

Healthcare-seeking behavior among ill children under five in Bangladesh: A multinomial analysis

Shahnaz Haque^{a,b}, Saidatulakmal Mohd^{a,c,d*}

^a School of Social Sciences, Universiti Sains Malaysia, Penang, Malaysia

^b School of Social Sciences, Shahjalal University of Science and Technology, Sylhet, Bangladesh

^c Centre for Research on Women and Gender (KANITA), Universiti Sains Malaysia, Penang, Malaysia

^d USM Initiatives on Ageing (USIA), Universiti Sains Malaysia, Penang, Malaysia

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ABSTRACT

Bangladesh has a complex healthcare system. Despite improvements in healthcare infrastructure, a significant proportion of children under five with illnesses are still taken to unqualified healthcare providers, or their parents rely on pharmacies, traditional healers, or self-care for treatment. However, expanding access to substandard care is unlikely to improve health outcomes. This study aims to analyze the demographic and socioeconomic factors influencing healthcare-seeking behavior (HSB) using nationally representative data from the Bangladesh Household Income and Expenditure Survey (2016). Guided by Andersen's behavioral model of health services use, a multinomial logistic regression model is applied to identify factors affecting HSB. The findings reveal that variables such as the mother's age, urban residence, household wealth index, and the presence of multiple illnesses increase the likelihood of seeking care from qualified healthcare providers. In contrast, no significant association is found between the child's sex and parental healthcare-seeking behavior. Additionally, as children grow older, parents are more likely to turn to pharmacies, traditional healers, or self-care options. The analysis also shows that while children of educated mothers are more likely to receive care from qualified providers, those whose mothers are employed are more often treated through pharmacy/traditional/self-care methods. Further research is needed to explore the underlying reasons for this behavior among working mothers. Policymakers should prioritize reducing rural–urban disparities and poverty. Moreover, increasing public awareness about the importance of addressing childhood illnesses—through nationwide workshops or seminars—can help prevent neglect and mistreatment.

* Corresponding author. E-mail address: eieydd@usm.my

1. Introduction

Maintaining good health during childhood significantly influences later outcomes such as education, health, and economic well-being, as demonstrated in prior research (Oreopoulos, 2006). A study conducted in India further highlights that better health leads to increased labor productivity, which in turn supports economic growth (Gupta & Mitra, 2004). The health of children under five is particularly critical, as they are highly vulnerable to mortality without adequate care. Over the past three decades, child survival rates have improved considerably, as reflected in the decline in under-five mortality. In 2020, the global mortality rate for children under five was 1 in 27—an improvement from 1 in 11 in 1990. Despite this progress, 5.0 million children under five died in 2020 (World Health Organization, 2022). Furthermore, infectious diseases such as pneumonia, diarrhea, and malaria remained leading causes of death, contributing to the loss of approximately 13,800 children under five each day in 2021 (United Nations Children's Fund, 2023).

One of the key goals of the Sustainable Development Goals (SDGs) is to eliminate preventable deaths among newborns and children under five by 2030. To achieve this, countries are urged to reduce neonatal mortality to no more than 12 deaths per 1,000 live births and under-five mortality to no more than 25 deaths per 1,000 live births (United Nations, n.d.).

In Bangladesh, the under-five mortality rate declined to 31.0 per 1,000 live births in 2020, while the infant mortality rate dropped to 25.7, and the neonatal mortality rate stood at 18.8 per 1,000 live births (World Bank, 2023). However, these rates remain high compared to the Sustainable Development Goal (SDG) targets. One study suggests that if the current trend in reducing under-five mortality continues, Bangladesh is likely to meet the SDG target by 2030. Nonetheless, progress may be hindered by the continued low utilization of healthcare services, which remains a significant predictor of under-five mortality (Khan et al., 2021).

Furthermore, expanding access to poor-quality care is unlikely to improve health outcomes (Kruk et al., 2018). Delayed access to modern medical treatment is a major contributor to infant mortality. A significant proportion of neonatal deaths are associated with delays in recognizing illness and seeking medical care. For example, 32% of caregivers delayed seeking help for more than 72 hours after noticing symptoms (Gomez et al., 2024).

One key determinant of health service utilization is healthcare-seeking behavior (HSB). HSB refers to the actions individuals take when they recognize or experience a health concern, with the goal of finding appropriate treatment or a cure (Ward et al., 1997). In this context, "actions" refer to the extent to which individuals actively seek out or use healthcare services in response to illness (Slobbe et al., 2017). Children under five cannot seek care on their own; therefore, their healthcare-seeking behavior is reflected in the decisions and actions of their parents or guardians. As such, HSB for this age group is typically considered the parents' or caregivers' HSB on behalf of the child.

In many low- and middle-income countries, HSB for children under five remains inadequate. While 74% of children have received the measles vaccine, only 16% of children in sub-Saharan Africa sought medical treatment for a cough or fever, and just 10% received treatment for diarrhea (Adedokun & Yaya, 2020). In Nigeria, only 32.3% of children with pneumonia received appropriate care (Bakare et al., 2023), while in Zambia, approximately 25% of sick children did not receive care from any healthcare provider (Apuleni et al., 2021). In contrast, a more optimistic picture is seen in southern Ethiopia, where 70.2% of mothers and caregivers reported seeking modern healthcare for their children's illnesses (Yeheyis et al., 2023).

In Bangladesh, only 25.6% of children under five showing symptoms of fever or cough are taken to formal healthcare facilities. This rate varies by location, with 33.7% in urban areas and 23.5% in rural areas (Ahmed & Yunus, 2020). Another study reported a slightly higher figure, with 37% of children receiving care from formal providers (Khanam & Hasan, 2020). A more recent study conducted in the Khulna district

found that approximately 59% of mothers sought care from unqualified practitioners when their children were ill (Akter, 2022).

Bangladesh's heterogeneous healthcare system is shaped by four main actors: the government, the private sector, non-governmental organizations (NGOs), and international donor agencies. These stakeholders collectively influence the system's goals and organizational structure. The public sector, particularly the government, plays a central role in policy formulation, governance, implementation, and the provision of healthcare and medical education. The Ministry of Health and Family Welfare (MoHFW) oversees the healthcare system through two key agencies: the Directorate General of Health Services (DGHS) and the Directorate General of Family Planning (DGFP).

The DGHS manages the healthcare delivery system through several administrative levels, including district, upazila (sub-district), union, and ward. Simultaneously, the DGFP operates the Maternal and Child Health/Family Planning (MCH-FP) service delivery system at each of these levels, extending from the national level down to the community or village level (National Institute of Population Research and Training & ICF, 2019).

One of the government's high-priority initiatives is the Expanded Program on Immunization (EPI), which targets six preventable childhood diseases. The proportion of children aged 12–23 months who received all recommended basic vaccines increased significantly—from 46% in 1993–1994 to 86% in 2017–2018. Importantly, there is no significant gender disparity in basic vaccination coverage between boys and girls (National Institute of Population Research and Training & ICF, 2020).

Despite these advancements, major challenges remain. Although healthcare services now reach from the national to the village or ward level, and basic vaccination coverage has nearly been achieved, the quality of care is still a concern. According to the Bangladesh Household Income and Expenditure Survey (HIES) 2016, over 60% of ill children under five were treated by non-qualified healthcare providers or through pharmacy-based or traditional methods (BBS, 2017).

A significant proportion of antibiotic prescriptions in Bangladesh—estimated at 63%—originate from unqualified healthcare providers. Moreover, antibiotics are prescribed in approximately 44% of all consultations within primary healthcare settings (Systems for Improved Access to Pharmaceuticals and Services, 2015). Often, healthcare providers diagnose microbial infections based solely on signs and symptoms, prescribing antimicrobials empirically rather than following standardized treatment guidelines (Faiz & Basher, 2011). This practice fosters misconceptions and spreads inaccurate information about illnesses, ultimately contributing to the irrational and improper use of antibiotics (Nahar et al., 2020; Pulla, 2016). Such patterns of healthcare-seeking behavior pose serious risks to public health.

Despite the importance of understanding healthcare-seeking behavior (HSB) for improving child health outcomes, only a limited number of studies in Bangladesh have examined HSB for children under five. Existing research has typically focused on specific diseases or common illnesses (Khanam & Hasan, 2020; Ahmed & Yunus, 2020), particular climate-vulnerable regions (Haque et al., 2019), or localized geographic areas (Akter, 2022). However, children throughout the country suffer from a wide range of conditions—including pain, injury, dysentery, and pneumonia—in addition to more commonly studied illnesses such as cough, fever, and diarrhea. To address disparities and improve healthcare-seeking behavior, it is crucial to consider the full spectrum of childhood illnesses across all regions of Bangladesh.

The aim of this study is to investigate the socioeconomic and demographic factors that influence healthcare-seeking behavior among children under five, using the most recent nationally representative dataset available at the time of research. The dataset is derived from the Bangladesh Household Income and Expenditure Survey (HIES) 2016, which includes samples from all 64 districts, covering rural areas, urban locations, and city corporations. While the HIES 2010 surveyed 12,240 households, the HIES 2016 expanded this to 46,080 households, offering broader and more representative coverage. Although the HIES

2022 has since been released, it was not available during the study period and thus could not be used. Additionally, the sample size in the HIES 2022 was reduced to 14,400 households, limiting its comparability to the more extensive 2016 dataset.

This study intends to provide valuable insights for policymakers to design and implement targeted interventions that can encourage parents to seek appropriate healthcare for their children, thereby improving child health outcomes across Bangladesh.

2. Literature review

2.1 Theory review

The Behavioral Model of Health Services Use, developed by Andersen in 1968, has been widely applied in health services research to identify factors influencing healthcare-seeking behavior (Akter, 2022; Khanam & Hasan, 2020; Slobbe et al., 2017). This model was later refined by Andersen and Newman (1973) and posits that the use of healthcare services is determined by three key categories of factors: predisposing factors, enabling factors, and need factors. The need component specifically refers to the perceived or evaluated severity of illness. Figure 1 illustrates this theoretical framework, demonstrating that healthcare-seeking behavior (HSB) is shaped by these three broad dimensions.

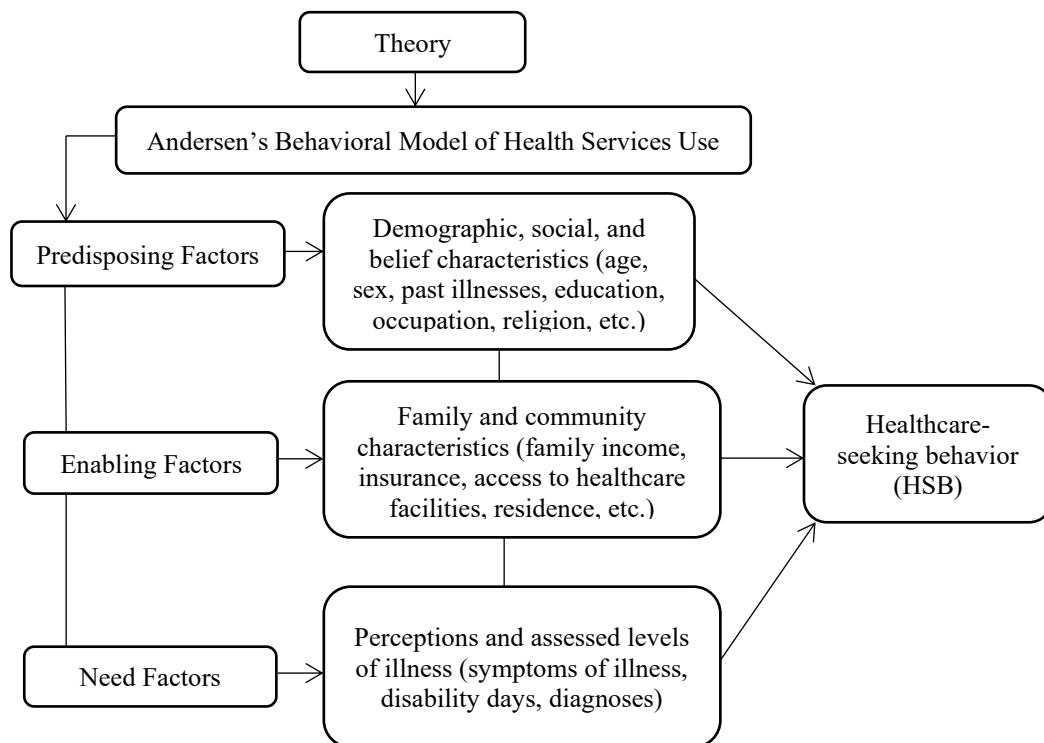


Figure 1. Theoretical framework

The predisposing factors represent an individual's inclination or tendency to seek healthcare before any illness occurs. These include demographic characteristics, social structure, and personal beliefs—such as age, sex, marital status, prior health experiences, education level, and occupation. Enabling factors refer to the logistical and economic means that either facilitate or hinder access to healthcare services. These encompass both individual and community-level resources, including household income, health insurance coverage, access to a regular source of care, availability and accessibility of health services, quality and qualification of healthcare personnel, and the geographic context (i.e., rural vs. urban settings).

This model provides a comprehensive lens through which healthcare utilization can be understood and evaluated, particularly in complex health systems such as that of Bangladesh.

The severity of an individual's illness is a key determinant of whether they seek medical care. This includes both the individual's perception of their illness and their subjective assessment of health status. Such perceptions may be reflected in the presence of symptoms within a given timeframe, self-rated health evaluations (e.g., excellent, good, or poor), and the number of days during which the individual experienced disability.

2.2 Empirical studies

Several predisposing factors influence healthcare-seeking behavior (HSB) for children worldwide. While a study in Zambia found no significant association between a child's sex or age and HSB (Apuleni et al., 2021), other research suggests otherwise. For instance, in The Gambia, mothers were less likely to seek healthcare for female children compared to male children (Terefe et al., 2023). This gender disparity in seeking care is not unique to The Gambia; similar patterns have been observed in South Asian countries, where female neonates are less likely to receive treatment than their male counterparts (Ismail et al., 2019).

In Bangladesh, male children are more likely to be treated by trained healthcare providers than female children (Haque et al., 2019). However, another study in Bangladesh found no significant association between a child's sex and mothers' HSB (Akter, 2022). Age is another important factor. Mothers are generally more likely to seek formal healthcare for younger children (Simieneh et al., 2019). Supporting this, a study in Indonesia reported that children under 12 months were more likely to receive medical treatment than those over 36 months (Khasanah et al., 2023).

Maternal age and education also significantly influence children's HSB in Bangladesh (Ahmed & Yunus, 2020; Sultana et al., 2019). In sub-Saharan Africa, employed mothers are more likely to ensure their children are vaccinated against measles and receive treatment for symptoms such as fever or cough (Adedokun & Yaya, 2020). Both maternal education and employment positively impact healthcare-seeking behavior for children in the region (Tebeje et al., 2024; Yaya et al., 2021). In India, maternal employment shows a nuanced relationship: positively associated with care-seeking for severe illnesses, but negatively associated with care-seeking for non-severe illnesses (Marsh et al., 2020). Nonetheless, Yaya et al. (2021), using data from 24 sub-Saharan African countries, found an overall positive association between maternal employment and HSB for children under five.

Enabling factors such as household economic status, place of residence, and the number of children in a household significantly influence parents' healthcare-seeking behavior (HSB) for their children (Ahmed & Yunus, 2020; Khanam & Hasan, 2020). As the number of children in a family increases, the likelihood of seeking formal or modern healthcare for each child tends to decrease (Tawfiq et al., 2023; Yaya et al., 2021).

While some studies have reported a positive relationship between proximity to healthcare facilities and the use of formal healthcare, the association has generally been found to be statistically insignificant (Khanam & Hasan, 2020; Rasul et al., 2019). For example, Simieneh et al. (2019) found that distance to

healthcare providers did not significantly influence HSB among children. However, contrasting findings from Kenya show that individuals often travel longer distances to access public hospital services (Escamilla et al., 2018).

In addition to enabling factors, need factors, which reflect the severity of illness, are also key determinants of HSB. In Ethiopia, a higher proportion of children with diarrhea were taken to formal healthcare facilities (Alene et al., 2019). Similarly, Khasanah et al. (2023) found that children with acute respiratory infections were more likely to receive medical care than those with only fever or cough. Mothers who perceive their child's illness as severe are significantly more likely to seek modern healthcare services than those who consider the illness to be mild (Yeheyis et al., 2023).

The type of illness plays a critical role in shaping HSB. In Bangladesh, children suffering from diarrhea are more likely to be taken to formal medical facilities compared to those with fever or cough (Ahmed & Yunus, 2020). Furthermore, children exhibiting multiple symptoms or illnesses are more likely to be brought to qualified healthcare providers than those experiencing a single condition (Khan et al., 2018).

3. Methodology

3.1 Data source

This research is a cross-sectional study utilizing secondary data from the Bangladesh Household Income and Expenditure Survey (HIES) 2016, conducted by the Bangladesh Bureau of Statistics (BBS) under the Statistics and Informatics Division (SID). The survey received financial and technical support from the World Bank and the World Food Programme. A stratified two-stage cluster sampling design was employed in the HIES 2016 data collection (Bangladesh Bureau of Statistics [BBS], 2017).

According to the HIES 2016 report (BBS, 2017), the sampling design involved an initial phase in which Primary Sampling Units (PSUs) were distributed across all 64 districts of Bangladesh, with 36 PSUs allocated per district. To stratify the sample, the country's eight divisions were categorized into three main locality types: rural, urban, and city, resulting in 20 primary strata—comprising eight rural divisions, eight urban divisions, and four major city corporations. In phase two, the PSUs were allocated at the district level, resulting in 132 sub-strata (64 urban, 64 rural, and 4 city corporations). Subsequently, 20 households were randomly selected from each PSU, yielding 720 households per district and a total sample size of 46,080 households for the HIES 2016.

This study focused on children aged from birth (0 years) to five years who had experienced illness or injury within 30 days prior to the survey and had sought healthcare from any type of provider. It is important to note that children at this developmental stage cannot articulate their healthcare needs, so parents or guardians responded to all child health-related questions during the survey. After applying filtering criteria—such as removing duplicate responses and excluding missing values—the total sample of sick children was 6,670. For this study, only children who sought healthcare from any provider were included; those who did not seek any treatment were excluded.

3.2 Method

To examine the relationship between various factors and healthcare-seeking behavior (HSB) among children under five, this study first used Pearson's chi-square test. The test was conducted through two-way tabulation in STATA 17, which provides the test statistics, degrees of freedom, and p-values. Since the dependent variable has three categories and meets the independence of irrelevant alternatives (IIA) assumption, a multinomial logistic regression (MNL) model was used to estimate the effects of the factors on HSB (Ausserhofer et al., 2022; Wang et al., 2015). Although previous studies have suggested ordered

logit regression (Adhikari, 2015), this approach requires the proportional odds assumption, which was not satisfied in our data. Therefore, the MNL model was deemed more appropriate.

The IIA assumption was tested using the Hausman test. Additionally, the independent variables were evaluated using Wald and likelihood ratio (LR) tests, and multicollinearity was assessed via the variance inflation factor (VIF). All analyses were performed using STATA 17. The MNL regression was run with the `mlogit` command, and post-estimation tests—including the Hausman, Wald, and LR tests—were conducted using the `mlogtest all` command.

3.3 Variables

In this study, healthcare-seeking behavior (HSB) is defined as a categorical variable with three options:

- *Qualified healthcare provider*: A provider who is authorized and registered to practice medicine, typically holding an MBBS degree or equivalent qualification. These providers work in facilities such as Union Health and Family Welfare Centers, community clinics, Upazila Health Complexes, Maternal and Child Welfare Centers (MCWC), government hospitals, medical colleges, NGO clinics, private hospitals, or private chambers.
- *Non-qualified healthcare provider*: Individuals who do not possess formal medical qualifications (e.g., no MBBS degree) but provide healthcare services.
- *Pharmacy/traditional/self-care*: Includes healthcare services obtained from pharmacies or dispensaries, homeopathy clinics, *ayurvedic/kabiraj/hekim* practitioners, and other traditional, spiritual, or self-care methods.

The model can be written as:

$$\text{HSB (Y)}_i = \beta_0 + \beta_1 \text{ Age of child (X}_1)_i + \beta_2 \text{ Sex of child (X}_2)_i + \beta_3 \text{ Age of mother (X}_3)_i + \beta_4 \text{ Education of mother (X}_4)_i + \beta_5 \text{ Earning status of mother (X}_5)_i + \beta_6 \text{ Total number of children (X}_6)_i + \beta_7 \text{ Residence (X}_7)_i + \beta_8 \text{ Household economic status (X}_8)_i + \beta_9 \text{ Distance to healthcare provider (X}_9)_i + \beta_{10} \text{ Types of illnesses (X}_{10})_i + \beta_{11} \text{ Health status of child (X}_{11})_i + \beta_{12} \text{ Delayed treatment (X}_{12})_i + \beta_{13} \text{ More illness (X}_{13})_i + \varepsilon \quad (1)$$

Where Y represents the dependent variable, β_0 denotes the intercept term, and $\beta_1, \beta_2, \beta_3, \dots$ are the parameters. The variables $X_1, X_2, X_3, \dots$ are the independent variables, and ε represents a random disturbance term. The dependent and independent variables are presented along with their definitions in Table 1.

Table 1. Dependent and independent variables

Variables	Definition
Dependent Variable	=1 if treatment is sought from a qualified healthcare provider
Healthcare-seeking behavior among Children under five years (Y)	=2 if treatment is sought from a non-qualified healthcare provider =3 if treatment is sought from a pharmacy/traditional/self-care
Independent Variables	
Predisposing Factors	
Age of child (X ₁)	= 1 if 0-2 years of age = 2 if 3-5 years of age
Sex of child (X ₂)	= 1 if the child is male = 2 if female
Age of mother (X ₃)	= 1 if 15-24 years of age = 2 if 25-34 years of age = 3 if 35 years or older
Education of mother (X ₄)	=1 if passed primary level or more =0 otherwise (less than primary level)
Earning status of mother (X ₅)	= 1 if the mother has income = 0 if she has no income
Enabling Factors	
Total number of children (X ₆)	Total number of children (0 to 17 years of age) in a household
Residence (X ₇)	=1 if rural =2 if urban
Household economic status (X ₈)	Wealth index (Poorest, poor, middle, rich, richest)
Distance to healthcare provider (X ₉)	Measured by time to reach there =1 if it takes >0.4 hours =0 if it takes <.4 hours
Need Factors	
Types of illnesses (X ₁₀)	= 1 if fever = 2 if diarrhea = 3 if dysentery = 4 if pain and injury = 5 if respiratory diseases = 6 if pneumonia = 7 if skin diseases = 8 if others

Variables	Definition
Health status of child (X_{11})	= 1 if a child has a chronic illness = 0 if no chronic illness
Delayed treatment (X_{12})	= 0, no delay = 1, delayed 1-2 days = 2, delayed 3-4 days = 3, delayed 5 or more days
More illness (X_{13})	= 1 if more than one illness = 0 if a single illness

This study employed the wealth index to assess socioeconomic status, following established methodologies (Amin et al., 2010; Latunji & Akinyemi, 2018; Mahmood et al., 2010). The wealth index is a composite measure that incorporates key indicators of household asset ownership. The assets included were radio, bicycle, motorcycle, refrigerator, fan, television, sewing machine, bedroom furniture, living room furniture, dining room furniture, kitchen cutlery, kitchen crockery, tubewell, watch, mobile phone, and computer, as identified in prior studies (Mahmood et al., 2010). Each asset was coded as a binary variable, where 1 indicates ownership and 0 indicates non-ownership. Assets with little variability — specifically those owned by fewer than 10% or more than 90% of households — were excluded from the analysis, consistent with recommendations by Fry et al. (2014).

Using these variables, Principal Component Analysis (PCA) was conducted to generate a factor score representing household wealth. The resulting scores were then categorized into five quintiles — poorest, poor, middle, rich, and richest — to capture relative socioeconomic status. The PCA was performed using the “*pca*” command in STATA 17.

4. Results and discussion

Table 2 presents the results of Pearson’s chi-square tests examining the relationships between the independent variables and healthcare-seeking behavior (HSB). The findings indicate that all variables, except for the sex of the child, show a statistically significant association with HSB. Notably, 54% of the children in the study sample are aged 0 to 2 years. Within this age group, the largest proportion of children sought care from qualified healthcare providers.

Table 2. Association between socioeconomic factors and healthcare-seeking behavior

Characteristics	Total Population N=6670 (100%)	Qualified healthcare provider n= 2,469 (37.02%)	Non-qualified healthcare provider n=1,656 (24.83%)	Pharmacy/tradit ional/self-care n=2,545 (38.16%)	P value
Age of child (in years)					0.000
0-2 years	3,617 (54.23)	1,461 (21.90)	864 (12.95)	1,292 (19.37)	
3-5 years	3,053 (45.77)	1,008 (15.11)	792 (11.87)	1,253 (18.79)	
Sex of child					0.186

Characteristics	Total Population N=6670 (100%)	Qualified healthcare provider n= 2,469 (37.02%)	Non-qualified healthcare provider n=1,656 (24.83%)	Pharmacy/tradit ional/self-care n=2,545 (38.16%)	P value
Male	3,484 (52.23)	1,325 (19.87)	857 (12.85)	1,302 (19.52)	
Female	3,186 (47.77)	1,144 (17.15)	799 (11.98)	1,243 (18.64)	
Residence					0.000
Rural	4,733 (70.96)	1,599 (23.97)	1,312 (19.67)	1,822 (27.32)	
Urban	1,937 (29.04)	870 (13.04)	344 (5.16)	723 (10.84)	
Health status of child					0.000
Has a chronic illness	403 (6.04)	225 (3.37)	78 (1.17)	100 (1.50)	
No chronic illness	6,267 (93.96)	2,244 (33.64)	1,578 (23.66)	2,445 (36.66)	
Types of illnesses					0.000
Fever	4,874 (73.07)	1,610 (24.14)	1,264 (18.95)	2,000 (29.99)	
Diarrhea	633 (9.49)	255 (3.82)	174 (2.61)	204 (3.06)	
Dysentery	124 (1.86)	39 (0.58)	28 (0.42)	57 (0.85)	
Pain/injury	152 (2.28)	75 (1.12)	30 (0.45)	47 (0.70)	
Respiratory diseases	203 (3.04)	120 (1.80)	36 (0.54)	47 (0.70)	
Pneumonia	228 (3.42)	151 (2.26)	43 (0.64)	34 (0.51)	
Skin diseases	112 (1.68)	49 (0.73)	29 (0.43)	34 (0.51)	
Others	344 (5.16)	170 (2.55)	52 (0.78)	122 (1.83)	
Delayed treatment					0.000
No delay	2,252 (33.76)	770 (11.54)	578 (8.67)	904 (13.55)	
Delayed 1-2 days	3,529 (52.91)	1,250 (18.74)	902 (13.52)	1,377 (20.64)	
Delayed 3-4 days	555 (8.32)	256 (3.84)	120 (1.80)	179 (2.68)	

Characteristics	Total Population N=6670 (100%)	Qualified healthcare provider n= 2,469 (37.02%)	Non-qualified healthcare provider n=1,656 (24.83%)	Pharmacy/tradit ional/self-care n=2,545 (38.16%)	P value
Delayed 5 or more days	334 (5.01)	193 (2.89)	56 (0.84)	85 (1.27)	0.000
More illness					
More than one illness	1,756 (26.33)	769 (11.53)	393 (5.89)	594 (8.91)	
Single illness	4,914 (73.67)	1,700 (25.49)	1,263 (18.94)	1,951 (29.25)	0.041
Age of mother					
15-24 years	1,862 (27.92)	666 (9.99)	499 (7.48)	697 (10.45)	
25-34 years	3,113 (46.67)	1,140 (17.09)	776 (11.63)	1,197 (17.95)	0.000
35 years or more	1,695 (25.41)	663 (9.94)	381 (5.71)	651 (9.76)	
Education of mother					
Completed primary level or more	4,110 (61.62)	1,632 (24.47)	998 (14.96)	1,480 (22.19)	0.072
Otherwise (less than primary level)	2,560 (38.38)	837 (12.55)	658 (9.87)	1,065 (15.97)	
Earning status of mother					
Mother has income	532 (7.98)	198 (2.97)	112 (1.68)	222 (3.33)	0.000
Has no income	6,138 (92.02)	2,271 (34.05)	1,544 (23.15)	2,323 (34.83)	
Wealth index					
Poorest	1,108 (16.61)	347 (5.20)	277 (4.15)	484 (7.26)	0.000
Poor	1,409 (21.12)	435 (6.52)	398 (5.97)	576 (8.64)	
Middle	1,432 (21.47)	481 (7.21)	396 (5.94)	555 (8.32)	
Rich	1,415 (21.21)	558 (8.37)	356 (5.34)	501 (7.51)	0.000
Richest	1,306 (19.58)	648 (9.72)	229 (3.43)	429 (6.43)	
Distance to healthcare provider					
Distance >0.4 hours	2,403 (36.03)	1,331 (19.96)	488 (7.32)	584 (8.76)	0.000
Distance <0.4 hours	4,267 (63.97)	1,138 (17.06)	1,168 (17.51)	1,961 (29.40)	
Total number of children	6670 (mean: 2.218) (mini: 1, maxi: 12)	2469 (mean: 2.165)	1654 (mean: 2.178)	2545 (mean: 2.295)	

Source: BBS (2017); measured by the author.

Children aged 3–5 years are predominantly associated with seeking care through pharmacy, traditional, or self-care methods. The majority of children in the study reside in rural areas, and approximately 94% did not suffer from any chronic illness. About 34% of children with illness sought treatment without delay, while 26.33% experienced more than one illness concurrently. Most mothers of these children belong to the middle-aged category and have completed at least primary education. Only 8% of mothers are earning members of their households.

Table 3 presents the results from the multinomial logistic regression, including coefficients (with pharmacy/traditional/self-care as the base category) and average marginal effects (AME). While coefficients in the multinomial logit model represent relative probabilities, AMEs provide an interpretation of the actual probabilities of different healthcare-seeking outcomes.

According to Table 3, parents are less likely to seek care from qualified healthcare providers for children aged 3–5 years compared to those aged 0–2 years (Khasanah et al., 2023). In contrast, parents show a higher likelihood of resorting to pharmacies, traditional healers, or self-care for older children. This trend is concerning given that younger children are generally more vulnerable, a finding consistent with previous studies from Bangladesh (Khanam & Hasan, 2020) and Burkina Faso (Badolo et al., 2022).

Table 3. Results of Multinomial logistic regression with coefficients and AMEs

Variables	Qualified healthcare provider		Non-qualified healthcare provider		Pharmacy/ traditional/ self-care
	Coefficient	AME	Coefficient	AME	AME
Age of child (ref. 0-2 years)	-0.2714*** (0.0622)	-.0516*** (.0111)	-0.0246 (0.0646)	.01716 (.0172)	.03439*** (.0344)
3-5 years					
Age of mother (ref. 15-24 years)					
25-34 years	0.1531* (0.0790)	0.0297** (.0138)	-0.0011 (0.0815)	-.01235** (.0136)	-.0174 (.0149)
35 years or more	0.2827*** (0.0966)	0.0611*** (.0172)	-0.0697 (0.1015)	-0.0347** (.0164)	-0.0264 (.0181)
Education of mother (ref. less than primary level)					
Completed primary level or higher	0.2697*** (0.0709)	0.0507*** (.0127)	0.0289 (0.0726)	-0.0162 (.0119)	-0.0345*** (.0131)
Earning status of mother (ref. no income)					
Has income	-0.1394 (0.1105)	-0.0081 (.0201)	-0.2420** (0.1220)	-0.0325 (.0203)	0.0407** (.0209)
Total number of children	-0.1394*** (0.0309)	-0.018*** (.0055)	-0.1083*** (0.0326)	-0.0084 (.0053)	0.0272*** (.0057)
Residence (ref. rural)					
Urban	0.4959*** (0.0714)	0.1275*** (.0125)	-0.3764*** (0.0798)	-0.1073*** (.0129)	-0.0202 (.0136)
Wealth index (ref. poorest)					
Poor	0.0435 (0.1021)	-0.0059 (.0176)	0.1943** (0.1007)	0.0327 (.0169)	-0.0267*** (.0192)
Middle	0.2300** (0.1021)	0.0239 (.0178)	0.2669*** (0.1020)	0.03172* (.0170)	-0.0556*** (.0191)
Rich	0.4763*** (0.1033)	0.0692*** (.0183)	0.3139*** (0.1059)	0.0194 (.0173)	-0.0885*** (.0194)
Richest	0.7032*** (0.1082)	0.1351*** (.0197)	0.0968 (0.1192)	-0.0368** (.0179)	-0.0983*** (.0206)
Distance to healthcare provider (ref. distance < 0.4 hours)					
Distance > 0.4 hours	1.4517*** (0.0677)	0.2622*** (.0100)	0.2949*** (0.0743)	-0.0623*** (.0111)	-0.1999*** (.0121)
Types of illnesses (ref. fever)					
Diarrhea	0.3159*** (0.1077)	0.0368* (.0192)	0.3064*** (0.1118)	0.0312 (.0192)	-0.0679*** (.0199)

Variables	Qualified healthcare provider		Non-qualified healthcare provider		Pharmacy/ traditional/ self-care
	Coefficient	AME	Coefficient	AME	AME
Dysentery	-0.4138* (0.2278)	-0.0588 (.0379)	-0.2739 (0.2362)	-0.0210 (.0288)	0.0798* (.0446)
Pain/injury	0.5611*** (0.2035)	0.1149*** (.0384)	0.0119 (0.2393)	-0.0438 (.0342)	-0.0711* (.0386)
Respiratory diseases	0.9776*** (0.1860)	0.1916*** (.0339)	0.1609 (0.2258)	-0.0575** (.0294)	-0.1340*** (.0324)
Pneumonia	1.5375*** (0.2011)	0.2620*** (.0319)	0.6323*** (0.23426)	-0.0418 (.0285)	-0.2201*** (.0278)
Skin diseases	0.4443* (0.2410)	0.0655 (.0434)	0.2832 (0.2603)	0.0144 (.0426)	-0.0799* (.0446)
Others	0.3193** (0.1353)	0.0951*** (.0262)	-0.4152** (0.1725)	-0.0891*** (.0218)	-0.0059 (.0274)
Delayed treatment (ref. no delay)					
Delayed 1-2 days	0.0757 (0.0678)	0.0124 (.0121)	0.0315 (0.0694)	-0.0002 (.0116)	-0.0121 (.0127)
Delayed 3-4 days	0.3496*** (0.1188)	0.0677*** (.0217)	0.0338 (0.1320)	-0.0223 (.0204)	-0.0453** (.0226)
Delayed 5 or more days	0.6964*** (0.1531)	0.1429***	0.0078 (0.1854)	-0.0558** (.0252)	-0.0870*** (.0285)
More illness (ref. single illness)					
More than one illness	0.3452*** (0.07)	0.0704*** (.0122)	-0.0314 (0.0764)	-0.0331*** (.0123)	-0.0373*** (.0134)
_Constant	-1.7499*** (0.1603)		0.0100 (0.1622)		

Notes: LR $\chi^2(46) = 1181.94$; Prob > $\chi^2 = 0.0000$; Pseudo R² = 0.0819; ***, **, * indicates significant at 1%, 5%, and 10% level respectively; standard error in the parenthesis.

Mothers in the older age group (35 years or older) are more likely to seek healthcare services from qualified providers for their children, while showing less tendency to use non-qualified providers, compared to younger mothers aged 15–24 years. This finding echoes previous research (Tebeje et al., 2024) and may be attributed to the greater experience and knowledge older mothers acquire over time, enabling them to better recognize the importance of professional medical care for their children—a pattern also observed in studies from Ethiopia (Dagnew et al., 2018).

Furthermore, mothers who have completed at least primary education are significantly more inclined to seek care from qualified healthcare providers than those without formal education. Educated mothers tend to be more aware of the severity of their children's illnesses and the need for appropriate medical attention. This observation aligns with findings from Bangladesh (Ahmed & Yunus, 2020) and Sub-Saharan Africa (Tebeje et al., 2024).

Conversely, mothers who have a source of income are more likely to seek healthcare for their children from pharmacies, traditional healers, or resort to self-care, compared to non-earning mothers. This tendency could be linked to non-severe illnesses where working mothers manage conditions at home due to time

constraints—a trend also noted in India (Marsh et al., 2020) and supported by research showing that employed mothers often have less time for childcare (Shepherd-Banigan et al., 2017). However, this finding contrasts with studies from Sub-Saharan Africa (Adedokun & Yaya, 2020; Tesema & Seifu, 2023), where employed mothers were more likely to seek formal healthcare for their children.

Additionally, parents of children living in urban areas are more likely to seek treatment from qualified healthcare providers than those in rural regions. The better availability and accessibility of healthcare facilities in urban areas likely drive this difference, as corroborated by earlier studies in Bangladesh (Khanam & Hasan, 2020; Ahmed & Yunus, 2020) and other low- and middle-income countries (Ketema et al., 2024).

Children from households with higher socioeconomic status, as reflected by an elevated wealth index, are significantly more likely to be taken to qualified healthcare providers by their parents compared to children from lower socioeconomic backgrounds. Conversely, parents in higher wealth groups tend to rely less on pharmacies, traditional remedies, or self-care practices. This pattern likely stems from the affordability of healthcare services, as families with greater financial resources have better access to qualified providers. These findings are consistent with prior research conducted in Bangladesh and other contexts (Ahmed & Yunus, 2020; Khasanah et al., 2023).

Family size also plays an important role: the fewer the number of children in a household, the higher the likelihood that parents will seek care from qualified healthcare providers. This association can be attributed to the reduced financial and mental burden when caring for fewer children. Mothers with larger families were found to be less likely to pursue healthcare for their children, a conclusion supported by earlier studies (Tawfiq et al., 2023; Khanam & Hasan, 2020).

Interestingly, the travel time to healthcare facilities does not appear to deter parents from seeking care from qualified providers; in fact, longer travel times may even increase the likelihood of accessing such services. In this study, travel time—rather than physical distance or mode of transportation—was used as the metric, which may better capture accessibility. Prior research in Bangladesh supports this finding, suggesting that physical distance is no longer a significant barrier to healthcare access (Mannan, 2013; Nurani et al., 2023). However, in Kenya, longer travel distances to public hospitals have been observed (Escamilla et al., 2018).

The type of illness is another critical determinant of healthcare-seeking behavior. Parents of children exhibiting symptoms such as diarrhea, respiratory infections, and pneumonia are more likely to seek care from qualified healthcare professionals than those whose children experience fever. This trend is corroborated by evidence from Ethiopia and Bangladesh, which shows a higher proportion of children with diarrhea receiving formal medical care compared to those with fever or cough (Alene et al., 2019; Ahmed & Yunus, 2020; Khasanah et al., 2023).

Additionally, delays in seeking treatment—defined here as five or more days—are associated with a greater likelihood of parents seeking qualified healthcare providers rather than non-qualified ones. Delayed treatment often worsens the child's condition, thereby increasing the necessity for professional medical care. Similar patterns have been documented in Tanzania and Ethiopia (Mhalu et al., 2019; Wellay et al., 2018).

Furthermore, children suffering from multiple illnesses are more likely to be taken to qualified healthcare providers compared to those with a single illness, reflecting the increased severity and complexity of their condition. Mothers who perceive their child's illness as severe are also more inclined to seek modern healthcare, as shown in studies from Ethiopia and elsewhere (Khan et al., 2018; Yeheyis et al., 2023).

Finally, the assumption of independence of irrelevant alternatives (IIA) in the multinomial logistic regression was tested using the Hausman test, with results presented in Table 4.

Table 4. Hausman test of IIA assumption (N=6670)

H ₀ : Odds (Outcome-J vs outcome-K) are independent of other alternative (L)				
Categories	Chi2	df	P>chi2	Evidence
Qualified healthcare provider (J)	3.139	24	1.000	for H ₀
Non-qualified healthcare provider (L)	10.742	24	0.991	for H ₀
Pharmacy/traditional/self-care (K)	-38.552	24	-	for H ₀

Note: df means degrees of freedom; H₀: null hypothesis

Regarding the Hausman test for the Independence of Irrelevant Alternatives (IIA) assumption, it is important to highlight that negative test statistics were frequently observed, as shown in Table 4. According to Hausman and McFadden (1984), such negative results can be interpreted as strong evidence supporting the validity of the IIA assumption. Additionally, the likelihood ratio (LR) and Wald tests conducted on the independent variables yielded statistically significant results, affirming their relevance in the model. The average variance inflation factor (VIF) was calculated to be 1.29, well below the commonly accepted threshold of 4, indicating no evidence of problematic multicollinearity among the predictors.

While this study utilizes data from the HIES 2016 survey, the socioeconomic factors influencing healthcare-seeking behavior (HSB) among children under five remain relevant in recent years, as supported by previous literature. Furthermore, a substantial proportion of mothers and caregivers in Bangladesh continue to seek care for their children from pharmacies, local, or unqualified healthcare providers (Akter, 2022; Ali et al., 2025), underscoring the ongoing importance of addressing healthcare access and quality in policy and practice.

5. Conclusion

This study's key findings highlight that predisposing factors (such as the child's age, mother's age, mother's education, and mother's earning status), enabling factors (including wealth index, place of residence, and distance to healthcare providers), and need factors (type of illness, treatment delay, and presence of multiple illnesses) significantly influence healthcare-seeking behavior (HSB) among children under five. Notably, children aged 3–5 years are more likely to receive care through pharmacies, traditional healers, or self-care compared to children aged 0–2 years, signaling the need for targeted interventions focusing on this older age group. The study found no significant association between a child's sex and HSB, aligning with some previous research. However, the positive association between children of earning mothers and the use of pharmacy/traditional/self-care warrants further investigation to understand underlying causes and inform relevant policy measures.

Despite Bangladesh's multi-tiered healthcare delivery system, disparities between rural and urban areas persist in accessing qualified healthcare for children. To address these inequalities, government policies should prioritize the enhancement of healthcare facilities in rural regions to match those available in urban centers. Additionally, organizing seminars and workshops to educate caregivers on the importance of seeking care from qualified healthcare providers can play a critical role in improving healthcare utilization. Raising public awareness about timely and appropriate management of childhood illnesses can further reduce neglect and mistreatment. Such efforts are essential to lowering under-five mortality rates and advancing progress toward the Sustainable Development Goals (SDGs).

Conflict of interest statement

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

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Authors' biodata

Shahnaz Haque is currently doing her Ph.D. in Economics at the School of Social Sciences, Universiti Sains Malaysia, 11800 USM, Penang, Malaysia and is a faculty member in the Department of Economics, School of Social Sciences, Shahjalal University of Science and Technology (SUST), Sylhet, Bangladesh (ORCID: 0000-0003-2768-1283). She completed her undergraduate and master's degrees in Economics from Rajshahi University, Bangladesh. Her areas of interest are development economics and health economics. She can be reached via email at shahnazh@student.usm.my and shahnaz31-eco@sust.edu.

Saidatulakmal Mohd, PhD is a Professor in Economics at the School of Social Sciences, Universiti Sains Malaysia, 11800 USM, Penang, Malaysia; Director, Institutional Planning and Strategic Centre (IPSC), Universiti Sains Malaysia; and Coordinator USM Initiatives on Ageing (USIA), Universiti Sains Malaysia, (ORCID: 0000-0002-7947-7324). Her main area of research is welfare economics, concentrating more on the well-being of the elderly and the roles of social protection. Other areas that interest her include development economics, tourism and heritage economics and public finance. She can be reached via eieyddda@usm.my.

Authors' contributions

Shahnaz Haque conceptualized the study, conducted data curation and analysis, and authored the original draft of this research. Saidatulakmal Mohd provided supervision throughout the research process and conducted a review of the writing and editing. Both authors contributed to the development of the methodology and formal analysis.



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