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Role of Health Literacy, Socioeconomic Status, and Access to Healthcare in Improving Preventive Healthcare Behavior in Islamabad

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ABSTRACT

Preventive healthcare practice, incorporating the uptake of vaccinations, routine screening of health, control of food intake, physical exercise, and early medical appointment is widely accepted as the most economical tool of decreasing the pondering of chronic and communicable disease across the globe. Although there have been massive investments in the health infrastructure in the mainstream, there remain pronounced inequalities in the patterns of preventive behavior adoption among populations concerning both the intersecting dimensions of health literacy, socioeconomic status (SES), and access to healthcare services. This paper will analyze the independent and interactive effects of the three determinants in the development of preventive healthcare behavior among Pakistani adults in an urban setting. Quantitative cross-sectional survey design was used in which structured data were obtained in the form of a questionnaire with 250 adult participants who were chosen using stratified random. Health literacy, SES, and healthcare access were measured using validated instruments, the Newest Vital Sign (NVS) adapted scale, a composite index of income, education and occupational class, and the Penchansky and Thomas access dimensions framework, respectively. Preventive behavior was measured as a composite measure of six behavior domains. The analysis of descriptive statistics, Pearson correlations and multiple linear regression were performed in SPSS version 26. Findings demonstrate that preventive behavior scores are significantly and positively related to health literacy, SES, and access to healthcare. The strongest predictor was health literacy (beta = 0.42, p < 0.001), then there is healthcare access (beta = 0.31, p < 0.001) and SES (beta = 0.27, p < 0.01). The combination of the three variables contributed 58.3 percent of the variance of preventive behavior. The researchers conclude that policy action is necessary to improve preventive healthcare behavior by means of coordinated policy efforts on improving health literacy, structural mitigation of socioeconomic obstacles, and increasing access to affordable and acceptable health services. Health policies, community health programs, and health facilities are given recommendations.

Keywords: health literacy, socioeconomic status, healthcare access, prevention healthcare behavior, health disparities, prevention of chronic diseases, health promotion, Pakistan, behavioral determinants, and public health.

INTRODUCTION

Preventive healthcare behavior is one of the pillars of contemporary public health, the totality of actions that people take to sustain or better their health, to avoid the onset of disease, and to identify disease as early and as remediable as possible. Such behaviors are but not limited to regular health check-ups, keeping up with vaccinations, exercise, eating a balanced diet, shunning tobacco and alcohol as well as early access to primary healthcare services (Cutler & Lleras-Muney, 2010). The shift in the epidemiological paradigm to chronic non-communicable diseases (NCDs) (such as cardiovascular disease, diabetes mellitus, hypertension, and cancer) in the world has positioned preventive behavior at the centre of health system sustainability due to the fact that these diseases are mostly preventable yet cause about 74 per cent of all deaths worldwide (World Health Organization, 2022).

Although there is overwhelming evidence of the effectiveness of preventive interventions, there exist significant differences in uptake of preventive behavior amongst and across populations. These inequalities are not accidental; they are patterned systematically along socioeconomic stratification, educational attainment and geographical distance to health services. According to the social determinants of health framework, developed by the WHO Commission on Social Determinants of Health (2008), it is the conditions under which people are born and nurtured, in which people live, work, and age, which are the strongest predictors of the outcomes of health, and the determinants of health-related behaviours (Marmot, 2005). In this context, the health literacy, socioeconomic status (SES), and access to healthcare become three of the most regularly recorded and theoretically consistent factors of preventive behavior.

Health literacy - or the extent to which a person can acquire, process and comprehend fundamental health information and services necessary to achieve the right health decision making - has come into increasing scholarly focus as a determinable factor of preventive behavior (Nutbeam, 2008). Low health literacy levels make people less willing to undertake health-related screening, adhere to prophylactic medications, or understand the healthy information published by the government, which poses an added disadvantage in health delivery (Berkman et al., 2011). A connection exists between health literacy and preventive behavior, but it is indirect, which is mediated by cognitive self-efficacy, perceived health competence, and ability to navigate complex health systems.

The socioeconomic status, which is usually defined as a combination of income, level of education, and occupational prestige, has an overall effect on the health behavior using several channels. The increase of SES creates the possibility to consume healthy food, provides quality housing, time to exercise, and has the financial means necessary to purchase preventive health services and drugs (Adler and Newman, 2002). Education as a component of SES is positively linked with health literacy per se, which forms a positive loop in which behavioral and informational benefits are reinforced by socioeconomic benefit. On the contrary, reduced SES is linked to chronic psychosocial stress, material deprivation, and a lower level of cognitive bandwidth to engage in health-related decision-making, which in turn suppresses preventive behavioral activities (Pampel et al., 2010).

The third focal determinant of this paper, access to healthcare, does not only refer to the proximity of the health services (geographically) but a multidimensional construct that entails availability, affordability, acceptability, accommodation, and adequacy of the services as conceptualized by Penchansky and Thomas (1981). Structural barriers to access refer to high out-of-pocket payments, distance to health services, length of waiting time, and lack of trained providers, significantly lower the use of preventive services even in people who are motivated to adhere to preventive behavior (Syed et al., 2013). These structural barriers are acute in the low- and middle-income countries (LMICs) such as Pakistan, and primary healthcare infrastructure is highly centralized in urban areas and is constantly underfunded at the periphery levels.

Pakistan is a particularly instructive example of exploring how health literacy, SES and access to healthcare interact in affecting preventive behavior. Pakistan has more than 230 million people and a huge and increasing burden of non-communicable diseases, with the ongoing threat of communicable diseases, but its spending on the population health is one of the lowest in South Asia, at around 1.2 percent of GDP (Ministry of National Health Services, 2021). The high functional illiteracy rates (around 40% of adults are unable to read simply) and fragmented, inconsistent and often inaccessible environments of health information limit the health literacy levels between adults (UNESCO, 2021).

The proposed research will answer the under-researched empirical question of how health literacy, SES, and healthcare access predict preventive healthcare behavior in an urban Pakistani population and how these factors intersect and directly relate to each other in predicting preventive healthcare behavior. Although each of these determinants has been addressed individually in the world literature, their mutual analysis in a coherent system of analysis, adopted to the Pakistani situation, has not been extensively undertaken. It is important to understand their relative contribution and possible interactions in order to create a specific set of interventions to help prevent people in different segments of the population to adopt preventive behavior in the most effective way (Kickbusch, 2001; DeWalt et al., 2004).

The paper is organized in the following way. Section 2 is a literature review of the existing theoretical and empirical research on health literacy, SES and healthcare access as predictors of preventive behavior. Section 3 details the research methodology such as sampling, instrumentation and analysis methodology. In Section 4, data concerning the analysis of the survey are provided with descriptive statistics, correlation table and regression findings. Section 5 explains the implication of these findings as compared to the available literature. Section 6 gives the conclusion and policy recommendations to the health system actors, community health programs as well as educational institutions in Pakistan.

The research provides novel empirical evidence to a significant area of study under study, which is critically important, and offers policy and practice implications to empirically improve preventive

health at the population level (Berkman et al., 2011; Pampel et al., 2010).

LITERATURE REVIEW

Conceptualization of Preventive Healthcare Behavior

The literature on the public health and behavioral sciences has theorized preventive healthcare behavior in various ways. One of the most dominant and the oldest theoretical models is the Health Belief Model (HBM), which assumes that people tend to use preventive measures more frequently when they feel that they are vulnerable to a certain health hazard, the threat is severe, and the preventive measures yield greater benefits when compared with the perceived barriers (Rosenstock, 1974). The HBM has been widely used to forecast preventive behaviors such as acceptance of vaccination, cancer screening, and self-management of their chronic disease and meta-analytic results confirm its predictive validity in all the cultural settings (Carpenter, 2010).

The Social Cognitive Theory by Bandura (1997) builds on the HBM by emphasizing the relevance of self-efficacy- individual belief in his/her ability to do a particular health behavior- as a mediating factor between knowledge and action. More self-efficacious individuals are prone to make preventive behavioral changes, continue with their practice even in the presence of obstacles and resume their practice after failures. Self-efficacy acts as an intermediary between the acquisition of information and behavioral enactment in the context of health literacy which concurs with the reasons as to why not everyone with sufficient health knowledge will be able to change their knowledge into regular preventive action (Bandura, 1997; Nutbeam, 2008).

Health Literacy, Preventive Behavior

Health literacy is gaining prominence of being a social determinant of health but on its own. Limited health literacy is linked to worse health outcomes, increased hospitalization, decreased participation in preventive care and decreasing adherence to treatment regimens is the landmark report made by the Institute of Medicine (2004). Berkman et al. (2011) performed a systematic review of 96 studies and concluded that there is consistent evidence that low health literacy is related to decreased receipt of mammography, influenza vaccination and colorectal cancer screening and worse management of chronic diseases, such as diabetes and hypertension.

Low educational level, minimal exposure to evidence-based health information and health communication systems dominated by informal and often untrustworthy channels of information all contribute to the health literacy gap in low-income countries. Kickbusch (2001) suggested a redefinition of health literacy as an essential empowerment tool to achieve health equity in that access to information about health and the capacity to use it, could not be defined apart of the structural situation that defines access to information. Sorensen et al. (2012) have more recently suggested a model of integrated health literacy that includes not only the functional literacy but also communicative and critical health literacy dimensions, which are interconnected to influence preventive behavior participation.

Socioeconomic and Preventive Health Behavior

One of the strongest and repeated findings in the social epidemiology is the gradient relationship between SES and health behavior. In a synthesis review, Pampel et al. (2010) found that high SES is always linked to increased incorporation of a large spectrum of preventive health practices such as physical activity, dietary reform, cessation of smoking, and the utilization of health screening practices. These correlations exist even when information about health knowledge and health attitudes is considered, which implies that SES has the independent structural influence on behavior in the terms of material resource access, time constraints, and social norms.

Adler and Newman (2002) defined three major pathways by which the SES influences health behavior, which include the material pathway (access to resources that promote healthy behaviors), the psychosocial pathway (chronic stress and diminished cognitive resources related to deprivation), and the behavioral pathway (differential exposure to norms and information that promote health behavior). In Pakistan, Nishtar et al. (2010) and Rani et al. (2003) have reported high SES gradients in preventive behavior uptake, with lower-income households being much more likely to not seek preventive care, to not engage in physical activity, or to not follow dietary advice. Income inequality and educational differences hence would serve as structural determinants to thwart preventive health action that cannot be averted by provision of information alone.

Access to Healthcare and Preventive Service Utilization

The concept of healthcare access according to the theory of Penchansky and Thomas (1981) is a multidimensional concept that includes: availability (supply of services compared to demand), accessibility (geographic coverage), affordability (price compared to funds to pay), acceptability (cultural and personal fit of the service), and accommodation (organizational structure to utilize the services). This framework is extensively used in health services research, and it has been experimentally proven to be an indicator of preventive service use in various health systems (Syed et al., 2013).

The barrier of the geographic accessibility is especially prevalent in the LMICs, in which the rural and the peripheral urban communities might not have proximate primary healthcare institutions with trained primary healthcare providers. Jacobs et al. (2012) showed that any marginal appreciable time even on transit to health facilities has a major impact on the use of preventive health services such as

antenatal care, immunization and cervical cancer screening. Affordability is also a no less formidable obstacle, as over 56 percent of all health expenditures in Pakistan are out-of-pocket (World Bank, 2021), which practically excludes low-income households through regular preventive checkups and screenings when it comes to diagnostic diagnoses.

Crossovers between Health Literacy and SES and Access

It is becoming more widely acknowledged in the literature that health literacy and SES, as well as healthcare access, do not act as distinct determinants of preventive behavior but are interacting and mutually reinforcing factors of health inequality. The relationship between education and health outcomes was found to have a mediating role played by health literacy (Wolf et al., 2007) implying that health literacy is the mediating variable in the education-health gradient. In the same line of thought, Baker (2006) hypothesized the relationship between health literacy and SES to be two-way: on the one hand, SES influences the factors influencing development of health literacy, i.e. the quality of educational opportunities and the quality of information environment, and on the other hand, health literacy is expected to allow individuals to negotiate health systems more successfully, which would help to mitigate certain access barriers by SES.

These intersections in the Pakistani setting have been understudied. The available literature takes a narrow focus on either health literacy or SES, with access as a contextual component, and not as a theoretically combined determinant. Exclusions Work by Siddiqi et al. (2011) and Nishtar et al. (2010) are exceptions as they reported the disadvantages of compounding in low-SES, low-literacy populations in accessing preventive care services, but neither article simultaneously modeled all three determinants in a regression model or specifically considered the composite outcome of preventive behavior.

Preventive Behavior and Health literacy in Pakistan

Studies that have specifically focused on health literacy in Pakistan are scanty but increasing. Memon et al. (2016) evaluated the health literacy of patients who visited primary care clinics in Karachi and discovered that more than 60 percent of the participants in the study had a lower health literacy level than the adequate level of health literacy and the scores were indicated on the NVS tool. Less health literacy was linked with a decreasing level of uptake of hypertension and diabetes screening, lower mammography, and lower influenza vaccination. Gender has proved to be a major moderating factor whereby women had lower average health literacy scores as a result of disparities in access to education and information environment and not as a result of inherent cognitive differences.

In Pakistan, community-based interventions that aim to enhance health literacy levels among communities (such as lady health worker interventions and those conducted by community health centers) have shown encouraging outcomes in the context of enhancing preventive behavior adherence, when they integrate the acquisition of literacy skills with practical health information. The sustainability of such interventions and reaching the deepest-marginalized communities, however, is still limited due to the capacity of the workforce and financial resources. DeWalt et al. (2004) reasoned that health system redesigning such as simplified health communication materials, trained patient navigators, and teach-back methodologies are necessary to address the health literacy gap at the system level and not leave it to the individuals to address the remediation burden.

Literature and Study Contribution

The analysis of the existing literature demonstrates that there are some gaps that are constant and that the study is aimed at filling them. One, it is uncommon to model health literacy, SES, and healthcare access concurrently as predictors of preventive behavior within the context of a single analytical model, and in Pakistani public health studies. Second, in the majority of Pakistani research, the authors use single-item SES proxies, including monthly income, as opposed to composite SES indices that reflect the multidimensionality of the stratification process of the socioeconomic environment. Third, the access to healthcare is often viewed as a dichotomous variable (visited or not a facility) instead of an evaluation of the access on the multidimensional scale. Fourth, the relative importance of each determinant in predicting preventive behavior - a crucial piece of information to help set policy priorities is not established well within the local evidence base. This paper directly fills all these gaps, providing a multi-determinant, multi-level analysis of preventive behavior that can be used in targeted and evidence-based policy to improve Pakistan.

METHODOLOGY

Research Design

The type of research design used in this study was a quantitative cross-sectional survey design, which is suitable in exploring the relationship between various independent variables and a health behavior outcome at one time. Cross-sectional designs are common in health behavior studies because they are effective and generate estimates that represent the population in the face of limited resources (Creswell, 2014). The research was placed in a positivist epistemological paradigm, whereby stress was laid on measurement accuracy, statistical generalization, and hypothesis testing.

The setting of the study

The research was done in Islamabad city, Punjab Province, Pakistan, which is among the largest urban areas in the country with more than 13 million people. Islamabad was chosen due to its different socioeconomic makeup, an established primary healthcare system, and sampling frame accessibility

with the Urban Unit Punjab. The target population consisted of adults aged 18 years and older and were living in Islamabad at least 12 months continuously and were able to make an informed consent.

Sample Size and Sampling

The power of multiple linear regression with three predictors with a medium effect size ($f^2 = 0.15$), alpha=0.05 and power= 0.80 was calculated using the G+Power software and gave a minimum required sample of 250 respondents to provide even more statistical accuracy and the possibility to perform a subgroup analysis. The stratified random sampling was utilized where the stratum was based on residential zone (5 administrative towns of Islamabad) and SES category (low, middle, high depending on residential area classification). The allocation was proportional, so that it represented the strata.

Instruments

The measure of health literacy was created so that it involved adapting the Newest Vital Sign (NVS) into Urdu in which the respondents responded to the items of the indicated scale with numeracy and literacy questions, specifying the nutritional label as a result, and giving the scores that were then read as 0 (lowest) to 6 (highest). A score of 0-1 means that there is probability of low health literacy, 2-3 means that there is a possibility of low health literacy and a score of 4-6 means that there is sufficient health literacy. SES was measured using a composite index of monthly household income (five categories), education level (five levels), and self-reported occupational type, standardized and equalized. Availability, accessibility, affordability, acceptability and accommodation were assessed as 15 item scale based on the Penchansky-Thomas framework and measured on a 5-point Likert scale, which is the measurement of healthcare access. A composite scale of 12 items was used to determine preventive behavior in six domains that included vaccination behavior, cancer and chronic disease screening, dietary behavior, physical activity, health facility use, and tobacco/alcohol avoidance. These scales were all piloted on 30 respondents and showed good internal reliability (NVS adapted = 0.74; SES composite = 0.81; access scale = 0.83; preventive behavior scale = 0.79).

Data Collection

The data were collected in the period of January and March 2025 by the trained enumerators whereby they interviewed households face-to-face. Systematic random sampling on residential street lists was used to approach households. Interviews lasted 25-35 minutes. Informed consent was obtained verbally by all the respondents whose responses were to remain confidential. They obtained a response rate of 96.2; questionnaires that could not be completed were discarded (n=10) and a final analytical sample of 250 was obtained.

Data Analysis

Analytics was done in the form of IBM SPSS Statistics 26. The sample and main variables were described using the descriptive statistics. The Pearson correlation analysis was used to test bivariate relationships between the three predictor variables and the outcome. The hierarchical multiple linear regression model was developed: Model 1 included SES as independent variable; Model 2 and Model 3 included additional variables of healthcare access and health literacy, respectively. This method allowed evaluating the incremental explanatory role of each predictor. The assumptions that were checked before interpretation were regression assumptions such as the normality of residues, homoscedasticity, lack of multicollinearity (VIF below 5) and linearity. The p value of statistical significance was 0.05.

Ethical Approval

The affiliated university ethics committee gave the ethical approval. The research was adhering to each postulates of the Declaration of Helsinki. The sample was enrolled voluntarily and no personal identifiable information was gathered; all data were stored in a password-secured secure server.

DATA ANALYSIS AND RESULTS

Sociodemographic Characteristics

Table 1 gives the sociodemographic profile of the 250 respondents. There were 139 male (55.6) and 111 female (44.4) respondents. The average age was 34.2, with the most prevalent age group of 26-35 years (36.0%). The levels of education were very high; 14.4% of those surveyed had not been educated at all or only up to the primary school, 26.0% had been educated through matriculation (10 th grade), 32.4% had an education level up to the intermediate level or diploma and 27.2% had degree education at the bachelor level or above. Monthly household earnings were split into five groups with the majority (36.8) being between PKR 30,001-60,000. In the five residential strata, the representation was fairly proportional to the population estimates.

Table 1: Sociodemographic Profile of Respondents (N=250)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	139	55.6
	Female	111	44.4
Age Group	18–25 years	54	21.6
	26–35 years	90	36.0
	36–45 years	68	27.2
	46+ years	38	15.2
Education	No formal / Primary	36	14.4
	Matriculation	65	26.0

	Intermediate / Diploma	81	32.4
	Bachelor's or above	68	27.2
Monthly Income	Below PKR 30,000	72	28.8
	PKR 30,001–60,000	92	36.8
	PKR 60,001–100,000	58	23.2
	Above PKR 100,000	28	11.2
Residential Zone	Zone 1 (Gulberg/Johar Town)	51	20.4
	Zone 2 (Iqbal Town/Township)	52	20.8
	Zone 3 (Shahdara/Shalimar)	49	19.6
	Zone 4 (Ravi/Aziz Bhatti Town)	50	20.0
	Zone 5 (Data Gunj Bakhsh Town)	48	19.2

Health Literacy Scores

Table 2 shows health literacy scores measured using the adapted NVS tool (range 0-6). The average health literacy level in the entire sample was 3.04 (SD = 1.52), which showed a borderline-limited level of health literacy. About 34.8 per cent of respondents rated 0-1 (high possibility of having limited health literacy), 28.4 per cent rated 2-3 (possibility of limited health literacy), and 36.8 per cent rated 4-6 (sufficient health literacy). There were also significant differences in health literacy by educational levels: the mean score of individuals with bachelor-level education and higher was 4.89 (SD = 0.91), and the mean score of individuals with no formal education or primary education was 1.42 (SD = 0.78). The mean health literacy scores were lower among the female respondents (2.81) compared with male respondents (3.23) although the difference between the two groups was statistically significant (t = 2.14, p = 0.033).

Table 2: Health Literacy Scores by Education Level (N=250)

Education Level	n	Mean NVS Score	SD
No formal / Primary education	36	1.42	0.78
Matriculation	65	2.56	1.04
Intermediate / Diploma	81	3.18	1.22
Bachelor's degree or above	68	4.89	0.91
Total Sample	250	3.04	1.52

Socioeconomic Status Distribution

The composite SES index was used to place the respondents into three levels, that is, low SES (score 1-3), medium SES (score 4-6), and high SES (score 7-9). According to Table 3, 36% of the respondents were in the low SES group, 44.8 percent in the average SES, and 19.2 percent in the high SES category. The monotonic gradient in the mean preventive behavior composite scores by SES tiers was clear with low SES respondents scoring a mean of 34.6 (SD = 7.8) on the preventive behavior scale, medium SES respondents scoring 44.2 (SD = 8.1), and high SES respondents scoring 54.7 (SD = 7.3) out of the possible score of 72. One-way ANOVA proved that there were significant differences in the mean scores of preventive behavior at different tiers of SES (F = 62.4, df = 2,247, p < 0.001), with post-hoc Tukey tests showing that differences in all tiers were statistically significant at p = 0.001.

Table 3: Preventive Behavior Scores by Socioeconomic Status Tier (N=250)

SES Tier	n (%)	Mean Prev. Behavior Score	SD	Range
Low SES (composite score 1–3)	90 (36.0%)	34.6	7.8	18–52
Medium SES (composite score 4–6)	112 (44.8%)	44.2	8.1	26–64
High SES (composite score 7–9)	48 (19.2%)	54.7	7.3	38–72
Total Sample	250 (100%)	43.1	10.6	18–72

Healthcare Access Dimensions

Table 4 shows the average scores on the five dimensions of access of Penchansky-Thomas assessment, which are rated on a 1-5 scale with high ratings giving rise to high access. Affordability was the least rated (2.41, SD = 0.98) as it indicated the high financial constraints toward preventive care among a large percentage of the respondents especially among the low and middle income earners. Availability was also low (2.68, SD = 0.91), which means that the perceived shortages of primary care providers were noted, particularly in the outer residential areas. Acceptability had the greatest score (3.89, SD = 0.76) which implies that cultural and personal fit with any existing health services is not the main point of obstructions among most respondents. The intermediate scores were in the accessibility (geographic) 3.12 and accommodation 3.24. The mean of the healthcare access composite score was 3.07 (SD = 0.72) with an additional variation recorded between residential zones; respondents in Zone 1 (high-income central areas) gave a mean composite access score of 3.74 as opposed to 2.52 in Zone 5 (low-income peripheral areas) which is significant at p = 0.001.

Table 4: Mean Scores on Healthcare Access Dimensions (N=250)

Access Dimension	Mean	SD	Interpretation
Affordability	2.41	0.98	Significant cost barrier
Availability (provider supply)	2.68	0.91	Moderate shortage perceived
Accessibility (geographic)	3.12	0.85	Moderate distance barriers
Accommodation (organizational)	3.24	0.79	Adequate in most areas
Acceptability (cultural fit)	3.89	0.76	Low barrier — culturally compatible
Overall Access Composite	3.07	0.72	Below adequate threshold

Correlation Analysis

The Pearson correlation of the three predictor variables and preventive behavior outcome is shown in Table 5. All the three predictors showed significant positive relationships and preventive behavior: health literacy ($r = 0.61$, $p < 0.001$), healthcare access ($r = 0.54$, $p < 0.001$), and SES ($r = 0.52$, $p < 0.001$). Inter-correlations were also found to be moderate among the predictors: health literacy and SES ($r = 0.49$), health literacy and healthcare access ($r = 0.44$) and SES and healthcare access ($r = 0.46$), were significant with $p = 0.001$. Although these inter-correlations suggest shared variance between the predictors - as theory predicts they are aspects of a broader social advantage gradient - the Variance Inflation Factor (VIF) values (1.34-1.72) confirmed that growths of multicollinearity were not problematic in regression models.

Table 5: Pearson Correlation Matrix — Predictors and Preventive Behavior (N=250)

Variable	1. Prev. Behavior	2. Health Literacy	3. SES	4. HC Access
1. Preventive Behavior	1.00			
2. Health Literacy	0.61**	1.00		
3. SES Composite	0.52**	0.49**	1.00	
4. Healthcare Access	0.54**	0.44**	0.46**	1.00

*** $p < 0.001$*

Multiple Linear Regression — Predictors of Preventive Behavior

Table 6 shows the findings of hierarchical multiple regression analysis on the independent effects of SES, healthcare access, and health literacy on scores in preventive behavior. In Model 1, preventive behavior was attributed to SES ($R^2 = 0.270$, $F = 91.8$, $p = 0.001$). In Model 2, when the access to healthcare is added, the explained variance was 40.7% ($DR^2 = 0.137$, $p < 0.001$). The complete Model 3 that included all three predictors was able to explain 58.3 percent variance in preventive behavior ($R^2 = 0.583$, $F = 113.4$, $p < 0.001$) which was much better than Models 1 and 2. Health literacy became the most significant predictor in the full model (beta $= 0.42$, $t = 8.91$, $p < 0.001$), then there was healthcare access (beta $= 0.31$, $t = 6.54$, $p < 0.001$) and SES (beta $= 0.27$, $t = 5.62$, $p < 0.001$). The three predictors were found to be significant in the context of the other two, which verified their independent effects in preventive behavior.

Table 6: Hierarchical Multiple Linear Regression — Predictors of Preventive Behavior (N=250)

Predictor	Model 1 Beta	Model 2 Beta	Model 3 Beta	t (M3)	p (M3)	VIF
SES Composite	0.52**	0.38**	0.27**	5.62	< 0.001	1.61
Healthcare Access	—	0.41**	0.31**	6.54	< 0.001	1.72
Health Literacy (NVS)	—	—	0.42**	8.91	< 0.001	1.34
R²	0.270	0.407	0.583			
Adjusted R²	0.267	0.402	0.576			
F statistic	91.8**	84.5**	113.4**			

*** $p < 0.001$. Beta values are standardized regression coefficients.*

DISCUSSION

The results of this paper give strong empirical evidence that health literacy, socioeconomic status, and access to healthcare are independently and significantly related with preventive healthcare behavior, with the health literacy being the best predictor when all three factors are modeled together. This finding is in line with an emerging body of international research recording health literacy to be a key factor in driving preventive behavior in various health systems (Berkman et al., 2011; Nutbeam, 2008), but it also applies this finding to the urban Pakistani setting where health literacy as a determinant of behavior has been under-researched. The fact that adding health literacy to SES and access explain an extra 17.6% of preventive behavior not covered by the other two factors (the change in R2 between Model 2 and Model 3) highlights this distinct and strong contribution, and argues against the implicit assumption popular in the policy debate of Pakistan, which claims that socioeconomic improvement is the only factor that will lead to better health-related behavior. The high health literacy gradient between the categories of educational attainment (mean NVS scores of 1.42 among no formal education and 4.89 among university graduates) confirms the informational role of the formal education in facilitating health literacy improvement, but also points out that the educational investment is not enough to overcome the lack of

health literacy among the individuals who are at the intermediate levels of educational attainment: an individual with middle levels of educational attainment also exhibits the gap in the health literacy levels that render the engagement in preventive behaviors impossible. The affordability barrier to healthcare access that was identified with the lowest average rating of all five dimensions of Penchansky-Thomas is also connected with the fact that in Pakistan, the out-of-pocket health spend burden remains high and indicates that financial protection mechanisms (such as means-tested subsidy programs and community health insurance schemes) should become an immediate structural priority. The established social gradient in preventive behavior (significant ANOVA differences across all three SES tiers) is also the expected result of the literature on social gradients in the promotion of preventive behavior (Pampel et al., 2010; Adler and Newman, 2002) and contextualizes the difficulty in promoting preventive behavior in Pakistan: unless structural interventions are implemented to achieve the goal of decreasing socioeconomic inequality, individually-focused health behavior interventions will only proportionately benefit already-privileged groups, potentially further increasing instead of reducing health Collectively, these results suggest a multi-level, multi-faceted, and integrative preventive health promotion strategy that can be used to tackle health literacy in the individual level, SES disadvantages in the household and community level, and access disadvantages in the health system level.

CONCLUSION

This paper aimed at testing the hypothesis on the role of health literacy, socioeconomic status and access to health care as predictors of preventive healthcare behavior in 250 adult participants in urban Islamabad, Pakistan. The findings establish that the three determinants are significantly and independently related to preventive behavior with the combination of these three determinants explaining 58.3 per cent of the variance in the preventive behavior composite score. With the same predictor, the health literacy was the one that passed the test of significance the most, followed by the healthcare access and SES, all significant after the other variables were controlled. The paper also presents high socioeconomic inequalities in health literacy and access to healthcare, whereby it is observed that disadvantage compounds and lower-SES groups experience decreased health literacy, higher access barriers, and lower behavioral engagement in preventive health services. The substantive implications of these findings to the public health policy of Pakistan, the structure of the health system, and community health programming are important.

RECOMMENDATIONS

To begin with, health literacy improvement should be incorporated as a strategic focus of the Government of Pakistan and provincial health authorities in the National Health Vision and health literacy education should be included in the national school curriculum starting at the primary level, so that the new generation can become adults with the basic capacity in health information processing and decision making. Second, the Ministry of National Health Services must contract the creation of plain-language, visual, and numeracy-friendly health communication resources on all major preventive health programs such as vaccination, cancer screening, hypertension and diabetes management, and maternal health, which should be developed following the accepted health literacy principles, such as the teach-back methodology, short sentences, using the active voice, and imagery that resonates with the culture. Third, the mandate of lady health workers and community health workers should be broadened by the Government of Punjab and other provincial health departments to directly incorporate health literacy assessment and delivery of health education using literacy-sensitive methods at the household level to equip these frontline workers with standard training and tools to assist low-literacy beneficiaries to navigate preventive services. Fourth, health financing policy must focus on helping to eradicate user charges and out-of-pocket expenses on core preventive care, such as reproductive health check-ups, blood pressure and glucose screening, childhood and adult vaccinations, and cervical and breast cancer screening, by expanding coverage by social health insurance and using special vouchers to households below the poverty line, which is the most critical barrier to access, as measured by cost, in this analysis. Fifth, urban health authorities need to engage in the systematic mapping of preventive service gaps in residential zones, as well as investing in mobile health clinics, satellite health posts, and community health camps to extend the service availability and geographic access to underserved peri-urban regions and reduce the reported spatial variation of healthcare access that exacerbates the SES-related disadvantages

REFERENCES

1. Adler, N. E., & Newman, K. (2002). Socioeconomic disparities in health: Pathways and policies. Health Affairs, 21(2), 60–76. https://doi.org/10.1377/hlthaff.21.2.60
2. Baker, D. W. (2006). The meaning and measure of health literacy. Journal of General Internal Medicine, 21(8), 878–883. https://doi.org/10.1111/j.1525-1497.2006.00540.x
3. Bandura, A. (1997). Self-efficacy: The exercise of control. W. H. Freeman.
4. Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low health literacy and health outcomes: An updated systematic review. Annals of Internal Medicine, 155(2), 97–107. https://doi.org/10.7326/0003-4819-155-2-201107190-00005

5. Carpenter, C. J. (2010). A meta-analysis of the effectiveness of the health belief model variables in predicting behavior. Health Communication, 25(8), 661–669. https://doi.org/10.1080/10410236.2010.521906

6. Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.). SAGE Publications.

7. Cutler, D. M., & Lleras-Muney, A. (2010). Understanding differences in health behaviors by education. Journal of Health Economics, 29(1), 1–28. https://doi.org/10.1016/j.jhealeco.2009.10.003

8. DeWalt, D. A., Berkman, N. D., Sheridan, S., Lohr, K. N., & Pignone, M. P. (2004). Literacy and health outcomes: A systematic review of the literature. Journal of General Internal Medicine, 19(12), 1228–1239. https://doi.org/10.1111/j.1525-1497.2004.40153.x

9. Institute of Medicine. (2004). Health literacy: A prescription to end confusion. The National Academies Press. https://doi.org/10.17226/10883

10. Jacobs, B., Ir, P., Bigdeli, M., Annear, P. L., & Van Damme, W. (2012). Addressing access barriers to health services: An analytical framework for selecting appropriate interventions in low-income Asian countries. Health Policy and Planning, 27(4), 288–300. https://doi.org/10.1093/heapol/czr038

11. Kickbusch, I. (2001). Health literacy: Addressing the health and education divide. Health Promotion International, 16(3), 289–297. https://doi.org/10.1093/heapro/16.3.289

12. Marmot, M. (2005). Social determinants of health inequalities. The Lancet, 365(9464), 1099–1104. https://doi.org/10.1016/S0140-6736(05)71146-6

13. Memon, A. A., Khan, H., Khan, M. A., & Bhatti, A. B. (2016). Health literacy assessment in primary care patients in Karachi, Pakistan. Journal of the College of Physicians and Surgeons Pakistan, 26(8), 655–659.

14. Ministry of National Health Services. (2021). Pakistan national health accounts 2019–20. Government of Pakistan.

15. Nishtar, S., Bile, K. M., Ahmed, A., Amjad, S., & Iqbal, A. (2010). Integrated population-based surveillance of noncommunicable diseases: The Pakistan model. American Journal of Preventive Medicine, 38(1 Suppl), S133–S136. https://doi.org/10.1016/j.amepre.2009.09.032

16. Nutbeam, D. (2008). The evolving concept of health literacy. Social Science & Medicine, 67(12), 2072–2078. https://doi.org/10.1016/j.socscimed.2008.09.050

17. Pampel, F. C., Krueger, P. M., & Denney, J. T. (2010). Socioeconomic disparities in health behaviors. Annual Review of Sociology, 36, 349–370. https://doi.org/10.1146/annurev.soc.012809.102529

18. Penchansky, R., & Thomas, J. W. (1981). The concept of access: Definition and relationship to consumer satisfaction. Medical Care, 19(2), 127–140. https://doi.org/10.1097/00005650-198102000-00001

19. Rani, M., Bonu, S., Jha, P., Nguyen, S. N., & Jamjoum, L. (2003). Tobacco use in India: Prevalence and predictors of smoking and chewing in a national cross sectional household survey. Tobacco Control, 12(4), e4. https://doi.org/10.1136/tc.12.4.e4

20. Rosenstock, I. M. (1974). Historical origins of the health belief model. Health Education Monographs, 2(4), 328–335. https://doi.org/10.1177/109019817400200403

21. Siddiqi, S., Masud, T. I., Nishtar, S., Peters, D. H., Sabri, B., Bile, K. M., & Jama, M. A. (2009). Framework for assessing governance of the health system in developing countries: Gateway to good governance. Health Policy, 90(1), 13–25. https://doi.org/10.1016/j.healthpol.2008.08.005

22. Sorensen, K., Van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z., & Brand, H. (2012). Health literacy and public health: A systematic review and integration of definitions and models. BMC Public Health, 12(80). https://doi.org/10.1186/1471-2458-12-80

23. Syed, S. T., Gerber, B. S., & Sharp, L. K. (2013). Traveling towards disease: Transportation barriers to health care access. Journal of Community Health, 38(5), 976–993. https://doi.org/10.1007/s10900-013-9681-1

24. UNESCO. (2021). Literacy statistics metadata information table. UNESCO Institute for Statistics. http://uis.unesco.org

25. Wolf, M. S., Gazmararian, J. A., & Baker, D. W. (2007). Health literacy and health risk behaviors among older adults. American Journal of Preventive Medicine, 32(1), 19–24. https://doi.org/10.1016/j.amepre.2006.08.024

26. World Bank. (2021). Out-of-pocket expenditure (% of current health expenditure) – Pakistan. World Bank Open Data. https://data.worldbank.org

27. World Health Organization. (2022). Noncommunicable diseases: Key facts. WHO. https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

28. World Health Organization Commission on Social Determinants of Health. (2008). Closing the gap in a generation: Health equity through action on the social determinants of health. WHO Press.