



The American Journal of Physical Education and Health Science (AJPEHS)

ISSN: 2992-9679 (ONLINE)

VOLUME 4 ISSUE 2 (2026)



PUBLISHED BY
E-PALLI PUBLISHERS, DELAWARE, USA

Socioeconomic Status and Access to Healthcare among Adults in Bangladesh: The Mediating Roles of Healthcare Affordability, Health Literacy, and Geographical Accessibility

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Article Information

Received: July 12, 2026

Accepted: September 23, 2026

Published: October 22, 2026

Keywords

*Geographical Accessibility,
Health Literacy, Healthcare
Access, Healthcare Affordability,
Socioeconomic Status*

ABSTRACT

This study aims to determine the association of perceived socioeconomic status with healthcare access among adults in Bangladesh and the mediation of healthcare affordability, health literacy and geographical accessibility. This was a quantitative cross-sectional survey design and the final sample consisted of 470 adults with health care need or use in the last 12 months. 26 five-point Likert-scale items were used to measure five reflective constructs. Partial Least Squares Structural Equation Modelling was used to evaluate measurement and structural models. Results indicate that both socioeconomic status and healthcare access have a positive association and strong association with all three mediators. Healthcare affordability, health literacy, and geographical accessibility all have a positive association with access to healthcare. The structural model accounts for 61.3% of the variance in access to healthcare and is valid in terms of its predictive relevance. All three specific indirect effects are statistically significant, showing some mediation. Geographical accessibility and health literacy are the next two areas with the most indirect impact, followed by healthcare affordability. The results show that socioeconomic factors are related to healthcare access in various economic, informational, and spatial ways. The study provides a framework for thinking about healthcare access inequality and provides concrete guidance on interventions that tackle both affordability and health literacy as well as physical access to healthcare in an integrated way.

INTRODUCTION

The availability of health services does not necessarily translate into access to health care. People also need to be able to pay for the care, comprehend health information, access the correct facilities and finish the recommended treatment. These requirements render the problem of access to health services a multi-dimensional social and economic problem (Hasan *et al.*, 2022). Socioeconomic status is especially significant, as household resources, educational status, job security, and financial security may affect the belief of the accessibility of health care services when needed. The relationship may take place through various pathways and not a single pathway for adults in Bangladesh who reside in various conditions in urban, semi-urban and rural areas.

Income, education, job status, distance, or service utilization is often used as a single predictor in studies of access to health care. This way may be able to describe individual disadvantages, but it can possibly not manifest how socioeconomic situation is translated into practical access. A family with low socioeconomic means might not be able to afford the consultation costs or to buy medications (Khan *et al.*, 2016). Households may have less access to and ability to understand accurate health information. It can also inhabit an area where duration of travel or reliability of transport or road surface conditions pose further obstacles. These are all economic, informational, and geographical mechanisms, which may happen together and could account for the variations in access despite the formal availability of these services by individuals of different socioeconomic backgrounds

(Md. A. Rahman *et al.*, 2021).

This current study creates a combined model where perceived socioeconomic position is directly related to access to health care and indirectly through other variables. The mediators which are studied include healthcare affordability, health literacy, and geographical accessibility. Healthcare affordability indicates how much people can afford to pay for consultations, medication, lab tests, transportation and other expenses without compromising on other basic household requirements. Health literacy is the knowledge, skills and understanding required to access, comprehend, assess, and apply health information in making health care decisions, including decisions about where and when to seek health care. Geographical accessibility considers the presence of adequate facilities at an adequate distance, time for access, reliability of transportation and travel conditions. Healthcare is viewed as an opportunity to get professional health care, proper services, necessary medicines, diagnosis, follow up and timely consultation in cases of need (Tanvir Ahmed *et al.*, 2020).

The study is structured at the level of adults who indicated that they either needed or used health care services in the last year. This criterion is nearer to the recent healthcare experience, rather than hypothetical perceptions. The final sample of 470 respondents is also significantly diverse, with respect to age, place of residence, education, employment status, earnings, health insurance, health condition, and use of health services and main provider. This change allows for a more general analysis of the suggested relationships in the study population. (Berete

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et al., 2023)

The study makes three contributions. For one, it provides an integration of economic, informational, and spatial mechanisms in a single PLS-SEM model. Second, it separates the direct links between socioeconomic status and access to health care from three specific indirect links. Third, it determines the relative empirical relevance of these pathways by means of the direct pathways, indirect pathways, explanatory power, predictive relevance and evidence from the measurement models. The goal of the research, therefore, is to understand if one's socioeconomic status is related to access to health care and to explore the degree to which affordability, health literacy, and geographical accessibility serve as mediators in the transmission of access.

LITERATURE REVIEW

Socioeconomic status and access to healthcare

Socioeconomic status is a person's or household's status in terms of financial resources, education, occupation, economic security and the level of personal living standards. In this study, the construct is viewed, not reduced to one unattainable end indicator (Salwa *et al.*, 2024). That's because there may be a disconnect between objective income or education and financial stress, feeling secure, or having the means to buffer against unforeseen costs. Thus, perceived socioeconomic status provides an overview of the perceived availability of practical resources to their families (Lilimadani, 2025).

Access to care is not limited to contact with service. Access to health services is meaningful when they are available to receive services within a reasonable time, access competent providers, have access to essential medicines and diagnostic services and when they can complete recommended treatment and follow-up (Susmita Das *et al.*, 2017). These activities can be facilitated by socioeconomic gain, which can expand resources for healthcare-related decisions and decrease the limitations around treatment. This first relationship in the framework thus suggests a positive correlation between socioeconomic status and access to healthcare (Hasan *et al.*, 2025).

H1: Socioeconomic status is positively associated with access to healthcare.

Socioeconomic status and healthcare affordability

The proposed model has a mechanism of affordability. There are multiple types of expenditures in healthcare. These include consultant fees, medication costs, diagnostic tests, transportation and indirect costs associated with seeking medical attention (Ahmed, 2025). Households can have a healthcare provider in place, however access can be limited if these costs are challenging to manage. The cost to an individual or family of paying for health insurance becomes a critical issue when other costs, such as for food, housing, getting an education or paying other bills, must compete (Sarker, 2025).

Given this capacity to absorb health care costs, perceived

socioeconomic status should be closely tied to this. Households who think that they are well-off and can cope with sudden changes are more likely to think that the costs of consultations, medicines, tests and travel are possible. An increase in affordability should, in turn, facilitate access to care and completion of treatment. The framework thus calls for an SES-to-affordability pathway and an affordability-to-access pathway (Biswas *et al.*, 2025).

H2: Socioeconomic status is positively associated with healthcare affordability.

H5: Healthcare affordability is positively associated with access to healthcare.

Socioeconomic status and health literacy

The informational pathway is health literacy. Access decisions rely on individuals' ability to find reliable information, to comprehend professional directions, to evaluate the credibility of various sources, to know when a problem warrants medical help-seeking, and to apply information in the decision-making process. These skills contribute to the synergic transformation of formal availability of health care into informed and timely use (M. Rahman *et al.*, 2024).

Socioeconomic position may be related to health literacy as it may encourage access to information, trust of information, and confidence in making health-related decisions. It should be noted that the present model does not assume that socioeconomic status (SES) is equal to health literacy (HL) (Stormacq *et al.*, 2023). Instead, it views health literacy as a unique skill that socioeconomic factors can be related to access to. An increase in health literacy should simplify it for people to access the right health services, understand what is required of them for treatment, and know when they need professional help (Jalel, 2024).

H3: Socioeconomic status is positively associated with health literacy.

H6: Health literacy is positively associated with access to healthcare.

Socioeconomic status and geographical accessibility

Geographical accessibility includes the spatial and transport dimension of access. It relates to the availability of an adequate facility within reasonable distance, the time required to reach the facility, availability of transport when needed, and road and travel conditions that allow the use of a health facility. Even when someone is willing to seek care, and knows they need it, these factors can limit access (Md Anayet Ullah, 2023).

Socioeconomic position might be correlated to geographical accessibility since household residential opportunities, transport availability and their ability to overcome distance will differ by household (Haque, 2024). Socio-economic circumstances that are relatively good may put less strain on travelling to suitable service locations, while those that are less favourable may make location and travel requirements more challenging.

Geographical accessibility is then likely to serve as another link between socioeconomic status and perceived access in practice (Islam, 2019).

H4: Socioeconomic status is positively associated with geographical accessibility to healthcare services.

H7: Geographical accessibility is positively associated with access to healthcare.

Mediating mechanisms

The direct association between socio-economic status and access to health services doesn't necessarily explain the dynamic of the association. Mediation analysis can be used to dissect the overall association into identifiable pathways (Chaudhary *et al.*, 2025). In the current context, healthcare affordability is the economic pathway linked to the information pathway is health literacy, while the spatial pathway is geographical accessibility. While each mediator is conceptually unique, they can all influence the capacity to translate socioeconomic resources into effective access to health care (Anoof Abdulla *et al.*, 2024).

Socioeconomic inequality is also interpreted in a more realistic fashion through mediation logic. Better access to health care services may be related to higher socioeconomic status in part because health care is more accessible (e.g., less expensive), information more available and more easily understood, and health care facilities more readily accessed (M. Rahman *et al.*, 2025). Should these indirect effects also exist although the direct path from SES to access shows significance, this pattern

would signify a partial mediation. If this were true, it would imply that the three mechanisms account for significant aspects of this relationship yet are not the only means by which it develops (Zafri *et al.*, 2021).

H8a: Healthcare affordability mediates the relationship between socioeconomic status and access to healthcare.

H8b: Health literacy mediates the relationship between socioeconomic status and access to healthcare.

H8c: Geographical accessibility mediates the relationship between socioeconomic status and access to healthcare.

Conceptual framework

There are five reflective constructs in the conceptual framework. Socio-economic status is the exogenous construct that is perceived. Three parallel mediators: healthcare affordability, health literacy, geographical accessibility. The last endogenous construct is access to healthcare. The model proposes one direct pathway from socioeconomic status to health care access, three pathways from SES to the mediators, three pathways from the mediators to health care access and three specific indirect pathways (Mitra & Mridha, 2023). This design allows us to simultaneously evaluate the individual association between socioeconomic status and access to health care, and whether this association occurs through economic, informational and geographical pathways. A summary of the hypothesized relationships is shown in figure 1.

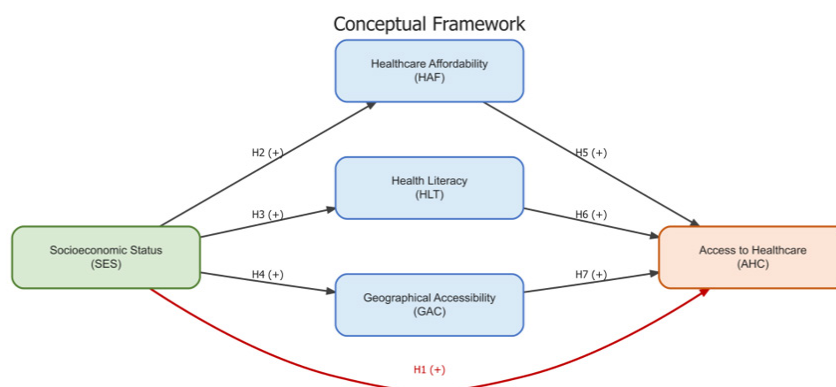


Figure 1: Conceptual framework of the study.

MATERIALS AND METHODS

Research design and population

The study was conducted on a quantitative basis, in the form of a cross-sectional survey. The study population comprised all adults (aged 18 years and older) in Bangladesh. Respondents had to also meet the following criteria to be eligible: they had to have had or used one or more health care services in the last 12 months. The screening conditions were designed to ensure that the participants were adults who had recent relevance in respect of accessing healthcare. 470 valid responses were received, enabling the practical feasibility of the dataset which was within the planned sample range and adequate

observations for proposing the PLS-SEM model (Earley, 2023).

The respondents were from both urban, semi-urban and rural areas and all the eight administrative divisions as was mentioned in the questionnaire. Demographic data included age, sex, marital status, area of residence, division, level of education, working status, household income, household size, health insurance coverage, and diagnosed chronic diseases, health care visitation, primary health care provider, and self-rated health status. These variables were used to characterize the sample and not to be a substitute of the latent socioeconomic-status construct (Zhang & Chen, 2022).

Instrument and measurement

A structured questionnaire was used to gather data. There were five multi-item reflective constructs, sociodemographic items and screening questions in the instrument. The level of agreement for all construct items was measured on a five-point Likert scale with a possible range of 1 = strongly disagree to 5 = strongly agree. Five items were used to assess the perceived socioeconomic status. Five items were used to measure healthcare affordability. There were five items measuring health literacy. Five items were used to measure geographical accessibility. Six items were used to measure access to healthcare. A total of 26 indicators were thus included in the final measurement model.

Socioeconomic-status items included evaluations of financial sufficiency, educational and occupational security, relative financial security, ability to manage unexpected expenses, and ability to lead an acceptable lifestyle. Affordability items included clinics visited, medicine, indirect costs, diagnostic testing, and the extent of the risk of health-care spending on essential household expenditure (Dr. Bhavanam Amarnath Reddy, *et al.*, 2023). Health-literacy items measured the ability to find, to understand, to make judgments about, and to use health information. Geographical-accessibility measured distance, travel time, transportation, road conditions, and the location of the facility. Items evaluated for healthcare access included timely and appropriate professional care, qualified consultation, timely completion of treatment, medicines, and diagnostic services.

Data quality and preliminary assessment

The analysis started with descriptive statistics such as mean, standard deviation, minimum and maximum value, skewness and kurtosis for all the measurement items. Construct level full-collinearity VIF values were used to determine common method bias. VIF values were used to assess indicator-level collinearity. Structural model collinearity was also checked for every predictor endogenous construct relationship. These checks were done prior to interpreting the structural paths (Kiyala, 2019).

PLS-SEM assessment procedure

Partial Least Squares Structural Equation Modelling was chosen due to the fact that this model estimated multiple reflective constructs, mediators in parallel fashion and some direct and indirect relationships. The analysis was carried out in two stages, logical steps. Firstly, the measurement model was assessed. Outer loading values were used to check the reliability of the indicators. Cronbach's alpha, rho_A and composite reliability were used to check internal consistency. Average variance extracted was used to examine the convergent validity. Heterotrait monotrait ratio and Fornell Larker criterion were used to test for discriminant validity (Andiappan & Wan, 2020).

Secondly, the structural model was tested. A measure of

predictor collinearity was assessed using inner VIF values. To measure the explanatory power, the R-squared and adjusted R-squared values were used. Evaluation of the predictive relevance was done by Q-squared values. Fit indices for composite-models comprised SRMR, d_ULS, NFI and RMS_theta. Standardized path coefficients, bootstrap means, bootstrap standard deviations, t-values, p-values, confidence intervals and f-squared effect sizes were used to evaluate direct hypotheses. The specific indirect effects and bootstrap confidence intervals were used to assess mediation.

Ethical and Analytical principles

Participation was voluntary. The questionnaire asked the respondents that they would not be identified, and that it would be used for academic research. Once age and residence eligibility was determined, completion of the questionnaire was considered voluntary consent. Results were analyzed in relation to statistical associations in a cross-sectional manner. As such, no temporal or causal relationships are inferred from the estimated paths. The focus is on the strength, meaning and explanatory contribution and mediation pattern of the observed relationships.

Hypothesis specification and interpretation

There were seven direct hypotheses and three specific mediation hypotheses tested in the structural model. H1 examined the direct SES-healthcare-access relationship. H2-H4 assessed the links between socioeconomic status and the three mediators. H5-H7 measured the associations between each mediator and healthcare access. H8a-H8c evaluated the specific indirect effects associated with these. Bootstrap t values, p values, and 95 percent confidence intervals provided in the output of the analysis were used to determine statistical significance. Along with significance, effect sizes were considered in order not to give interpretations solely based on the results of p-values that revealed a statistically detectable relationship (Andiappan & Wan, 2020). The mediation conclusion also considered if the direct SES-to-access relationship simply stayed significant after the mediators were included. Given this reflective modelling of all constructs, a validity assessment was directed at checking the consistency of indicators as indicators of their latent concepts. The overall procedure gave insights on the quality of the measures, the relationships among the constructs, and the extent to which the model accounts for predicts perceived healthcare access as well as the mechanisms between socioeconomic status and perceived access.

The original item structure in the research plan was maintained in the analysis. There was no one-to-one mapping of any indicator to any construct, and the demographic variables were not mechanically aggregated with the latent SES scale. This separation maintained the conceptual separation between perceived socioeconomic status and objective characteristics of the respondents.

RESULTS AND DISCUSSION

The results are listed in the same order as the PLS-SEM Assessment. The respondents and item distributions are first described, followed by the evaluation of common

method bias and the measurement quality, and then the structural model and the direct hypotheses and mediation effects are examined. All figures are from the final analysis of 470 respondents.

Table 1: Demographic and Socioeconomic Profile of Respondents.

Variable	Category	Frequency	Percentage
Age group	18–24 years	91	19.36
Age group	25–34 years	108	22.98
Age group	35–44 years	100	21.28
Age group	45–54 years	80	17.02
Age group	55–64 years	57	12.13
Age group	65 years or above	34	7.23
Gender	Male	226	48.09
Gender	Female	236	50.21
Gender	Other/self-described	5	1.06
Gender	Prefer not to say	3	0.64
Marital status	Unmarried	122	25.96
Marital status	Married	291	61.91
Marital status	Divorced/separated	23	4.89
Marital status	Widowed	34	7.23
Place of residence	Urban	188	40
Place of residence	Semi-urban	96	20.43
Place of residence	Rural	186	39.57
Administrative division	Barishal	34	7.23
Administrative division	Chattogram	74	15.74
Administrative division	Dhaka	91	19.36
Administrative division	Khulna	66	14.04
Administrative division	Mymensingh	51	10.85
Administrative division	Rajshahi	64	13.62
Administrative division	Rangpur	51	10.85
Administrative division	Sylhet	39	8.3
Education	No formal education	25	5.32
Education	Primary	70	14.89
Education	Secondary	121	25.74
Education	Higher secondary	142	30.21
Education	Undergraduate	76	16.17
Education	Postgraduate or above	36	7.66
Employment status	Full-time employed	121	25.74
Employment status	Part-time employed	35	7.45
Employment status	Self-employed	90	19.15
Employment status	Unemployed	47	10
Employment status	Student	45	9.57
Employment status	Homemaker	78	16.6
Employment status	Retired	54	11.49
Monthly household income	Below BDT 20,000	37	7.87
Monthly household income	BDT 20,000–39,999	94	20
Monthly household income	BDT 40,000–59,999	140	29.79
Monthly household income	BDT 60,000–79,999	114	24.26

Monthly household income	BDT 80,000–99,999	70	14.89
Monthly household income	BDT 100,000 or above	15	3.19
Health coverage	No coverage	260	55.32
Health coverage	Government support	72	15.32
Health coverage	Employer-funded coverage	69	14.68
Health coverage	Private insurance	43	9.15
Health coverage	Other	26	5.53
Chronic condition	Yes	165	35.11
Chronic condition	No	305	64.89
Healthcare visits during previous 12 months	None	33	7.02
Healthcare visits during previous 12 months	1–2 visits	211	44.89
Healthcare visits during previous 12 months	3–5 visits	129	27.45
Healthcare visits during previous 12 months	6–10 visits	72	15.32
Healthcare visits during previous 12 months	More than 10 visits	25	5.32
Primary healthcare provider	Public hospital/clinic	139	29.57
Primary healthcare provider	Private hospital/clinic	183	38.94
Primary healthcare provider	NGO clinic	32	6.81
Primary healthcare provider	Pharmacy/drug seller	86	18.3
Primary healthcare provider	Traditional provider	17	3.62
Primary healthcare provider	Other	13	2.77
Self-rated health	Very poor	4	0.85
Self-rated health	Poor	61	12.98
Self-rated health	Fair	213	45.32
Self-rated health	Good	164	34.89
Self-rated health	Very good	28	5.96
Household size	Mean = 4.19; SD = 1.38	470	100

Table 1 illustrates a varied sample by both demographic and socioeconomic factors. The age group of 25-34 years was the largest age group, whereas 7.23% were at the age 65 years or above. Respondents were comparable for

urban and rural areas. Over half lacked health insurance and 35.11% had a diagnosed chronic condition. The most commonly reported primary provider was private facilities (Jalel, 2024).

Table 2: Descriptive Statistics of Measurement Items.

Item	N	Mean	SD	Minimum	Maximum	Skewness	Kurtosis
SES1	470	2.945	1.192	1	5	0.054	-0.871
SES2	470	2.985	1.162	1	5	0.029	-0.858
SES3	470	3.066	1.174	1	5	-0.057	-0.845
SES4	470	3.081	1.185	1	5	-0.056	-0.889
SES5	470	3.136	1.169	1	5	-0.057	-0.813
HAF1	470	2.898	1.25	1	5	0.108	-0.972
HAF2	470	2.964	1.25	1	5	0.016	-0.982
HAF3	470	2.97	1.198	1	5	0.027	-0.895
HAF4	470	3.023	1.217	1	5	-0.03	-0.883
HAF5	470	3.009	1.232	1	5	0.038	-0.97
HLT1	470	3.049	1.211	1	5	-0.086	-0.902
HLT2	470	3.051	1.16	1	5	0.097	-0.874
HLT3	470	3.03	1.186	1	5	-0.004	-0.861
HLT4	470	3.138	1.179	1	5	-0.105	-0.866
HLT5	470	3.143	1.158	1	5	-0.065	-0.858

GAC1	470	2.817	1.157	1	5	0.195	-0.784
GAC2	470	2.834	1.191	1	5	0.133	-0.865
GAC3	470	2.828	1.184	1	5	0.15	-0.803
GAC4	470	2.885	1.17	1	5	0.032	-0.864
GAC5	470	2.96	1.154	1	5	0.004	-0.772
AHC1	470	2.902	1.264	1	5	0.108	-0.975
AHC2	470	2.902	1.259	1	5	0.063	-1.012
AHC3	470	2.994	1.292	1	5	-0.03	-1.02
AHC4	470	2.97	1.257	1	5	0.05	-1.009
AHC5	470	3.026	1.261	1	5	0.009	-0.971
AHC6	470	3.087	1.278	1	5	-0.114	-1.021

Table 2 shows that the mean for items tended to be around the middle of each 5-point scale. Means ranged from 2.817 for GAC1 to 3.143 for HLT5. Standard deviations varied between 1.15 and 1.29, representing significant

variation in responses. The reported indicators did not show extreme distributional pattern with small skewness values and negative but moderate kurtosis values.

Table 3: Common Method Bias Assessment

Construct	Full Collinearity VIF	Recommended Threshold	Assessment
SES	3.152	< 3.30	No serious common method bias
HAF	2.14	< 3.30	No serious common method bias
HLT	1.869	< 3.30	No serious common method bias
GAC	1.467	< 3.30	No serious common method bias
AHC	2.584	< 3.30	No serious common method bias

VIFs from full collinearity are in the range of 1.467 and 3.152 as reported in Table 3. All values were below the threshold of 3.30 which was used for the analysis. Therefore, no serious common method bias can

be detected at the construct level and the following measurement and structural estimates can be interpreted without worrying about problematic full collinearity (Hasan *et al.*, 2022).

Table 4: Indicator Loadings and Measurement-Model Collinearity.

Construct	Item	Outer Loading	Indicator VIF	Loading Assessment	VIF Assessment
SES	SES1	0.873	2.725	Acceptable	Acceptable
SES	SES2	0.854	2.484	Acceptable	Acceptable
SES	SES3	0.879	2.901	Acceptable	Acceptable
SES	SES4	0.867	2.647	Acceptable	Acceptable
SES	SES5	0.862	2.577	Acceptable	Acceptable
HAF	HAF1	0.878	2.856	Acceptable	Acceptable
HAF	HAF2	0.882	2.965	Acceptable	Acceptable
HAF	HAF3	0.888	3.078	Acceptable	Acceptable
HAF	HAF4	0.874	2.844	Acceptable	Acceptable
HAF	HAF5	0.876	2.864	Acceptable	Acceptable
HLT	HLT1	0.883	2.991	Acceptable	Acceptable
HLT	HLT2	0.861	2.575	Acceptable	Acceptable
HLT	HLT3	0.875	2.781	Acceptable	Acceptable
HLT	HLT4	0.886	2.89	Acceptable	Acceptable
HLT	HLT5	0.865	2.67	Acceptable	Acceptable
GAC	GAC1	0.873	2.768	Acceptable	Acceptable
GAC	GAC2	0.881	2.969	Acceptable	Acceptable
GAC	GAC3	0.86	2.616	Acceptable	Acceptable

GAC	GAC4	0.879	2.912	Acceptable	Acceptable
GAC	GAC5	0.874	2.823	Acceptable	Acceptable
AHC	AHC1	0.901	3.698	Acceptable	Acceptable
AHC	AHC2	0.888	3.375	Acceptable	Acceptable
AHC	AHC3	0.888	3.348	Acceptable	Acceptable
AHC	AHC4	0.882	3.241	Acceptable	Acceptable
AHC	AHC5	0.885	3.237	Acceptable	Acceptable
AHC	AHC6	0.884	3.248	Acceptable	Acceptable

As Table 4 shows, the indicators are well performed. All outer loadings were greater than 0.85 (with a range of 0.854 to 0.901). The range of Indicator VIF values was found to be between 2.484 and 3.698 and were

considered acceptable, as part of the analysis output. Thus the indicators indicated a good representation of the intended constructs in the absence of problematic measurement-model collinearity.

Table 5: Construct Reliability and Convergent Validity

Construct	Cronbach Alpha	rho A	Composite Reliability	AVE	Assessment
SES	0.918	0.918	0.938	0.752	Reliable and convergently valid
HAF	0.927	0.927	0.945	0.774	Reliable and convergently valid
HLT	0.923	0.923	0.942	0.764	Reliable and convergently valid
GAC	0.922	0.922	0.941	0.763	Reliable and convergently valid
AHC	0.946	0.946	0.957	0.789	Reliable and convergently valid

The internal consistency and convergent validity of Table 5 are high. Cronbach's alpha ranged from 0.918 to 0.946, composite reliability from 0.938 to 0.957, and AVE from 0.752 to 0.789. These indicate that items in each of

the constructs were very consistent and that constructs explain a large proportion of variance in their respective items (Lilimadani, 2025).

Table 6: Fornell-Larcker Criterion

Construct	SES	HAF	HLT	GAC	AHC
SES	0.867	0.702	0.655	0.461	0.703
HAF	0.702	0.88	0.458	0.355	0.63
HLT	0.655	0.458	0.874	0.282	0.575
GAC	0.461	0.355	0.282	0.873	0.543
AHC	0.703	0.63	0.575	0.543	0.888

The square root of AVE is shown on the diagonal of Table 6. For every construct, the diagonal value exceeded its correlations with the other constructs. The pattern thus demonstrates the discriminant validity in terms

of the Fornell-Larcker assessment and suggests that the constructs of SES, affordability, health literacy, geographical accessibility, and healthcare access were empirically different.

Table 7: Heterotrait-Monotrait Ratio of Correlations.

Construct	SES	HAF	HLT	GAC	AHC
SES	1	0.76	0.711	0.501	0.754
HAF	0.76	1	0.494	0.383	0.672
HLT	0.711	0.494	1	0.305	0.614
GAC	0.501	0.383	0.305	1	0.58
AHC	0.754	0.672	0.614	0.58	1

Table 7 is a second validity check of discriminants. The off-diagonal HTMT were all below 0.80 and in the range of 0.305 to 0.760. The largest value was in the SES and health care affordability interval. The overall pattern

provides sufficient separation between the five constructs and helps ensure that the structural paths are not due to construct redundancy.

Table 8: Structural-Model Collinearity Assessment.

Endogenous Construct	Predictor	Inner VIF	Assessment
HAF	SES	1	Acceptable
HLT	SES	1	Acceptable
GAC	SES	1	Acceptable
AHC	SES	2.975	Acceptable
AHC	HAF	1.975	Acceptable
AHC	HLT	1.754	Acceptable
AHC	GAC	1.274	Acceptable

The VIF values for the structural model were relatively low as seen in Table 8. The VIFs for SES predicting each mediator were 1 and the four predictors of healthcare access ranged from 1.274 to 2.975. This shows that there

was no high level of multicollinearity among the structural predictors and path coefficients were reasonably stable for interpretation (Salwa *et al.*, 2024).

Table 9: Explanatory Power and Predictive Relevance.

Endogenous Construct	R Squared	Adjusted R Squared	Q Squared	R2 Assessment	Predictive Relevance
HAF	0.492	0.491	0.489	Weak	Predictive relevance established
HLT	0.429	0.428	0.427	Weak	Predictive relevance established
GAC	0.212	0.211	0.209	Very weak	Predictive relevance established
AHC	0.613	0.61	0.602	Moderate	Predictive relevance established

As presented in Table 9, the model accounted for 49.2% of the variance in the healthcare affordability, 42.9% of the variance in the health literacy, 21.2% of the variance in geographical accessibility and 61.3% of the variance in healthcare access. The adjusted one was nearly the same

value. All Q-squared values were positive (including 0.602 for healthcare access), suggesting that each endogenous construct in the model was relevant to the problem of prediction.

Table 10: Composite-Model Fit.

Fit Index	Value	Recommended Criterion	Assessment
SRMR	0.018	< 0.080	Acceptable
d_ULS	0.003	Lower values indicate better fit	Report value
NFI	0.999	> 0.900	Acceptable
RMS_theta	0.018	< 0.120	Acceptable

The composite-model fit indices listed in Table 10 demonstrated acceptable fit to the criteria listed in the analysis. SRMR was 0.018, NFI was 0.999, and RMS_theta was 0.018. The d_ULS value was 0.003. These statistics combined suggest that the model developed in the study was well estimated within the assumed PLS-SEM assessment framework and the observed relationships were well reproduced.

Table 11 presents the results of all seven direct hypotheses, which were all significant at $p < .001$. The

highest path was SES to health care affordability ($\beta = 0.702$), the next was SES to the health literacy ($\beta = 0.655$), and SES to geographical accessibility ($\beta = 0.461$). Geographical accessibility ($\beta = 0.273$), SES ($\beta = 0.262$), affordability ($\beta = 0.253$) and health literacy ($\beta = 0.211$) had positive association with healthcare access. None of the bootstrap confidence intervals included 0. The standardized path coefficients and R-squares are estimated and presented as a pictorial representation in Figure 2.

Table 11: Direct-Effect Hypothesis Testing.

Hypothesis	Path	Beta	Bootstrap Mean	Bootstrap SD	T Value	P Value	CI 2.5 Percent	CI 97.5 Percent	F Squared	Significance	Decision
H1	SES -> AHC	0.262	0.261	0.048	5.417	0	0.168	0.356	0.06	***	Supported
H2	SES -> HAF	0.702	0.701	0.03	23.441	0	0.643	0.759	0.97	***	Supported
H3	SES -> HLT	0.655	0.656	0.033	19.992	0	0.59	0.718	0.753	***	Supported
H4	SES -> GAC	0.461	0.46	0.039	11.68	0	0.383	0.537	0.27	***	Supported
H5	HAF -> AHC	0.253	0.253	0.039	6.553	0	0.178	0.328	0.084	***	Supported
H6	HLT -> AHC	0.211	0.21	0.038	5.506	0	0.135	0.285	0.065	***	Supported
H7	GAC -> AHC	0.273	0.274	0.03	9.05	0	0.215	0.333	0.151	***	Supported

Table 12: Specific Indirect Effects and Mediation Testing.

Hypothesis	Indirect Path	Indirect Effect	Bootstrap Mean	Bootstrap SD	T Value	P Value	CI 2.5 Percent	CI 97.5 Percent	Mediation Type	Decision
H8a	SES -> HAF -> AHC	0.178	0.177	0.029	6.037	0	0.121	0.237	Partial mediation	Supported
H8b	SES -> HLT -> AHC	0.138	0.138	0.026	5.227	0	0.088	0.192	Partial mediation	Supported
H8c	SES -> GAC -> AHC	0.126	0.126	0.018	6.958	0	0.093	0.162	Partial mediation	Supported

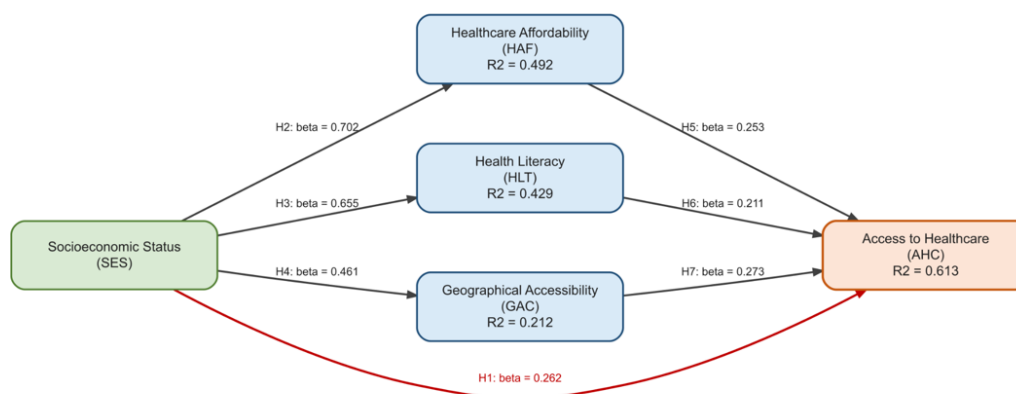


Figure 2: PLS-SEM structural model with standardized path coefficients and R² values.

Table 12 shows three statistically significant specific indirect effects. The pathway with the highest beta was affordability (0.178) followed by health literacy (0.138) and geographical accessibility (0.126). For each a 95%

bootstrap confidence interval did not contain 0. The three mechanisms were considered partial mediators as the direct SES-to-access path was also important.

Table 13: Summary of Hypothesis-Testing Results

Hypothesis	Relationship	Effect	P Value	Decision
H1	SES -> AHC	0.262	0	Supported
H2	SES -> HAF	0.702	0	Supported
H3	SES -> HLT	0.655	0	Supported
H4	SES -> GAC	0.461	0	Supported
H5	HAF -> AHC	0.253	0	Supported
H6	HLT -> AHC	0.211	0	Supported
H7	GAC -> AHC	0.273	0	Supported
H8a	SES -> HAF -> AHC	0.178	0	Supported
H8b	SES -> HLT -> AHC	0.138	0	Supported
H8c	SES -> GAC -> AHC	0.126	0	Supported

Table 13 provides a summary of the hypothesis decision. All the H1-H7 and H8a-H8c were sustained. The pattern suggests that there is a direct link between SES and access to healthcare services and three indirect links that occur simultaneously. Evidence thus favours a complete conceptual framework of economic, informational and geographical mechanisms of access to healthcare.

Discussion

The results offer a clear reason for the relationship of socioeconomic status and healthcare utilization of the adults surveyed. A direct pathway between the perceived SES and access also remained positive and significant after three mediators were included. This indicates that whilst affordability, health literacy and geographical accessibility are important aspects of the relationship, they are not enough to account for it. There seems to be a residual association between socioeconomic positions and having access to basic services, medicines, diagnostics, and follow-up of adequate professional care (Ahmed, 2025). There was the most significant structural association in the model of socioeconomic status and healthcare

affordability. This is a conceptual match to measurement of socioeconomic status. Those who felt more financially secure, felt they could pay for unexpected costs better, and reported a more acceptable standard of living also were more likely to state that they could afford consultations, medicines, tests, transport, and indirect healthcare costs. There was then a positive correlation between affordability and access (Md. A. Rahman *et al.*, 2021). Specific indirect effect was the greatest out of the three mediation pathways. The finding suggests that financial manageability is a key mechanism linking socioeconomic position with access to health care.

Health literacy was as well a significant mediator. There were strong socioeconomic associations with the ability to find reliable information, to understand professional instructions, to assess trustworthiness, to recognise a need for professional care and to use information for care-seeking decisions. Health literacy was then found to be positively associated with access to health care. This pathway suggests there are factors that may be causing a disparity in access that is not simply a financial or geographical issue. Information literacy and the ability to

make informed health care decisions is a different path between socioeconomic status and access (Stormacq *et al.*, 2023).

Geographical accessibility resulted in a different pattern. Geographical accessibility accounted for the highest direct association with accessing healthcare as compared to the other two mediators, socioeconomic status and health literacy. This is an important difference. The lower R-squared for geographical accessibility could be due to location or transport conditions being shaped by a variety of determinants aside from socioeconomic position (Susmita Das *et al.*, 2017). However, once access is made possible, there is a strong link between respondents' ability to receive the healthcare they require and reasonable distance, travel time, transport reliability, and road conditions.

The variance accounted for by the model was 61.3 % and the Q-square value for access is 0.602. These results suggest the basic combination has significant explanatory power for the sample studied and maintains predictive content. The remainder of the variance that is not accounted for indicates that the four predictors in the model do not fully explain access to healthcare. Other dimensions could be service quality, provider availability, cultural acceptability, household decision-making, perceived need, administrative barriers, the trust in providers or previous healthcare experiences. The present data set does not include measurements of these factors and inferences of their contributions should be made with caution (Chaudhary *et al.*, 2025).

The results of the measurements support the interpretation of the structural results. High reliability, strong loadings, high AVE values and acceptable discriminant validity were obtained for all constructs. Moreover, the common method bias and structural collinearity tests indicated no significant issue based on the analytical criteria (Young *et al.*, 2006). It was thus necessary to show that all five constructs were empirically distinguishable as part of the measurement structure to determine the significance of the mediation effects. The overall findings contribute to a complex view of access to healthcare, in which socioeconomic resources have multiple roles (financial, informational, physical).

One other insight relates to the presence of direct and indirect effects. Even when affordability, health literacy, and geographical accessibility were added to the model, the direct SES-to-access coefficient remained at 0.262. In addition to the direct pathways measured in this residual relationship, a socioeconomic position may affect access. Those mechanisms are not identified in the present analysis, but it should be noted that the result warns against relying on any one mediator as a full explanation on the socio-economic disparities in accessing healthcare (Susmita Das *et al.*, 2017).

There is also nuance in the relative effect sizes. SES was characterized by very big f-square on affordability of healthcare and health literacy and relatively smaller on geographical accessibility. The reported f-squared was

more modest for the four direct predictors of healthcare access with the highest f-squared for geographical accessibility. This profile suggests that socioeconomic status is a strong influence on the mediators, while access to care is influenced by a combination of things. That is, no one predictor dominates the model. The explanatory power is closely related to its multi-channels, each of which objectively affects the final outcome.

Theoretical and Practical Implications

The study contributes to research of health care access because it considers three mediating mechanisms in parallel: and does not view socioeconomic status as a single predictor. Results indicate that geographical accessibility, health literacy and affordability each account for a large part of the SES-access relationship. This integrated nature makes clear that socioeconomic inequalities can take a number of different forms simultaneously.

In practice this means that it is possible to target one barrier without addressing another. While financial protection can enhance affordability, people may still face informational and/or geographical barriers. Even good health-literacy programs can be of limited benefit if medicines, diagnostics, or transport is inaccessible or too expensive. Distance may be decreased with facility expansion, but access is not complete if households are unable to afford care. Results thus lend themselves to coordinated approaches involving cost protection, understandable and reliable health information, and to increased physical access to the right services. The relatively high mediation effect by affordability indicates a need to focus on the cost of consultations, medicines, diagnostic tests and indirect travel costs (Abdullah *et al.*, 2018).

The model also indicates that utilisation count should not be the sole indicator for monitoring when planning services. A person could have contact with a provider and still have difficulties accessing or paying for diagnostics, understanding instructions, accessing appropriate facilities, and/or follow-up. It is, therefore, important that measurements of access reflect the circumstances that influence the usability of care (Berete *et al.*, 2023). The five-construct framework offers a brief and concise structure to monitor such changes and can be modified for comparisons between residence types or socioeconomic groups.

Limitations and Future Research

There are several limitations to the study. It is a cross-sectional design that reveals associations and is not able to establish temporal or cause-effect relationships. The constructs were assessed based on self-reported perceptions and therefore the results are based on the respondents' assessment and not any independently verified financial, informational or travel environment. Despite variation in demographic groups and across all eight divisions, the sample is not nationally representative. Future research should incorporate longitudinal designs,

probability sampling, objective travel or expenditure measurement, and provider-type and subgroup analysis based on residence and income levels, chronic-condition status. Other mediators can also be assessed to account for other unexplained variance in health care access.

The mediation estimates should also be considered statistical decomposition within one survey wave. They cannot be used to establish if socioeconomic status changed prior to the mediators or if the mediators changed prior to healthcare access. Future research may further boost temporal interpretation by collecting measures of socioeconomic status first and affordability constraints, information use, travel characteristics and healthcare use second, and then follow them over a period.

CONCLUSION

The present study shows that perceived SES is a positive factor for the access health of the adults of the surveyed villages of Bangladesh. The impact is both direct and indirect via health care affordability, health literacy and geographical access. All seven direct hypotheses were supported along with all three mediation hypotheses. The mediator with the strongest direct association with access to health care was geographical accessibility, and the one with the largest specific indirect effect was affordability. The model accounted for 61.3% of the variance in access to healthcare and was positively predictive.

The results suggest that inequality in access to health care must be considered more than just an inequality in resources at the household level. Socioeconomic factors relate to affordability of care, the ability to interpret and utilize health information and access of appropriate health services. Policies and service strategies that enable them to tackle these dimensions are thus more likely to be consistent with the observed pattern than stand-alone interventions. Combining all the above, the proposed framework provides a specific starting point for further research on multidimensional healthcare access and socioeconomic inequality in Bangladesh.

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