in the socio-economic context for Pakistan, specifically for postnatal care using MICS dataset.

Literature Review

The socioeconomic characteristics play an important role in the utilization of postnatal healthcare services. It is suggested that initiatives are required to combat poverty, enhance educational resources, and empower women to boost the use of maternity care in emerging economies. Ahmed et al. (2010) found that women from wealthier families and those who were educated had adequate maternal care than those from poor socioeconomic backgrounds. Amin et al. (2010) recommends that to reduce Bangladesh's high maternal and child mortality rates government must focus attention in higher poverty areas as women from affluent backgrounds had a higher likelihood of accessing better postnatal and antenatal care services as compared to disadvantaged backgrounds. Singh et al. (2012) investigated that place of delivery and financial situation were the main drivers of PNC. Women who delivered babies at home with poor wealth status had fewer chances of receiving postnatal health care. Kim et al. (2019) also found that wealth status is a significant contributor to postnatal care. Lam et al. (2019) examined that newborn in households with well-established financial status had higher chances of receiving postnatal healthcare. Lagendijk et al. (2019) indicate that mothers' age and poor wealth status had a substantial negative impact on the use of postnatal services. Blanchard et al. (2019) also demonstrate that there was a considerable decrease in maternal and newborn death rates when community health workers provided postnatal health care services to women and newborns who were socially and economically disadvantaged. Anindya et al. (2021) found that the postnatal services

were higher in upper middle-income countries compared to the low-income countries. It was revealed further that the wealthiest individuals received a higher proportion of PNC services compared to the poor. Similarly, poverty at community level was also significantly associated with the utilization of postnatal care as studied by Dankwah et al. (2021).

There are studies suggesting that differences in postnatal healthcare requires a national policy that encompasses all regions based on the premise of equality. Lauria et al. (2013) suggest the primary factors causing disparities in the use of prenatal and postnatal health care in Italy were the mother's education level and employment status. Mothers who were educated and had good jobs were utilizing postnatal care more than those who were uneducated and unemployed. Khanal et al. (2014) found that women in Nepal with low or no education, no job, and belonging to poor backgrounds had significantly lower chances of receiving postnatal care services. Ononokpono et al. (2014) studied the connection between a woman's area of residence and her use of postpartum care in Nigeria and indicate that women from educated communities had a higher likelihood of receiving postpartum care compared to women from uneducated communities. Sharkey et al. (2017) found that due to lack of education and mothers' lack of awareness about clean cord care, first bath and breastfeeding after the child's birth are significant for improving the health status of mothers and newborn. Siriwardhana et al. (2019) examined the association between socioeconomic inequality and postnatal health checks by considering the visits performed by public health midwives in Sri Lanka and found that women's education and area of residence are mains causes of socioeconomic discrepancy in postnatal health assessments. Similarly, Nur et al. (2021) found wealth, birth order, mother's education level, and mother's occupation as significant factors related to discrepancies in postnatal health care other than area of residence for regional differences in Indonesia. Dankwah et al. (2021) showed that women living in educated communities had more postnatal care utilization compared to women living in uneducated communities. Ahinkorah et al. (2021) found that women with lower levels of education, no jobs, low socioeconomic position have lower chances of getting postnatal health checks. Saira et al. (2021) studied the effects of socioeconomic factors on the newborns' failure to receive postpartum care in Pakistan. Education of mothers and place of birth were found to be the most significant factors impacting the utilization of postpartum care in Pakistan. A study on Tanzania also suggest that maternal mortality rate is due to disparities in the utilization of maternal health care services which is influenced by women's education, financial situation, and place of residence Kinyondo et al. (2022).

The role of media and awareness is also important in determining postnatal health checks A study by Timilsina and Dhakal (2015) suggests that programs creating awareness among women about importance of postnatal care is needed to improve the maternal healthcare. **Bwalya et al. (2017)** studied the elements that influence the provision of postnatal care for newborns in Zambia and mothers**' exposure to mass media was found to be an important factor.** Kim and Kim (2019) also demonstrate that media exposure significantly influenced the utilization of maternal health care in Chad. The findings by Paul and Chouhan (2020) show that other than common socioeconomic parameters such as education, wealth condition, the exposure to mass-media significantly impacted the usage of maternity care services. Ahinkorah et al. (2021) also found that women not exposed to mass media had a higher likelihood of not receiving any postnatal health services. Ali et al. (2021) indicated that caste and media exposure predict maternal care utilization in urban India. Similarly, Onwuka et al. (2023) investigated the reason why women do not attend postnatal clinics, and the results found that unawareness of the women was the main factor that was contributing to less attendance to the clinics.

Matijasevich et al. (2009) found that the place and type of delivery contributed towards the disparities in maternal postnatal care services between public and private patients in Brazil. Dahiru and Oche (2015) studied the factors influencing the use of postpartum care in Nigeria and found that place of residence influenced the postnatal care other than the mother's level of education and wealth status. Limenih et al. (2016) claimed that women who underwent C-section had more chances of getting postnatal care than those who delivered normally. Sharkey et al. (2017) showed that mothers who delivered at home received inadequate postnatal healthcare compared to those who delivered in health facilities. Bwalya et al. (2017)

suggests that mothers and newborns from rural areas need particular attention and increasing deliveries in hospitals could significantly improve the health of newborns as well as mothers. Abebo and Tesfaye (2018) studied the case among Southern Ethiopian on use of postnatal care and mother's awareness had a significant impact along with other key factors like area of residence, place of delivery and women employment status. De Jonge et al. (2018) found that place of delivery was the cause of disparities in postnatal health treatment for newborns. Paul and Chouhan (2020) explored that among the many socio-demographic variables affecting women's usage of maternity care in Indian, age, place of residence, caste of women played an important role. Li et al. (2022) examined that women living in urban settings had higher utilization of maternal postnatal care services. Elhady et al. (2021) gathered data via focus groups interviews in the Nile Delta (rural Egypt) and found that home delivery had a negative impact on PNC utilization. Berhe et al. (2019) found that geographic location and type of delivery were the significant drivers of postpartum care usage other than women's education. Similarly, a study by Ayele et al. (2019) found that women living in urban areas receive more postnatal care as compared to those living in rural areas. Mahajan and Kaur (2021) revealed that district of residence, caste, birth order, and type of delivery had a substantial impact on the utilization of postnatal care services among Punjabi rural women in India. Leventhal et al. (2021) found that major barriers to PNC are area of residence, ethnicity, and culture significantly affected postnatal health coverage for poor women.

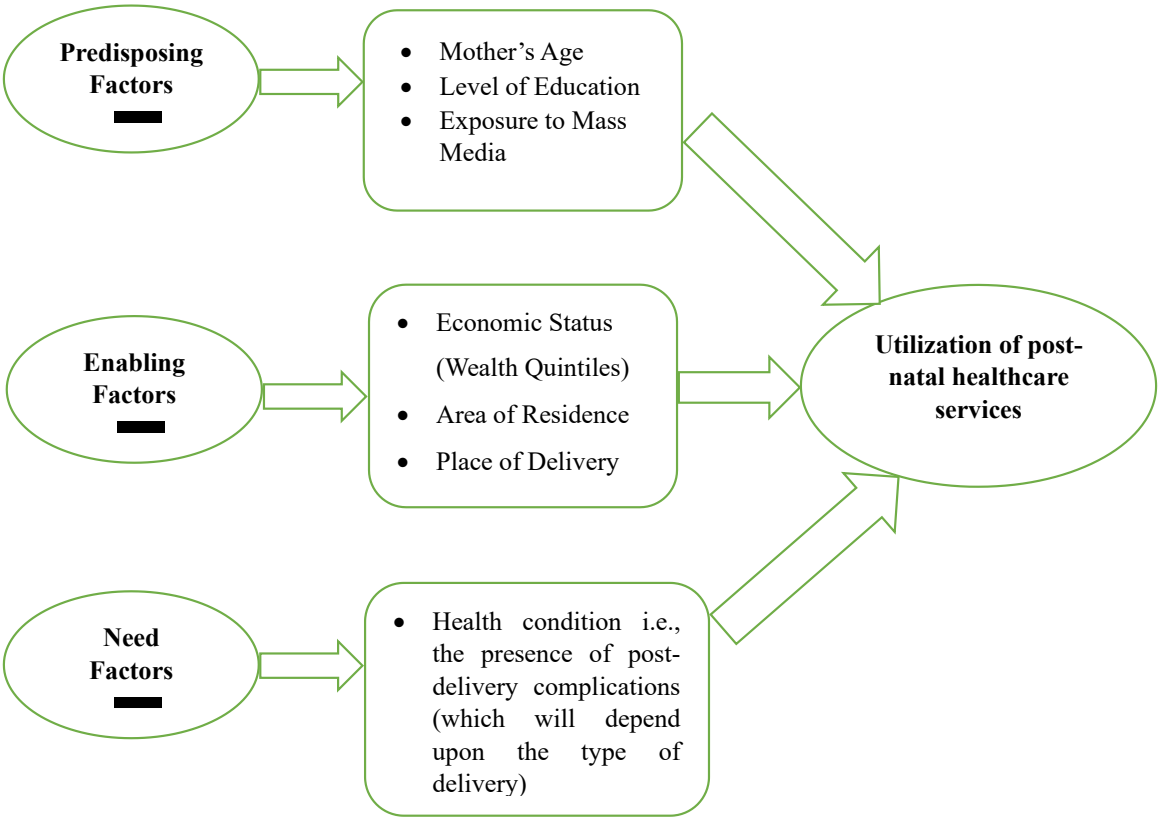
Methodology

Conceptual Framework

This study adopts the Andersen and Newman's Behavioral Healthcare Utilization Model (Andersen & Newman 1973, 2005) as a conceptual framework to examine factors associated with postnatal healthcare utilization. The model was originally introduced by Ronald M. Andersen in the 1960s and has undergone various modifications and a final version was presented in 1990's (Andersen, 1995). At first, the model used family as a unit of analysis, but due to difficulties in obtaining information at the family level the analysis was shifted to the individual level. This model is frequently used to analyze factors that influence the individual's access to and utilization of healthcare services. The framework states that an individual's access to health care services is influenced by three main factors i.e., predisposing factors, enabling factors, and need factors (Andersen & Newman, 1973, 2005; Li et al., 2016). Figure 1 represents the theoretical framework of the study.

The predisposing factors play a critical role in an individual's healthcare utilization. The predisposing factors are those factors that individuals possess before the start of the illness such as age, education etc. The researchers in this study included mother's age, level of education, and exposure to mass media (television) predisposing factors**.** Mother's age can affect the mother's understanding and perception on postnatal checkups. Similarly, level of education can also influence mother's perception about the importance of postnatal care services. Both factors can influence the PNC utilization behavior. Educated women have better understanding about the post-delivery complications as compared to uneducated women. In addition, mass media also contributes to creating awareness about the significance of postnatal care. The enabling factors are those factors that either facilitate or obstruct access to personal health care services. It indicates individuals' ability to finance the expenses of health care services. The researchers included wealth status, residential location (urban/rural setting) and place of delivery (public/private hospital) as enabling factors. Higher wealth status can enable a person to obtain better health care, whilst low-income levels make it difficult to obtain appropriate health services (Wudineh et al., 2018). Area of residence also influences an individual's access to health care services. A health facility near to the area of residence is found to have significant positive- impact on health seeking behavior (Abd Manaf et al., 2017). Lastly, the need factor explains the rationale for the utilization of health care services. The researcher included the health condition such as the occurrence of post-delivery complications in this category which is assumed to depend upon the type of delivery (normal vs C-section).

Figure 1. Schematic diagram of conceptual framework adapted from Andersen-Newman Model of Health Service Utilization



Source: Authors' compilation using existing literature (Andersen & Newman, 1973, 2005; Andersen, 1995).

Data Source and Variables

The study used Multiple Indicator Cluster Survey (MICS6) dataset for Punjab, Pakistan. The cohort used for analysis are the women in reproductive age, that is, between the age of 15 to 49 years. Out of the total sample size, only 15 percent women responded to the question related to postnatal health check for mothers and babies. Among those respondents, 76 percent received postnatal care for babies whereas only 23 percent of mothers received postnatal care. A key justification for selecting variables such as mother's age, area of residence, place of delivery, type of delivery, level of education, exposure to mass media, and wealth status lies in the robust availability and proven accuracy of data from the MICS6 dataset for Punjab. Table 1 provides the description of variables used in the analysis.

Model specification

To investigate the effects of socioeconomic factors on postnatal care (PNC) utilization, the study selected seven variables as shown in Table 1. The dependent variable in current study is dichotomous i.e., the presence or absence of PNC, therefore, binary logistic regression is applied for the estimation of model. Based on the conceptual framework presented in Figure 1, the model in equation (1) is represented as below:

$$\text{logit } P_{(PNC)} = \ln(P_{(PNC)}/1 - P_{(PNC)}) = \beta_0 + \beta_1 MA + \beta_2 AR + \beta_3 POD + \beta_4 TOD + \beta_5 EDU + \beta_6 EMM + \beta_7 ES \quad (1)$$

Where, $P_{(PNC)}$ = probability of receiving a postnatal care, (1- $P_{(PNC)}$) = probability of not receiving a postnatal care, MA = mother's age, AR = mother's area of residence, POD = place of delivery, TOD = type of delivery, EDU = education level, EMM = mother's exposure to mass media, ES = economic status. $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$, are the estimated coefficients for each of the explanatory variable. The right-hand side of the equation represents the linear combination of explanatory variable with logit function i.e., the natural log of the odds

ratio. Odds ratio is interpreted as the variation in the odds of receiving the PNC due to change in the independent variables and interpreted as exponential function of logistic regression i.e., Exp(β), represented in equation 2.

$$\text{Odds ratio} = e^{\beta 0 + \beta 1 MA + \beta 2 AR + \beta 3 POD + \beta 4 TOD + \beta 5\ EDU + \beta 6 EMM + \beta 7 ES} \quad \ldots\ldots\ldots (2)$$

Table 1. Description of the variables

Variables	Description
Outcome variable	
Postnatal care	**Postnatal care refers to the care that is provided to the newborns and mothers immediately after the birth of the baby, and it is given up to six weeks or 42 days (**WHO, 2015). **The** maternal postnatal care was represented as Mother's health checked after leaving health facility. Similarly, Newborn postnatal care was represented as Baby's health checked after leaving health facility.
Explanatory variables	
Mother's Age	It refers to the age of mothers. In this study, the mothers' age is divided into three groups as i) less than 20 years, ii) 20-34 years and iii) 35-49 years.
Area	It refers to the area of residence of the mothers which is divided into two categories as i) rural and ii) urban area.
Place of Delivery	It refers to the place at which the delivery of the baby took place. The study has included two categories for place of delivery as i) private hospitals and ii) public hospitals.
Type of Delivery	It refers to the type of delivery which includes the two categories as i) normal delivery and ii) C-section delivery.
Education	It refers to the education of mothers. The study included two categories as i) uneducated and ii) educated
Exposure to Mass Media	It refers to the exposure of mothers to mass media. This study has included television because television was observed as the most common medium of media exposure among women. The study used the category of media exposure as i) do not watch TV at all and ii) watch TV almost every day.
Economic Status	It refers to the wealth status of mothers. The five categories of wealth quintile are used as i) poorest ii) near poorer iii) middle iv) richer v) richest

Source: The variables are extracted from MICS6 dataset by UNICEF.

Transforming the above equation (2) by taking log of each side of the equation, the liner regression is attained as represented in equation (1). Thus, the log of odds is called the logit model whereas the transformed model is the linear representation of estimated coefficients β'$_s$. Odds ratio will express the increase or decrease in the chance of the occurrence of PNC due to presence of an explanatory variable while holding all other variables constant. If odds ratio = 1 then there is no association between dependent variable and independent variable. The odds ratio > 1 shows positive association whereas odds ratio < 1 represents a negative association between dependent variable and explanatory variables. In binary logistic regression analysis, the Wald test is used to check the significance of explanatory variables with an assumption that the residuals are normally distributed. It investigates the contribution of each independent variable used in the model. Another assumption is that independent variables are not perfectly correlated with each other. The study has employed Spearman's correlation to measure the strength of relationship among variables and the absolute value of 0.5 is used as threshold level.

Analysis

Table 2 provides descriptive statistics about the frequency of postnatal health checks for mothers and babies, which shows the factual position of postnatal healthcare in Punjab, Pakistan. The study used different factors that influence the utilization of postnatal health care. These factors are mother's age, area of residence, place of delivery, type of delivery, education level, exposure to mass media, and economic status.

Table 2. Frequency of Postnatal health care for mothers and newborns

Variables	Category	Mother's Postnatal health check	Baby's Postnatal health check
Mother's Age	less than 20	18.9%	19.1%
	20-34	22.6%	22.9%
	35-49	22.9%	24.5%
Area of Residence	Urban	24.9%	25.7%
	Rural	21.6%	22.0%
Place of Delivery	Private hospital	26.8%	25.1%
	Government hospital	16.3%	20.1%
Type of Delivery	Normal	11.9%	19.1%
	C-section	39.4%	29.3%
Education	Uneducated	17.4%	19.0%
	Educated	25.0%	25.0%
Exposure to Mass Media (TV)	Not at all	17.9%	21.6%
	Almost every day	25.0%	23.6%
Economic Status	Poorest	14.7%	17.8%
	Near poor	18.9%	20.3%
	Middle	22.9%	23.0%
	Richer	24.0%	23.7%
	Richest	30.3%	29.3%

Source: Authors' calculation using MICS6 dataset for Punjab, Pakistan.

Table 2 shows that only 18.9 percent of mothers under the age of 20 received PNC, whereas 19.1 percent of babies born to mothers under the age of 20 got PNC. Between the age group of 20-34, 22.6 percent of mothers said that they received postnatal care and 22.9 percent of babies born to mothers of this age group received PNC. In the age group of 35-49, 22.9 percent of mothers received postnatal health check and 24.5 percent of babies born to women of this age group received postnatal healthcare after leaving health facility. 24.9 percent of women living in urban areas got postnatal health check, compared to 21.6 percent of mothers living in rural areas. 25.7 percent of babies born to mothers residing in urban areas obtained postnatal healthcare, compared to 22.0 percent of babies born to moms residing in rural areas. The percentage of PNC was higher among women giving birth in private hospitals reflecting 26.8 percent. Similarly, 25.1 percent of newborns delivered in private hospitals received postnatal health checks. In comparison, women who delivered in government hospitals had a lower percentage of postnatal healthcare with only 16.3 percent obtaining the care. Likewise, newborns delivered to government hospitals had a lower percentage of postnatal healthcare reflecting only 20.1 percent.

Among women delivering baby via C-section, 39.4 percent of them received postnatal healthcare checks, while 29.3 percent of newborns delivered via C-section received postnatal healthcare checks. In contrast, for mothers who had normal delivery, only 11.9 percent received postnatal care and 19.1 percent of newborns delivered through normal delivery received postnatal care. It means that those women who underwent C-section and babies born to them received more postnatal health checks than women who gave birth via normal delivery. Among the uneducated women, only 17.4 percent of women and 19 percent of their newborns received postnatal care. Among those women who watched television almost every day, 25 percent of women and 23.6 percent of babies born to them received postnatal health check. Whereas, among those who did not watch television, 17.9 percent of women and 21.6 percent of babies acquired postnatal care. It is evident that those women and babies belonging to richest wealth quintiles are the ones who received more postnatal checks than others. 30.3 percent of women from richest wealth quantile and 29.3 percent of babies born in richest wealth quintiles received postnatal care. On the other hand, among the poorest wealth quantile only 14.7 percent of mothers and 17.8 percent of babies received postnatal health care.

Table 3 shows the values for correlation coefficients depicting the likely association between variables. The results of the correlation matrix indicate that the mother's postnatal care has a high and significant correlation with newborn's postnatal care, C-section delivery followed by weaker but significant association with place of delivery, economic status, mass media exposure, education level and rural area, respectively. The association of baby's PNC is more with C-section delivery in comparison to rest of the variables. The absolute values are below the threshold level of 0.5 which depict no evidence of multicollinearity among independent variables.

Table 3. Correlation estimations of the variables

	Mother's PNC	**Baby's PNC**	**Mother's Age**	**Area of Residence (Rural)**	**Place of Delivery (Government Hospital)**	**Type of Delivery (C-section)**	**Education Level**	**Exposure to Mass Media (TV)**	**Economic Status**
Mother's PNC	1.000								
Baby's PNC	0.373**	1.000							
Mother's Age	0.010	0.020*	1.000						
Area of Residence (Rural)	-0.036**	-0.040**	0.003	1.000					
Place of Delivery (Government Hospital)	-0.123**	-0.059**	0.034**	0.118**	1.000				
Type of Delivery (C-section)	0.320**	0.117**	-0.014	-0.053**	-0.285**	1.000			
Education Level	0.086**	0.068**	-0.276**	-0.208**	-0.265**	0.134**	1.000		
Exposure to Mass Media (TV)	0.081**	0.022*	-0.081**	-0.236**	-0.202**	0.120**	0.317**	1.000	
Economic Status	0.116**	0.085**	-0.009*	-0.421**	-0.335**	0.179**	0.497**	0.434**	1.000

Source: Authors' own calculations. ** refers to significance at 5 percent.

Table 4 shows that mother's age is significantly associated with the utilization of maternal postnatal care. The odds ratio depicted that the women of age group less than 20 had 25.5 percent of lower chances of getting postnatal care as compared to women in age group 35-49. The women of age group 20-34 had 13.3 percent less chances of getting postnatal health care after leaving the health facility as compared to those women who were of age 35-49. The study by Sisay et al., (2019) argued that women in age group 35-49 have more likelihood of getting postnatal check-ups. The result of binary logistic regression analysis shows that the postnatal healthcare for mothers was not significantly associated with the mother's area of residence. However, postnatal healthcare was significantly associated with the place of delivery. According to the odds ratio, those women who gave birth in private hospitals had 22 percent more chances of getting postnatal healthcare as compared to those women who gave birth in government hospitals. The studies by Chhetri et al. (2020); Chungu et al. (2018); Khatri et al. (2021) and Matijasevich et al. (2009) also claimed that PNC services were utilized more by mothers giving birth in private hospitals as compared to those delivering babies in public hospitals.

Type of delivery was one of the significant factors that affected the provision of postnatal health care for mothers. Women experiencing normal delivery had 76.3 percent fewer chances of getting adequate postnatal health care compared to women who underwent C-section delivery. Many previous studies have provided the evidence of positive relationship between maternal postnatal care utilization and C-section

delivery (Berhe et al., 2019; Dahal et al., 2022; Dey et al., 2021; Khaki, 2019; Mahajan & Kaur, 2021; Matijasevich et al., 2009). Contrary to many studies, the results of this analysis showed that education did not have any significant impact on the utilization of postnatal healthcare for mothers.

The role of media was expressed in terms of the frequency of watching television. The results depict that exposure to media had a significant positive impact on postnatal healthcare. As shown by the odds ratio, it is evident that those women who did not watch television had 12 percent fewer chances of getting postnatal health care as compared to those women who watched television almost every day. The analysis is similar to other studies concluding that mass media had a significant positive impact on the utilization of PNC services. (Ahinkorah et al., 2021; Ali et al., 2021; Kim & Kim, 2019). According to the results, as we move from the lowest income strata to the highest income strata, the chances of women not receiving postnatal healthcare decrease. Women from the poorest backgrounds had 37 percent fewer chances of receiving postnatal health care as compared to the women in richest wealth quintiles. Women from the near-poor quantile had 27.2 percent fewer chances, and women belonging to the richer wealth index had only 16.6 percent fewer chances compared to women from the highest wealth background. Extensive literature is available that provide strong association between economic status and maternal postnatal care utilization (Anindya et al., 2021; Dahiru & Oche, 2015; Feroze et al., 2021; Kinyondo et al., 2022; Lagendijk et al., 2019; Nur et al., 2021; Wudineh et al., 2018; Zere et al., 2010).

Table 4. Factors associated with PNC for mothers

YES[a]	B	St. Error	Sig.	Exp(B)
Intercept	-0.197	0.103	0.055	0.821
Mother's Age				
Less than 20	-0.294	0.163	0.072	0.745*
20-34	-0.143	0.069	0.039	0.867**
35-49	Ref	.	.	.
Area of Residence				
Urban	-0.084	0.064	0.189	0.919
Rural	Ref	.	.	.
Place of Delivery				
Private Hospital	0.199	0.056	0.000	1.220**
Government Hospital	Ref	.	.	.
Type of Delivery				
Normal	-1.441	0.054	0.000	0.237**
C-Section	Ref	.	.	.
Education Level				
Uneducated	-0.104	0.067	0.122	0.901
Educated	Ref	.	.	.
Exposure to Mass Media (Television)				
Not at all	-0.128	0.062	0.038	0.880**
Almost Every day	Ref	.	.	.
Economic Status				
Poorest	-0.463	0.115	0.000	0.629**
Near poor	-0.317	0.096	0.001	0.728**
Middle	-0.147	0.083	0.077	0.863*
Richer	-0.182	0.077	0.018	0.834**
Richest	Ref	.	.	.

Source: Authors' calculations. Method of estimation: Binary logistic regression.
[a] Reference category: 'No'.
Notes: The dependent variable in this model is postnatal care for mothers. ** and * indicate the level of significance at 5 and 10 percent respectively. The likelihood ratio test is significant at 5 percent. Column 4 presents the p-values for Wald test that assess the significance of each variable in the model. The chi square test is highly significant (p-value = 0.000) which suggests the accuracy of the model. The predictive capacity of the estimated model is 77.5 percent suggesting that the model has high predictive potential in determining mother's PNC.

Table 5 shows the result of binary logistic regression to study the association of socioeconomic factors with postnatal healthcare for babies after leaving the health facility. The chances that a baby receive postnatal health care increase significantly as age of women increases. According to the odds ratio, the women from age group less than 20 have 32.3 percent less chances that their babies would get postnatal health care as compared to babies of women in age group 35-49. Those mothers belonging to age bracket 20-34 have 16.5 percent less chances that their babies would get postnatal health care as compared to babies of mothers within the age bracket 35-49 years. Results show that mothers' age did affect the healthcare utilization for newborns (Singh et al., 2022).

Table 5. Factors associated with PNC for babies

PNC = YES[a]	B	St. Error	Sig.	Exp(B)
Intercept	-0.652	0.098	0.000	0.521
Mother's Age				
Less than 20	-0.390	0.156	0.012	0.677**
20-34	-0.181	0.065	0.005	0.835**
35-49	Ref	.	.	.
Area of Residence				
Urban	0.038	0.061	0.529	1.039
Rural	Ref	.	.	.
Place of Delivery				
Private Hospital	0.124	0.052	0.018	1.131**
Government Hospital	Ref	.	.	.
Type of Delivery				
Normal	-0.449	0.051	0.000	0.638**
C-Section	Ref	.	.	.
Education Level				
Uneducated	-0.178	0.063	0.005	0.837**
Educated	Ref	.	.	.
Exposure to Mass Media (Television)				
Not at all	0.109	0.057	0.057	1.115*
Almost Every day	Ref	.	.	.
Economic Status				
Poorest	-0.397	0.107	0.000	0.672**
Near poor	-0.306	0.091	0.001	0.737**
Middle	-0.208	0.080	0.009	0.812**
Richer	-0.199	0.074	0.007	0.820**
Richest	Ref	.	.	.

Source: Authors' calculations. Method of estimation: Binary logistic regression.
[a] Reference category: 'No'

Notes: The dependent variable in this model is postnatal care for babies. ** and * indicate the level of significance at 5 and 10 percent, respectively. The likelihood ratio test is significant at 5 percent. Column 4 presents the p-values for Wald test that assess the significance of each variable in the model. The chi square test is highly significant (p-value = 0.000) which suggests the accuracy of the model. The overall percentage about the predictive capacity of the estimated model is 77.5 percent which indicates that the model has predictive potential in determining whether a baby's health was checked after leaving a health facility.

However, postnatal healthcare for babies is not significantly associated with the mother's area of residence but significantly associated with the place of delivery. According to the odds ratio, those babies who were born in private hospitals had 13.1 percent more chances of getting postnatal care as compared to those born in government hospitals. This result is consistent with the findings of Bwalya et al. (2017) and De Jonge et al. (2018).

According to the analysis, the type of delivery also had a strong significant impact on utilization of postnatal healthcare for babies. Babies who were born via normal delivery had 36.2 percent less chances of getting postnatal healthcare as compared to those who were delivered by C-section. Amsalu et al. (2022) claimed that the mode of delivery significantly impact the utilization of postnatal care services. Postnatal healthcare for babies was significantly associated with the education level of mothers. It is evident from the odds ratio represented in Table 5 that those babies whose mothers were uneducated had 16.3% less chances of getting postnatal health care as compared to those whose mothers were educated. Lam et al. (2019) and Sharkey et al. (2017) also concluded that education of mothers have significant impact on babies PNC. The role of media also showed significant association with the utilization of postnatal healthcare for babies. Mothers who were exposed to mass media had 11.5 percent higher chances that their newborns would not receive PNC. Biswas et al. (2021) explored that the mother's exposure to mass media have a positive impact on their newborns' postnatal care.

Socioeconomic status, as expressed by wealth quantile, is strongly associated with the utilization of postnatal health care for babies. Babies belonging to the highest wealth quantile have the highest chances of receiving postnatal health checks. This can be confirmed by the odds ratio provided in Table 5, which indicates that babies from the lowest wealth quantile have 32.8 percent lower chances of getting postnatal health checks compared to babies from the richest wealth quantile. The percentage of babies not receiving postnatal care decreases as the wealth index increases. The odds ratio of receiving postnatal health checks, relative to the richest wealth quantile, is as follows: for the near-poor chances are 26.3 percent lower; for middle wealth quantile the chances are 18.8 percent lower; and for the richer wealth quantile chances are only 18 percent lower compared to the richest households. The studies by Amin et al., (2010), Blanchard et al. (2019) and Leventhal et al. (2021) also demonstrate strong positive impact of mothers' wealth status on newborns' postnatal care.

Conclusion and Recommendations

This study examines the factors affecting postnatal healthcare utilization in the socioeconomic context for Pakistan by adapting the Andersen-Newman Framework. It is found that mother's age, place of delivery, type of delivery, exposure to mass media, and wealth status significantly influence the utilization of maternal postnatal care (PNC). PNC was insignificantly associated with the mother's area of residence and her education level. Moreover, the results found that mother's age, place of delivery, type of delivery, mother's education level, exposure to mass media (television), and economic status significantly influence the newborn's postnatal care except the mother's area of residence. Although, the education level did not have a significant positive impact on maternal postnatal care utilization, but did have a significant positive impact on the postnatal care usage for the babies**.** The authors conclude that the importance of education should not be taken on a lighter note just because it is not directly found to be effective for mothers. The study also concludes that the disparity exists between maternal and newborn postnatal care.

Policymakers should design programs that specifically target women and babies from poor socioeconomic backgrounds that cannot afford health facilities so that the country can move forward to

achieve its international obligations in reducing maternal and newborn mortality. The government should take measures to improve facilities at public hospitals, especially in under resourced areas. They should be provided with all necessary equipment needed for better surveillance of newborns and mothers having post-delivery complications. Investment in health system based on equality is required for which mass media campaigns can also be utilized to increase awareness about the importance of PNC. Further direction for research must include the cultural factors which have not been included in the scope of this study.

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