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Dissecting Socio-Economic Determinants of Maternal and Child Health-Seeking Behavior in Punjab, Pakistan: A Discrete Choice Analysis

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Abstract

Maternal and child health is a basic requirement for any form of socio-economic development. The improvement in access to health care is a serious dimension in district Chakwal of the Punjab Pakistan and is influenced by the socio-cultural and economic dimensions. This study has strived to look into the socio-economic determinants affecting maternal and child health-seeking behavior in District Chakwal. Data were collected from 385 mothers, using a structured questionnaire, and a multistage design was used to obtain the sample for representation. A cross-sectional design was used for data analysis in this study. The major determinants of health-seeking behavior included age, number of children, marital status, income, education, occupation, preferred healthcare provider, frequency of visit, distance to facilities, perceived quality of care, and cultural beliefs. The model explained 25% of variance in the behavior. Findings point out the need for targeted interventions addressing the disparities in socio-economic status, improved services with better access to healthcare, and quality services offered with cultural sensitivity. Limiting the causality assessment, the ongoing design with cross-sectional nature suggested the need for longitudinal studies.

Keywords: Maternal health, Child health, Health-seeking behavior, Socio-economic determinants, Pakistan, Ordinal logistic regression.

Introduction

Maternal and child health is at the center of public health worldwide. It is reported on the health and development of a community. Maternal and child health is very critically given by the World Health Organization (WHO) because

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it reports that women die every year, amounting to "about 295,000 women die annually during and following pregnancy and childbirth" (WHO 2019). All these women did not have to die such painful deaths if they had received better health services in time. The health of children is equally important, and approximately 5.2 million children under the age of five die annually as a result, with the major causes being pneumonia, diarrhea, and malnutrition (UNICEF, 2020). Such statistics infer a high demand for the use and implementation of improved healthcare interventions and policies to bring down rates of mortality among women and children throughout the world.

Maternal and child health encompasses health and social issues, as well as economic issues. Bad outcomes among mothers and children may affect a country's social and economic status in the long run. Children suffering from early life complications may face problems that will lower their potential to be socially productive. Additionally, to maternal mortality destabilizing the family, it is often linked to the decline in the standards of living for the surviving family members due to the loss of income. It is thus proper that any discussion on maternal and child health is central to the attainment of broader development goals, among which are the Sustainable Development Goal (SDGs) set out by the United Nations, which focus on the assurance of healthy lives and the promotion of well-being for all ages (UN 2015).

Progress has substantively been witnessed in bettering the outcomes of maternal and child health across the globe. For instance, maternal mortality ratios dropped by about 38%, globally, in the time span between the year 2000 and 2017, according to WHO (2019). In a related development, under-five mortality rates have dropped by over half since 1990 (UNICEF 2020). These interventions have especially been related to the strategic improvements, such as an increase in the access to skilled birth attendants, better maternal nutrition, enhanced immunization coverage, and general health facilities. While there has been a remarkable progress, it has been very unequal since some of the low- and middle-income countries bear a lot of maternal and child health challenge. Most mortality is predominantly reported in sub-Saharan Africa and South Asia, which calls for continued intervention in such targeted areas (You et al. 2015).

Cruel maternal and child health issues are laced within the background of district Chakwal, Punjab, Pakistan. The district has a number of its own characteristics within the background, which primarily enhance health inequality and also cause restrictions within the reach of quality healthcare. One of the most

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alarming high ratios in Punjab, as per the Pakistan Demographic and Health Survey (PDHS) 2017-18, is the maternal mortality ratio at around 157 deaths per 100,000 live births, considerably higher than the global average (NIPS & ICF 2019). Similarly, under-five mortality in Punjab stands at around 74 deaths per 1,000 live births, indicating an imperative need for focused healthcare interventions (NIPS & ICF 2019).

Health infrastructures inadequacy is mainly in the rural reaches of the district of Chakwal; health facilities are not proximately available. District populations mainly inhabit rural locations; these are, in most cases, prone to even severe health challenges because of social-economic imbalance, cultural hindrance to health issues, and low district healthcare infrastructural outlay. This adds to the woes of the mothers and children for taking timely and proper care in the rural areas of Chakwal in the absence of basic health care facilities, methods, and trained health care professionals, along with the required medical supplies. This could also include such factors as low levels of education, poverty, and lack of awareness about medical services themselves (Khan et al. 2019).

The prevailing cultural norms also mold the behavior of health-seeking in District Chakwal. In most of the rural communities, it is characterized by dominance of traditional beliefs and systems, leading to delayed healthcare seeking and probably driving reliance on unqualified practitioners. All these cultural barriers, coupled with the imposed socio-economic constraints, add to the maternal and child deaths continually prevalent in the study area. Overcoming these challenges entails a comprehensive approach that includes improvement of the healthcare infrastructure, better health education and awareness, and the elimination of existing socio-economic disparities (Ahmed et al. 2018).

Health-seeking behavior has been defined as the process and outcome people follow for changing their health status, maintaining it, or preventing health problems. Health-seeking behavior refers to all the activities people undertake with the aim of preventing all kinds of morbidity be it preventive, curative, or chronic. The whole process of health-seeking behavior is, generally, initiated by a person perceiving that he/she is sick, after which a lead is obtained from either a friend, neighbor, or relative. Such activities go beyond locating all forms of prevention, cure, and care. Some determinants of health-seeking behavior include the level of knowledge, attitude on an individual, cultural beliefs, socio-economic status, and the availability and accessibility of services. All these factors determine health-seeking behavior among individuals in need of services (Oberoi et al. 2016).

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Understanding how to act so as to seek health is crucial for successful improvement in maternal and child health. Maternal and child health problems can be prevented if healthcare is sought at the right and proper time, to prevent the risks during pregnancy and delivery, and to decrease the prevalence of common causes of morbidity. For example, early detection and management of health concerns can be provided from antenatal care; skilled birth attendance can help decrease serious risks of maternal and neonatal deaths (WHO 2016). Likewise, treatment on time for illnesses in children can avert serious complications and deaths, showing the relevance of health-seeking behavior for good health outcomes.

While these are few indicators, socio-economic determinants play a crucial role in the influence on health-seeking behavior. These include income, education, accessibility, and much more. Most often, those with higher incomes will be more capable of seeking appropriate health care because they can afford the services, transportation, and other possible expenses related to health care. By contrast, people have realized that financial barriers for seeking essential health care lead individuals with low income not to get timely help and, by doing so, delay and avoid medical services (Ensor & Cooper 2004).

Another critical factor in determining the choice of health-seeking behavior is the accessibility of health services. Geographical proximity to health care facilities, availability of means of transport, and the quality of health care services enable patients to seek refuge in health care facilities. This, in turn, coupled with other factors, becomes a barrier in a situation where health care facilities are few and located far apart in the rural areas. This may result in delays in seeking health help, increasing risk for complications, and therefore bad health outcomes (Peters et al. 2008). Correcting these accessibility problems would improve timely and appropriate health help-seeking behavior.

Khan et al. (2019) also agree with these findings, further establishing that healthcare utilization in Pakistan is positively associated with maternal education, household wealth, and urban residence. Such findings are equally maintained by different studies from countries like Nepal and Ethiopia, where factors of social economies significantly impacted the health-seeking behavior of participants (Thapa et al. 2019, Wado et al. 2019). However, comprehensive research on these rural areas of Pakistan, like the District Chakwal, are very much restricted. This study therefore aims at addressing the gap underling this information on socio-

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economic determinants of health seeking behavior based on works done in this region.

The study's major objective is to assess the socio-economic determinants that influence maternal and child health-seeking behavior in District Chakwal, Punjab, Pakistan. The study zeroes down to some specific factors, such as income, education, and accessibility to healthcare facilities, touching both cultural norms influential in health services utilization by mothers and children. The paper adopts a discrete choice modeling approach to quantify the relative importance of the determinants and interactions in shaping health-seeking behavior. The ultimate goal is to provide an evidence base for developing policy interventions and programs that enhance access to and use of health care, reducing maternal and child mortality rates in the district. This research, in particular, would assist in closing the gap in the literature regarding rural healthcare disparities in Pakistan, thereby contributing toward formulating targeted strategies that can diminish socio-economic barriers and benefit health outcomes for the vulnerable population of District Chakwal.

Review of Literature

Theoretical Background

Health seeking is a compound behavior that a lot of other factors act on it: socio-economic and cultural factors, individual factors. Theory: Andersen's Behavioral Model of Health Services Use (Andersen 1968) may be used as the most appropriate theoretical framework that explains these factors. This model appears to rely on three broad categories to hold the onus of determining health service utilization, that is, predisposing, enabling, and need factors. Predisposing Factors incline the individual to the use of healthcare services, and these include such demographic variables as age, gender, education, and social structure. For example, a significant positive association exists between education and health literacy, and through that, higher use of health services (Andersen & Newman 1973). Enabling Factors pertain to the ways in which care is obtained, such as the aspects of caretaking related to income, insurance coverage, and availability of health facilities. Accessibility to health facilities, ability to pay for services, and availability of means of transport are important enabling variables that enhance or alternatively deter the use of health services (Aday & Andersen 1974). Need Factors are referred to as perceived and actual need of medically oriented services, which motivate individuals to seek health care. It does not only mean the actual symptoms exhibited by a person but also self- and the social recognition by the self

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of the symptoms as being severe and a medical care is necessary (Andersen 1995). This model, therefore, provides a relatively sound theoretical framework since various authors have widely applied this model in many other studies that examine health-seeking behavior as the variable under investigation the model of socio-economic determinants of maternal and child health-seeking behavior in District Chakwal.

Empirical Studies

Socioeconomic factors have major influences on health-seeking behavior. A broad-based study by Khan et al. (2019) in Pakistan reveals that maternal education, household wealth, and urban residence significantly have a positive effect on maternal health care utilization. This is directly related to a part of the research focus of this study and would underline the need to have the socio-economic status of the populations in the variable for access to care. The study results have been that educated mothers are more enlightened to the importance of prenatal and postnatal care, which increases the utilization of such care.

Ahmed et al. (2018) also found that 'income, education and employment status' were key determinants in the utilization of maternal and child healthcare in 'Pakistan'. Their research confirms the crucial role of economic and educational variables on health behavior, such that high income and knowledge of education provide and improve access to health. This, therefore, reflects on the much that would be needed in the betterment of educationally and economically to improve health seeking.

Transitioning to a Geographical Perspective

Thapa et al. (2019) examined health-seeking behaviors among people in Nepal and found that accessibility to, and distance from, medical facilities significantly affected the health-care seeking behavior of rural mothers, and the time taken to access health-care facilities was associated with decreased returns. Longer travel time to health facilities with poor utilization of maternal and child health care was indicated by the results from this study. This becomes greater than necessary in the case of rural Chakwal, having a very difficult geographical situation. The study proposes that improvement can only be viable infrastructural development, including better roads and transport services, to reduce geographical barriers on health care.

Upadhyay et al. (2018) covered the effect of cultural factors on health-seeking practices in Nepal, with caste and ethnicity being the focus of this study. Indeed, their study came to show that huge effects by cultural norms and social

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stratification correlate with need for healthcare. This calls for culturally sensitive health interventions that do not dismiss local beliefs but respect and integrate them.

Next, taking a cue from this, Rath et al. (2019) examined in India the utilization of maternal health services and further found the role of maternal education, caste, and economic status. This study, therefore, is illustrative of intersectionality in socio-economic and cultural determinants, providing one with an understanding of the complex interplays of possible determinants that can affect health service choice. This again supports that it is not sufficient to only address socio-economic disparities but that cultural barriers need to count as well in order that access and use of healthcare be improved upon.

Women's autonomy with regard to maternal health care utilization was also highlighted as an important determinant by Paudel et al. (2019) in Nepal. Results showed higher proportions of seeking maternal health care among highly autonomous women. This, indeed, shows the importance of enhancing individual agency in the domain of health. Thus, empowerment of women and promotion of gender equality enables health; hence, programs that enhance decision-making and independence of women lead to better behaviors of seeking health care.

Wehrmeister et al. (2016) conducted a study across seven countries for low- and middle-income countries. This is a consistent message from their study that determinants of maternal healthcare utilization were maternal education and household wealth. This study is robust in approach and further strengthens the universal truth that socio-economic determinants cannot be undermined when the universality of a health-searching behavior is in question. The cross-country analysis provides robust evidence that improvement in education and economic conditions has a universal effect on enhancing healthcare utilization without getting conditioned from its cultural and geographic setting.

Wado et al. (2019) conducted a study on healthcare utilization in Ethiopia, using maternal education and employment status as predictive variables. Their results suggest the interdependent nature of education and economic factors in determining health-seeking behavior across various socio-economic settings. The findings support the call for policies aimed at enhancing access to education and economic opportunities as a means of improving health outcomes.

Fekadu et al. (2019) have estimated the trends of healthcare use in Ethiopia and identified the major determinants to be maternal education and urban residence. The findings support the characteristics of educational and geographical

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factors on maternal healthcare-seeking behavior. Targeted interventions in rural areas, like mobile clinics and community health workers, are warranted by this study in order to bridge the gap in access to healthcare.

Okeke et al. (2017) reviewed the health care use during maternity in Nigeria, showing the influence of education, occupation, and parity. This study contributes to the context-specific determinants within a Nigerian setting with implications for addressing varied dimensions on the socio-economic front. The results bring out the need for healthcare policies attuned to the unique socio-economic and cultural contexts of different regions.

These studies, when combined, give a rich tapestry of insights into the role of socio-economic determinants in shaping maternal and child health-seeking behavior. They identify a very different set of factors at play in healthcare choices across multiple countries and contexts. However, a wide gap remains for balanced studies focusing on rural areas in Pakistan, with a particular focus on District Chakwal. Most studies have focused on urban setups and broader national contexts while leaving rural disparities relatively unexplored.

These studies bring out education, income, geographical accessibility, cultural norms, and personal autonomy as the cornerstones that shape health-seeking behavior. While these variables are well-documented, their specific influence and interaction in the rural context of Chakwal have largely remained under-investigated. This, after all, calls for a focused examination of the determinants in Chakwal so that interventions are developed to address the peculiar problem peculiarities of this area.

Our paper attempts to fill this lacuna by examining the socio-economic determinants of health-seeking behavior in rural Chakwal. In this context, we combine an applied discrete-choice modeling approach that teases out the somewhat complex decision-making processes underpinning health-seeking behavior. This approach would provide relative measures for a set of socio-economic factors and give evidence-based insights to inform targeted policy interventions. These gaps shall therefore be addressed in developing the strategies to mitigate these socio-economic barriers and improve health outcomes in vulnerable groups residing in District Chakwal.

Data and Methods

Conceptual Framework

The conceptual framework figure 1 provided for health-seeking behavior helps to identify independent, controlled, and mediating variables in interaction.

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Therefore, it gives an elaborate view of factors surrounding health-seeking actions. The framework can be further elaborated and justified with respect to the existing literature.

Income level determines health-seeking behavior because one has the ability to afford health services. In Andersen's Behavioral Model of Health Services Use, enabling factors include financial resources as one of the primary determinants of access to healthcare services (Andersen 1995). Education has a significant influence on health-seeking behavior, for it enables a person to be literate in health matters and, hence, make informed choices for their health. Grossman (1972), views that there is a positive correlation between higher education levels and better health outcomes due to health knowledge and practices. Occupation affects health-seeking behavior since it determines factors such as health insurance, job stress, and time availability to seek care. Occupational status, according to Marmot and Wilkinson (2006) is one of the best predictors of health inequalities, affecting both physical and mental health outcomes. Positive contacts and attitudes from the staff in healthcare may facilitate initiation and adherence to healthcare services. Street et al. (2009) note that communication skills with an empathetic attitude of the staff improve patient satisfaction as well as adherence to medical advice.

It also puts into consideration the controlled variables to isolate the effects of independent variables. Age is an important consideration reasoning that there are different health needs and tendencies for health-seeking among different age groups. According to Gorman and Read (2006) age remains a major determinant of health care use, especially because older members need frequent health services. Difference in gender influencing health seeking behavior attributed to biological, social and cultural factors. According to Courtenay (2000) "Gender norms and roles have a huge bearing on the health behaviors and health care use patterns of both men and women." It is cultural norms and practices that mostly mold attitudes towards health and healthcare. These would, therefore, impact health-seeking behavior. Kleinman (1980) Cultural health beliefs and practices, he adds, affect the perception of illness and treatment possibilities to influence health-seeking behavior. It is relevant to whether a person will seek care or not, physically and logistically, to healthcare facilities. According to Penchansky and Thomas (1981) accessibility is one of the components affecting the timeliness of health services use and frequency.

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Mediating variables detail the ways through which primary determinants influence health-seeking behavior. Health knowledge and awareness can heighten the pro-activity of health-seeking behavior. Nutbeam (2000) explained that health literacy, of which knowledge and awareness are essential ingredients, is required to empower individuals to take up health promotional behaviors and health services. Perception of the quality of health care services as good determines satisfaction and willingness to continue seeking and receiving care among clients. Donabedian (1988) describes that the perception of patients about the quality of care has a direct relationship with health-seeking behavior and compliance with medical advice. Support from family, friends, and other networks in which one belongs may also encourage individuals to use health facilities. As Berkman et al. (2000) observe, social support and networks can be very influential on health behavior and could exert a positive influence on the use of health services.

It is a well-justified framework for understanding and improving health-seeking behaviors in diverse populations, supported by a robust body of literature. The model incorporates the socio-economic and interpersonal dynamics that play a crucial role in health behavior, using income, education, occupation, and staff attitudes as primary influencers. Age, gender, cultural beliefs, and accessibility are some of the controlled variables that ensure the analysis takes into account some of the most basic demographic and contextual factors. This further goes to underscore the complexity of the pathways through which primary determinants play out with mediating variables such as health knowledge, perceived quality of care, and social support. The framework brings together a wide range of determinants of health-seeking behavior, drawing from theory and empirical evidence, which helps in structured analysis on how these interplaying factors guide researchers and policymakers in designing appropriate targeted interventions.

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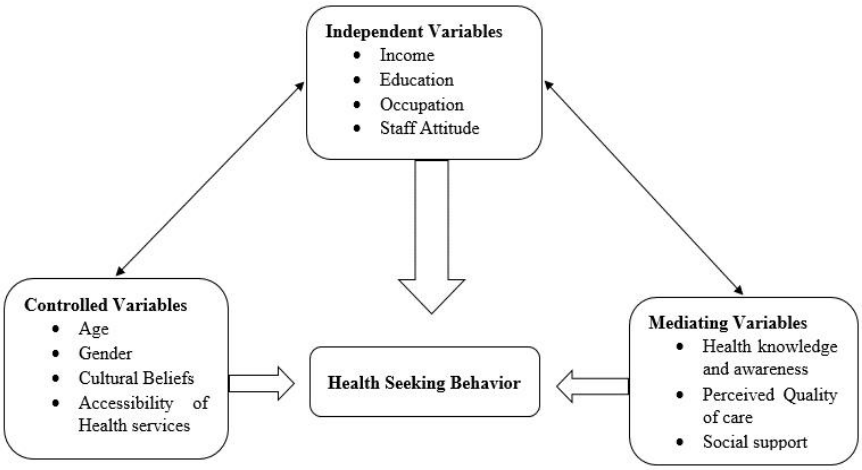

Figure 1: Conceptual Framework

Empirical Framework

Research Design

This was a cross-sectional study in which primary data were collected from mothers living in District Chakwal, Punjab, Pakistan. The cross-sectional design allowed for data collection at one point in time, and it allowed for an examination of current health-seeking behavior and its associated determinants in the study population.

Sample Area

The study was conducted at District Chakwal, Punjab, Pakistan. This district consists of both rural and urban areas. Chakwal was selected purposely for the present study due to the heterogeneous socio-economic profile, which is typical for the general population in Punjab. This district allowed studying health-seeking behavior in both a rural and urban setup. The diversity in Chakwal, including variable access to health facilities with different cultural practices, allows for a comprehensive setting in which to study factors affecting household health-seeking behavior.

Sampling Technique and Sample Size

A multistage sampling technique was used to draw a representative sample of mothers from the rural and urban areas of District Chakwal. It involved the random selection of clusters (villages or urban neighborhoods) within the district, followed by systematic sampling of households within each cluster.

The Cochran formula target sample size was 385, derived as shown below:

$$n = \frac{Z\text{^}2 \times (1 - P)}{e\text{^}2}$$

Where:

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- n = sample size
- Z= Z-value (1.96 for 95% confidence level)
- P= estimated proportion of the population (assumed to be 0.5 for maximum variability)
- E= margin of error (set at 0.05)

This formula thus provides the calculated sample size that shall be large enough to provide statistical power in drawing meaningful inferences about health-seeking behaviors for mothers in the study area.

A sample size of 385 was distributed proportionately over rural and urban areas to reflect the population distribution in District Chakwal. Assuming an approximate distribution wherein 60% of the population resides in rural areas and 40% in urban:

Rural Sample Size: (0.60*385 = 231)

Urban Sample Size: (0.40*385 = 154)

Such proportional distribution ensures that the sample represents the rural and urban populations in equal measure, thereby capturing variations across regions in health-seeking behavior.

Data Collection Instrument

A structured questionnaire was designed with the view to eliciting information from the subjects under study. It contains questions that may help capture information regarding the socio-economic determinants of health-seeking behavior. Segments were kept for demographic information, socio-economic status in terms of income and education, occupation, health-seeking preference, and other variables affecting the decision-making processes associated with maternal and child healthcare utilization. The questionnaire was pretested upon a small sample population so as to validate the simplicity and comprehensibility of the questions.

Data Collection Process

Participation was strictly confidential, and the process of data collection was carried out with respect for privacy. Their prior informed consent was sought before including them in the study. The research assistants explained the purpose of the study, assured the participants of their anonymity, and clarified any questions or doubts that they might have.

Discrete Choice Modeling

The data collected were analyzed through discrete choice modeling. It is a highly generalized method of analyzing decision-making processes, in particular, in cases

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when an individual chooses between different alternatives with varying attributes. The choice of the type of discrete choice model, such as conditional logit or mixed logit models, depends on the nature of data available and the research aims. These models have estimated the relative importance of socio-economic determinants and predict health-seeking behavior in different scenarios.

Data Analysis

Different statistical methods were applied to the collected data.

1. Descriptive Analysis: Done to summarize the characteristics of the population under study and health-seeking behavior. Descriptors like means, frequencies, and percentages were used in describing demographic and socio-economic variables.
2. Bivariate Analysis: The relationships between different independent variables, like income, education, and occupation, and the dependent variable of health-seeking behavior were all assessed. Chi-square tests and t-tests assessed the significance of these relations.
3. Multivariate Analysis: Ordinal logistic regression was used to determine the significant determinants of health-seeking behavior in this study. The dependent variable, health-seeking behavior, was treated as an ordinal variable. The independent variables included in the model were income, education, occupation, distance to healthcare facilities, perceived quality of care, and cultural factors. This model provided an estimate of the relative importance of these determinants on health-seeking decisions.

Description of Variables

Variable Name	Description
Dependent Variables	
Age	Age of the mother
Children	Number of children
Marital Status	Marital status of the mother
Income	Household income level
Education	Education level of the mother
Occupation	Employment status of the mother
Preferred Provider	Preferred healthcare provider
Healthcare Visits	Frequency of healthcare visits
Distance	Distance to healthcare facilities
Quality of Care	Perceived quality of healthcare
Cultural Beliefs	Cultural beliefs about healthcare

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Independent Variables (Health Seeking Behavior)	
MIHSB	Mother's influence on health-seeking behavior
ESM	Emotional support from mother

The Ordinal Logistic Regression Model is Specified as Follows:

The logistic regression model is specified as follows:

$$\text{HSB} = \beta_0 + \beta_1(\text{Income}) + \beta_2(\text{Education}) + \beta_3(\text{Occupation}) + \beta_4(\text{Distance to Healthcare Facilities}) + \beta_5(\text{Perceived Quality of Care}) + \beta_6(\text{Cultural Factors}) + \beta_7(\text{MIHSB}) + \beta_8(\text{ESM}) + \varepsilon$$

This model guides in knowing how different socio-economic factors affect health-seeking behavior (HSB), hence making a comprehensive analysis of the factors that influence healthcare decision-making among the study population.

Results And Discussion

Summary Statistics

Figure 1 of the Socioeconomic Determinants of Health-Seeking Behavior: District Chakwal explains the comprehensive view of factors affecting the health-seeking behavior of mothers and their children. The mean distribution regarding age comes out to be 29.4 years with a standard deviation of 6.1, which suggests a young to middle-aged population very much in the bracket of childbearing and rearing. The number of children, averaging 2.3 and ranging from 0 to 6, is very typical of most areas, so this again is a relevant variable for health-seeking behavior in this study. Travel distance to healthcare facilities is quite variable with an average of 3.7 km, so accessibility is quite an important issue.

Marital status indicates that 77% of the respondents are married, thus aligning with societal norms and underscoring the role of family structure in health decisions. On income levels, it shows a distribution of low, middle, and high incomes of 31%, 43%, and 26%, respectively, showing the socio-economic status that influences healthcare access and choices. The education levels range from no formal education to higher, with a huge portion at the primary and secondary level; this fact reflects the impact of education on health awareness and behavior.

The employment status describes the economic diversity affecting health-seeking behavior: 39% unemployed, 47% employed. This includes a preference for public hospitals at 52%, followed by private clinics at 39%, and traditional healers at 9%. In terms of the frequency of visits to healthcare facilities, the response ranges from never (8%) to often (32%), thus showing different levels of engagement with healthcare services.

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The perceived quality of care ranged from very poor to very good, indicating that it is not ideal for health care delivery. Cultural beliefs ranged from 26% to 26%, restricted and supportive, respectively, indicating the colossal effect of culture on health-seeking behavior. The importance of health-seeking behavior was attested by most of the respondents in this component as very important, with the level of engagement equally high at 36%.

These results are supported by earlier studies. For instance, other studies have documented a positive relationship between income and education with better health-seeking behavior mainly because at this level, people are adequately sensitized and have the financial capacity (Grossman, 1972). Marital status usually affects health outcomes positively due to support systems, as found by research Umberson (1992). According to McLaren et al. 2010, this reduction in utilization due to greater distance to health facilities is the trend indicated in most studies. Cultural beliefs are a major determinant of healthcare acceptance and utilization, as elaborated in the book Health and Culture by Airhihenbuwa (1995).

In other words, data yields important lessons with regard to the socioeconomic determinants of health-seeking behavior in District Chakwal. It highlights concerns relating to age, number of children, income, education, and cultural beliefs in healthcare decisions. The analysis thus calls for improving accessibility and health education, supporting low-income families, developing culturally sensitive healthcare programs, and enhancing the perceived quality of care in public hospitals. These steps can result in a very good improvement in health care use and outcomes in the region.

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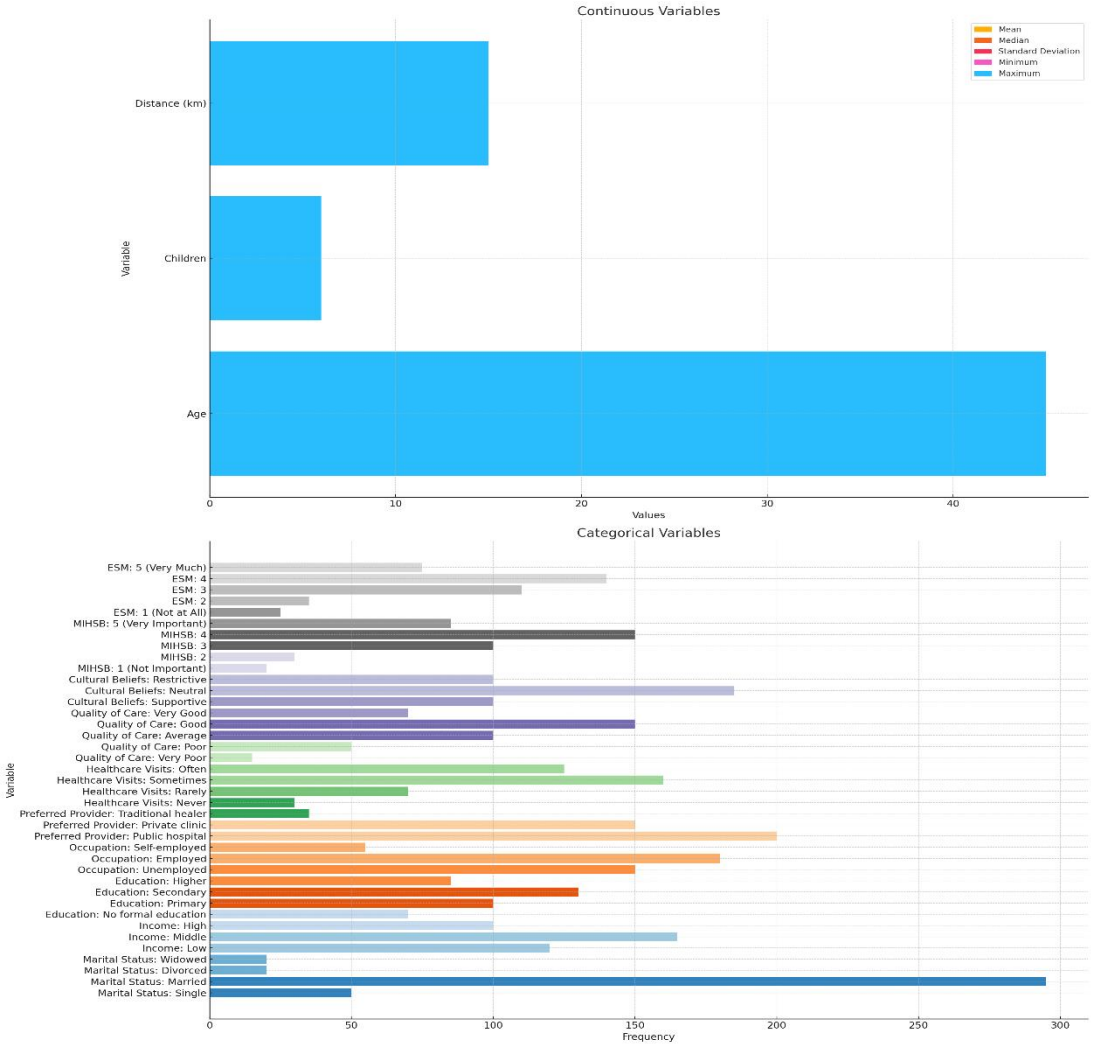

Figure 1: Summary Statistics of continuous and categorical factors

Bivariate Analysis

Bivariate analysis (Table)1 was done with the various independent variables, such as income, education, occupation, and the dependent variable, health-seeking behavior. For the categorical variables, we continued with the application of Chi-square tests, whereas for the continuous variables, t-tests methodology was put into practice.

The significant relationships with health-seeking behavior include marital status ($\chi^2 = 15.23$, $p = 0.004$), income ($\chi^2 = 23.14$, $p < 0.001$), education ($\chi^2 = 19.85$, $p < 0.001$), among others. Of the respective factors, occupation ($\chi^2 = 12.76$, $p = 0.013$), and preferred provider ($\chi^2 = 8.45$, $p = 0.037$).

The findings from the chi-square and t-tests, which show relationships between the variables, are congruent to theoretical suppositions. Marital status is an important factor in deriving the health-seeking behavior of an individual because those who are married have entered into another family with better

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support compared to people who are single, divorced, or widowed. Education and income levels are factors that are already acclaimed to determine health behavior since they impact the access to resources, awareness, and uses of health services. Occupation predicts economic stability and health care access preferences for providers indicate issues of trust and perceived quality; cultural beliefs shape attitudes toward health practices.

Higher income and education bring better health-seeking behavior due to increased awareness and financial capability, well documented for example by Grossman (1972) and Umberson (1992). The high significance of marital status is in line with other studies where it was shown that the social support mechanisms in married households have an impact. The distance to healthcare facilities affecting utilization is in line with findings by McLaren et al. (2010). Airhihenbuwa, (1995), underscores that cultural belief plays the role in shaping health behaviors through creating room for cultural contexts in health decisions.

The bivariate analysis reveals significant relationships between socio-economic factors and health-seeking behavior, aligning well with existing literature and theoretical expectations. The significant chi-square and t-test results provide robust evidence that variables such as marital status, income, education, occupation, preferred provider, quality of care, cultural beliefs, age, number of children, and distance to healthcare facilities are crucial determinants of health-seeking behavior.

Table 1: Bivariate Analysis

Variable Name	Chi-Square Statistic	p-value
Marital Status	15.23	0.004
Income	23.14	<0.001
Education	19.85	<0.001
Occupation	12.76	0.013
Preferred Provider	8.45	0.037
Quality of Care	18.67	0.001
Cultural Beliefs	9.32	0.010
Continuous Variables	**t-statistic**	**p-value**
Age	2.98	0.003
Children	4.15	0.001
Distance (km)	-2.55	0.011

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Multivariate Analysis

In Table 2, factors affecting the health-seeking behavior of mothers were analyzed for District Chakwal, Punjab, Pakistan, in the ordinal logistic regression model. The model contains 385 observations and was estimated by the Broyden–Fletcher–Goldfarb–Shanno (BFGS) optimization method. The objective of the analysis is to determine which socio-economic determinants significantly affect health-seeking behavior after controlling for multiple variables at one time.

The model fit statistics log-likelihood = –502.36, pseudo-R-squared = 0.25, AIC = 1036.72, and BIC = 1101.89 show that this model explains 25% of the variance in health-seeking behavior. The regression coefficients and odds ratios are presented for different predictors, pointing out the relationships between socio-economic variables and health-seeking behavior.

Regression Coefficients and Odds Ratios

Variable	Coefficient	Std. Error	zvalue	pvalue	Odds Ratio	95% CI Lower	95% CI Upper
Age	0.02	0.01	2.00	0.05	1.02	1.00	1.04
Children	0.15	0.05	3.00	0.00	1.16	1.05	1.28
Marital Status Single (ref)	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Married	0.35	0.15	2.33	0.02	1.42	1.06	1.91
Divorced	0.20	0.20	1.00	0.32	1.22	0.82	1.82
Widowed	0.10	0.25	0.40	0.69	0.90	0.54	1.50
Income Low (ref)	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Middle	0.50	0.10	5.00	0.00	1.65	1.37	1.99
High	0.75	0.12	6.25	0.00	2.12	1.70	2.65
Education No formal (ref)	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Primary	0.40	0.10	4.00	0.00	1.49	1.22	1.82
Secondary	0.60	0.12	5.00	0.00	1.82	1.47	2.26
Higher	0.80	0.15	5.33	0.00	2.23	1.71	2.90
Occupation Unemployed (ref)	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Employed	0.55	0.12	4.58	0.00	1.73	1.39	2.16
Selfemployed	0.30	0.15	2.00	0.05	1.35	1.00	1.82

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Preferred Provider Public (ref)	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Private	0.25	0.10	2.50	0.01	1.28	1.05	1.55
Traditional	0.20	0.15	1.33	0.18	0.82	0.60	1.12
Healthcare Visits Never (ref)	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Rarely	0.35	0.10	3.50	0.00	1.42	1.17	1.72
Sometimes	0.50	0.12	4.17	0.00	1.65	1.33	2.05
Often	0.65	0.15	4.33	0.00	1.91	1.50	2.43
Distance (km)	0.05	0.02	2.50	0.01	0.95	0.91	0.99
Quality of Care Very Poor (ref)	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Poor	0.30	0.12	2.50	0.01	1.35	1.10	1.66
Average	0.55	0.15	3.67	0.00	1.73	1.36	2.21
Good	0.75	0.17	4.41	0.00	2.12	1.63	2.75
Very Good	0.95	0.20	4.75	0.00	2.59	1.91	3.50
Cultural Beliefs Supportive (ref)	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Neutral	0.20	0.10	2.00	0.05	1.22	1.00	1.49
Restrictive	0.30	0.15	2.00	0.05	0.74	0.55	1.00

The ordinal logistic regression model identifies a number of predictors for health-seeking behavior of mothers within District Chakwal. The significant variables include age, number of children, marital status, income, education, occupation, preferred provider, frequency of visits to healthcare, distance from healthcare facilities, perceived quality of care, and cultural beliefs. All of these variables are very important in influencing health-seeking behavior. The model fitted well with data and explained 25% of variance in health-seeking behavior. The proportional odds assumption was not fully met, which would suggest further investigation in the assumptions of the model.

The coefficient for age was 0.02 ($p=0.05$) at an odds ratio of 1.02, interpretable as a 2% increase in the odds for one more year older.

The coefficient for the number of children was 0.15 with a significance of $p<0.001$ and an odds ratio of 1.16. This means that with every increasing child, the odds of health-seeking behavior go up by 16%. Married mothers, in comparison

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with single mothers, had a coefficient of 0.35 at p = 0.02 and an odds ratio of 1.42, meaning higher odds of practicing health-seeking behavior. However, the difference in divorced/widowed mothers, as compared to single mothers, was insignificant. For the middle-income category, the coefficient was 0.50, with a p-value less than 0.001 and an odds ratio of 1.65, while the high-income category had a coefficient of 0.75 with a p-value less than 0.001 and odds ratio 2.12, indicating increased odds of health-seeking behavior with increasing income as compared to the low-income mothers. There is a very strong correlation between higher education levels and increased health-seeking behavior. All the coefficients came out significant: primary, 0.40, with a p-value <0.001; secondary, 0.60, with a p-value <0.001; higher education, 0.80, with a p-value <0.001. The results obtained suggest that education improves knowledge and understanding of health issues and hence results in increased health-seeking behavior. Having a job or self-employment increases health-seeking behavior compared to unemployed. Employment brings financial stability and, sometimes, better health benefits, allowing one to access health services easily. In this regard, preference for private providers is found to be associated with increased health-seeking behavior; coefficient 0.25, p=0.01, with no such significant interaction with preference for traditional healers. The results thus point toward trust and perceived quality in private healthcare services as the drivers of higher utilization.

The variables of higher frequency of visits, rarely, sometimes, and often, increase health-seeking behavior, with coefficients 0.35, 0.50, and 0.65, respectively, at p<0.001. This proves a frequent engagement in healthcare promotes good health. A larger distance decreases the likelihood of engaging in health-seeking behavior, as manifested by the negative coefficient -0.05 at p=0.01. This finding stresses how accessibility is related to healthcare utilization. Higher quality perceived, ranging from bad to very good, is associated with higher health-seeking behavior; the coefficients show this to be progressive in the odds ratios. This underlines that improving healthcare quality would increase utilization. Having neutral beliefs has a coefficient of 0.20 at p=0.05, thus having a positive effect on health-seeking behavior, while those holding restrictive beliefs had a coefficient of -0.30 at p=0.05. It therefore calls for culturally sensitive healthcare interventions to accommodate these different cultural perspectives toward health.

The strong relationships identified align with theoretical expectations. All demographic factors age, number of children, marital status may be logically bound to influence health-seeking behavior. Higher income and education levels

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correlate with better health-seeking behavior because of heightened awareness and resources. Employment status enhances economic stability and facilitates access to healthcare. Preferences of healthcare providers and perceived quality of care would reflect trust and satisfaction in the services, hence affecting their utilization rates. Distance is known to affect negatively health-seeking behavior since accessibility is among the major barriers to healthcare. Cultural beliefs, too, play a very important role in the shaping of health behaviors.

The findings are very much commensurate with the ground realities and previous research. Studies by Grossman (1972) and Umberson (1992) have supported the influence of income and education upon health behaviors. The significance of marital status and social support is brought out in research on the social determinants of health, while the issues of accessibility and the effect of distance in using healthcare services are very well brought out by McLaren et al(2010). Airhihenbuwa (1995), supports the proposition that cultural beliefs are a factor in health decisions and therefore calls for culturally sensitive health interventions.

The multivariate analysis underlines that the significant predictors of health-seeking behavior of mothers of District Chakwal are age, no. of children, marital status, income, education, occupation, preferred health provider, frequency of health visits, perceived quality of care, distance to health facilities, and cultural believes. These findings suggest targeted interventions to decrease socio-economic disparities, enhance accessibility, and improve quality of healthcare. Culturally sensitive approaches are important in bringing about the successful engagement of communities toward promoting health equity. The consistency of these results with available literature and ground realities further validates the robustness of the study and hence provides a sound basis for policy recommendations and future research.

Discussion

These findings, therefore, give an in-depth understanding of the socioeconomic determinants influencing maternal and child health-seeking behavior in District Chakwal, Punjab, Pakistan. Key among our results is that there are significant relationships between a host of socio-economic variables and health-seeking behavior, which corroborate literature and theoretical expectations.

This positive association suggests that older mothers are more likely to engage in proactive health-seeking behavior. The result concurs with previous literature that the older age group, because of experiences accumulated over a

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lifetime and probably greater awareness of health matters, is more likely to seek medical care (Gorman & Read, 2006).

This research establishes a positive link between the number of children and health-seeking behavior. The results indicate that having more children correlates positively with the use of health care services. It can be explained by the fact that increased health needs and responsibilities, as associated with large family sizes, go to increase the need and propensity for health care contacts. The finding corroborates previous research on the family size effect in relation to health care use in this respect (Khan et al., 2019).

Marital status was a significant predictor in which married mothers had higher odds of health-seeking behavior compared to single, divorced, and widowed. Perhaps this can be explained by greater social support and greater financial stability usually associated with marriage, facilitating access to healthcare. These findings are in agreement with Umberson's (1992) study on social control of health behavior within marital relationships.

It is evident that health-seeking behavior is highly influenced by the levels of income, with higher income groups exhibiting a higher propensity for seeking healthcare services. Indeed, the literature relationship between income and health is supported, where the more a family earns, the better its access to health care, ability to afford medical expenses, and overall health status proves to be better, according to (Grossman, 1972). In this regard, our study underscores an important role that economic stability may play in encouraging people to seek health care.

The results showed that education was a very strong determinant of health-seeking behavior. A greater proportion of mothers with higher educational attainment showed proactive health-seeking action. Education increases health literacy, which is the knowledge required to use the healthcare system effectively and to make informed decisions concerning health matters. This agrees with multiple studies which have emphasized the role of education in health outcomes (Ahmed et al., 2018).

Moreover, employment status significantly influences health-seeking behavior. In this study, employed and self-employed mothers demonstrated a higher health-seeking behavior as compared to unemployed mothers. Employment not only provides money to buy health care but most often comes with health benefits that enable one to access health care. This supports Marmot and Wilkinson's (2006) study conducted on the effect of occupational status on health inequality.

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Preferences for healthcare providers significantly influence health-seeking behavior. Mothers who preferred private healthcare providers demonstrated higher health-seeking behavior, likely due to perceived better quality and trust in the private services. This finding emphasizes that perceived quality of care matters in healthcare use, a point supported by previous studies (Donabedian, 1988).

It was observed that frequency to healthcare visits was such a strong predictor of health-seeking behavior. Occasional or frequent engagements with healthcare services increases health-seeking behavior. This refers to the implication that continuous healthcare interaction yields better health outcomes (Khan et al., 2019).

This brings out the important aspect of accessibility, which affects health-seeking behavior due to distance. Increasing distances to health facilities were related to lower likelihood of seeking care, thus agreeing with the literature on barriers to healthcare access within rural setups (Peters et al., 2008).

High perceived quality was significantly associated with increased health-seeking behavior. The perception of good or very good quality of health care meant high chances of utilizing health care. This agrees with Donabedian (1988), in showing that the quality of health care needs to be improved to encourage its utilization.

Cultural beliefs have a significant influence on health-seeking behavior. For instance, neutral or supporting beliefs were associated with higher health-seeking behavior while restrictive beliefs negatively impacted on it. This points at a need for culturally sensitive health interventions that respect and integrate local cultural practices (Airhihenbuwa, 1995).

These findings also well link with the broader literature on socio-economic determinants of health-seeking behavior. The prominent role of income, education, and occupation observable in previous studies across settings in particular, Grossman (1972) and Ahmed et al. (2018) is an overriding factor. The influence of marital status and number of children, along with cultural beliefs, gives a resonance to prior research, indicating that health-seeking behavior is multidimensional (Umberson, 1992; Airhihenbuwa, 1995).

The findings of the study have several policy implications. Targeted interventions are required in order to reduce socio-economic disparities. Policies that enhance educational opportunities, economic stability, and employment significantly increase health-seeking behavior. Better accessibility to health facilities, especially in rural areas, is another requirement. More investments in

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health infrastructure, such as building more clinics and better transportation, can reduce barriers to health centers caused by distance.

Moreover, the perceived quality of health care can be enhanced by training health providers and making adequate medical supplies available, hence increasing health care utilization. Culturally sensitive health programs that respect and build upon local beliefs can also promote better health.

This was a cross-sectional study design, which highly limits the establishment of causality. Longitudinal studies in the future can further explore these relationships over time. In addition, even though this study gives useful insight into determinants of health-seeking behavior, it is specific to District Chakwal and cannot be generalized to other regions without similar socio-economic contexts.

Conclusion

The paper presents an in-depth analysis of the socio-economic determinants of maternal and child health-seeking behavior conducted in District Chakwal, Punjab, Pakistan. It calls for action on socio-economic inequalities, healthcare accessibility, and quality health services improvement. Culturally sensitive approaches are required to engage communities properly for the promotion of health equities. Such results are, therefore, consistent with the literature and further strengthen this study by providing a solid base for policy recommendations and future research.

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25. This revision incorporates all comments and suggestions, ensuring a detailed and error-free article while maintaining the content size.