**Assessing Priority-based Health Behaviors for Chronic Diseases: A Cross-sectional Study at Slum Areas in Bangladesh**

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**Abstract:**

**Background:** The development and management of chronic diseases are significantly influenced by health behavior. Around the world, chronic diseases are a major cause of morbidity and mortality, particularly in marginalized and low-income communities. Slums in urban areas are particularly vulnerable to the burden of chronic diseases because of the pervasive deplorable living conditions, the lack of access to healthcare services, and unhealthy lifestyle choices.

**Methods:** This cross-sectional study included 488 adults from three slum area in Bangladesh from 25th February to 2023 to 6th May 2023.

**Results:** According to structural equation modeling, the significant influence of chronic diseases on patient’s self-efficacy in managing their condition (B=.593), diet (B=.118) and physical exercise (B=.116) also play a role, while access to healthcare, mental health, and exposure to freeway air pollution show a negative association with chronic diseases.

**Conclusion:** The findings emphasize the importance of promoting healthy lifestyles and implementing targeted interventions to encourage individuals to adopt favorable health behaviors. By addressing these modifiable factors, we can potentially reduce the burden of chronic diseases and improve the overall health outcomes of individuals and communities

**Keywords:** Health Behavior; Chronic Diseases; Adults; Slum; Bangladesh

**Background:**

The chronic diseases are characterized by their extended duration and slow progression has emerged as a significant worldwide health concern. They are responsible for a sizeable share of the illness burden, morbidity and death, all over the world, particularly in communities that have poor incomes and marginalized (1). According to the United Nations Human Settlements Program (UN-Habitat), slums in urban regions are especially susceptible to the burden of chronic diseases due to the widespread poor living circumstances, limited access to healthcare services, and unhealthy behaviors (2). The physical health of a person or their capacity to recover from sickness may be affected by their behavior in relation to their health and approximately 40% of premature deaths are caused by unhealthy behaviors (3). According to a previous research from 2022, smoking has a significant influence on the development of chronic diseases such as cardiovascular diseases, respiratory disorders, and cancer (4). In addition , leading a sedentary lifestyle was linked to an increased likelihood of developing obesity, diabetes, and hypertension (5) . Unhealthy eating habits characterized by the consumption of processed foods and a low intake of fruits and vegetables, increased the probability of developing chronic diseases such as obesity, cardiovascular diseases, and metabolic disorders (6). A prior study revealed a correlation between individuals' exposure to air pollution and an increased risk of developing chronic diseases such as diabetes, hypertension, and mental health disorders. In addition, socioeconomic factors played a substantial role, with those of lower socioeconomic class reporting a higher incidence of unhealthy behaviors and a larger susceptibility to chronic diseases (7). The slum region in Dhaka, capital city of Bangladesh, is one of the most densely populated urban settlements in the world (8). This settlement is also characterized by overcrowding, inadequate sanitation, and limited access to basic utilities (9). In spite of the high incidence of chronic diseases among this group, there is a dearth of research that investigates the connection between healthy behaviors and chronic diseases, particularly in Dhaka's slum neighborhoods (2). In order to effectively create interventions and policies to address this public health concern, it is essential to have a solid understanding of the connection between individuals' health behaviors and the development of chronic diseases in the context of urban slums (10). As a consequence, this study has been planned to find out connection that exists between healthy behaviors and the development of chronic diseases in a slum region of Bangladesh.

**Methodology:**

**Study design and setting**

The cross-sectional study was conducted from 25th February to 2023 to 6th May 2023 to collect eligible data among the adults from some selected slum areas of Dhaka city. Those were age more than 18 years and reside in slum areas, Bangladeshi citizen and showed willingness to participate were included and who didn’t meet the criteria was excluded from this study Before starting the survey informed consent was taken from the participant. The study ethically approved by Jahangirnagar University ethical committee.

**Data collection tools and procedure**

After reviewing important relevant literature, a structured questionnaire based on participants' demographics, dietary habits, and self-reported chronic conditions were addressed for better understand the health behaviors and chronic illness burden of a group that is frequently overlooked and mistreated by focusing on a slum region in Dhaka. The first page of the questionnaire had a summary of the background, goals, eligibility criteria, risks, and benefits of the study, and statement of confidentiality. In order to assure validity, we were committed as researcher to upholding the study's reliability at every stage of the data gathering and analysis process. Credibility was also increased by making sure that each respondent was aware of the questionnaire and its goal. Face-to-face interviews were used to collect data after the pre-testing phase. The study participants completed the self-administered questionnaire in their own language. The strictest ethical standards were upheld during the entire study. The Declaration of Helsinki or its equivalent ethical principles were followed, as well as the Institutional Research Ethics. All study participants read the permission form and gave their consent after reading it. No incentives were given to study participants in exchange for their participation. At every level, data privacy and confidentiality were effectively preserved.

**Measures**

**Baseline characteristics:**

The number of 488 participants completed the survey that includes questions about demographic characteristics and health behavior related questions. Demographic variables we include: Gender, Education Level, Employment status, Monthly Income, Marital status, Religion. Behavior we define: Physical exercise (150 minutes per week), Smoking Status, Mental Health, Health Screenings, Access to Healthcare, BMI Category, Dietary habits of the community, Individual's exposure to freeway air pollution and health impacts, Level of community health promotion activities, Patient's self-efficacy in managing their chronic disease, and Patients' knowledge, skills, and confidence in managing their health and healthcare

**Community Healthy Eating Index (CHEI):**

A community's eating habits can be evaluated with the help of the Community Healthy Eating Index (CHEI). The goal of the index is to determine how well a given area adheres to the dietary standards set forth by the USDA. The CHEI is based on seven items, each of which has two possible responses (one healthy and one less healthy). A value of 1 indicates that item is the healthier option. The final score, which can be anywhere from 0 to 7, is calculated by adding the points awarded for each item. If a community has a higher score, it means that its diet follows the USDA's recommendations for optimal health to a greater extent. There is no consensus on what the optimal CHEI cutoff should be because it depends on the study population and the objectives of the intervention. However, a score of 4 or higher indicates a relatively healthy diet(11)(12)(13).

**Community Assessment of Freeway Exposure and Health (CAFEH**):

The CAFEH, or Community Assessment of Motorway Exposure and Health, is a questionnaire designed to assess the risks of breathing in pollution from motorways. It consists of six questions and has been used to pinpoint people whose proximity to motorways puts them at risk for certain health problems. On a scale from 0 to 3, with 3 being the highest, the greater the exposure to that item. A higher total score indicates more exposure to air pollution from motorways, which runs from 0 to 18. If a person's score is 8 or higher, they are considered to be at high risk for poor health consequences due to their proximity to motorways. However, the threshold value may change based on the study's population and the intervention's objectives (14) to name a few sources (Brugge, 2022; Brugge et al., 2021; Hudda et al., 2021).

**Community Health Promotion Activities Scale (CHPAS):**

The amount of health promotion activities in a community can be measured with a 6-item scale called the Community Health Promotion Activities Scale (CHPAS). It uses a 4-point Likert scale ranging from "never" to "always" to gauge how often people engage in health promotion activities. Community health promotion programs have been studied with the help of the CHPAS. High scores on the CHPAS indicate extensive community health promotion efforts (19)(20). The scale runs from 6 to 24(20).

**Chronic Disease Self-Efficacy Scales:**

It is possible to gauge a patient's confidence in their ability to take charge of their health and make positive changes with the use of the Chronic Disease Self-Efficacy Scales. Providers and researchers can gauge a patient's self-efficacy in treating a chronic condition using these scales, which in turn informs treatment decisions. Multiple Chronic Disease Self-Efficacy Scales exist, with each one focusing on a different chronic illness like diabetes, asthma, or heart disease. The self-efficacy in managing a chronic condition is assessed using a 6-item questionnaire. The scale goes from 0 to 60, with higher numbers reflecting greater confidence in one's abilities. Some researchers (Lorig et al., 2001), others (Chalmers et al., 1990), and yet others (Barlow et al., 2000) have proposed using a cut-off value of 30 to identify patients with low self-efficacy who may benefit from interventions to enhance their confidence in managing their chronic disease(21).

**The Patient Activation Measure (PAM):**

The Patient Activation Measure (PAM) is a scientifically-validated survey of patient health literacy, self-efficacy, and healthcare engagement. The PAM contains 10 questions, each with four possible answers. Each answer choice receives a score from 1 to 4, with lower numbers suggesting less activation and higher numbers indicating more. The sum of these scores is a numeric value between 0 and 40. Activation levels are often assigned to patients based on the cut-off values for PAM scores, which range from 1 (lowest activation) to 4 (maximum activation). Specific cut-off levels may vary per study or environment, but one typical categorization is as follows: If your PAM score is below 19, your level is 2; if it's between 19 and 22, your level is 3; if it's between 22 and 27, your level is 4; and so on. These thresholds were determined by analyzing data from more than 30,000 patients in different health care systems in the United States (Hibbard et al., 2005; Hibbard et al., 2020). They have been shown to be predictive of a wide range of health outcomes, including service utilization, self-management, and clinical outcomes(22).

### **Data management and analysis**

Using Microsoft Excel 2010, data were cleaned, sorted, and coded. Descriptive statistics are used to summarize the demographic and characteristics of the sample. Bivariate and multivariate regression analyses were conducted to examine the relationship between health behavior, and chronic diseases. Then a structural equation model is fitted for chronic diseases relating health behavior. All analysis is conducted in the Statistical Package for the Social Sciences (SPSS) and Smart-PLS software.

**Results**

### ***Baseline characteristics***

The descriptive analysis provides insights into various aspects of the population under study. The gender distribution shows that 71.1% of participants were female; the majority (44.7%) had a primary education. Housewives formed the largest group among employment statuses, accounting for 45.5%. In terms of monthly income, 78.3% earned less than 15,000. The marital status of the community was predominantly married, comprising 84.6%. Religion-wise, 90.0% identified as Islam. Around 70.3% of individuals reported not engaging in 150 minutes of physical exercise per week. Regarding smoking status, 75.8% were never smokers. Mental health analysis revealed that the largest group (67.0%) experienced mild symptoms of depression or anxiety. Moreover, 62.1% were not up-to-date on recommended health screenings, and 89.1% lacked access to affordable and high-quality healthcare. Evaluating BMI, 64.3% were of normal weight, 19.5% were underweight. When it came to dietary habits, 40.8% had an unhealthy diet. Furthermore, 84.6% of individuals were at an increased risk for adverse health outcomes due to exposure to freeway air pollution. Community health promotion activities were at a lower level for 96.1% of the population. Among patients, 78.5% exhibited high self-efficacy in managing their chronic disease. Lastly, in terms of knowledge, skills, and confidence in managing health and healthcare, the highest percentage (37.5%) achieved Level 4 proficiency [Table 1].

### ***Chi square association between health behavior and chronic diseases***

Chronic diseases have a significant association with education level (p = .001), employment status (p = .001), marital status (p = .031), physical exercise (p = .008), Mental health (p = .001), dietary habits (p = .011), exposure to freeway air pollution (p = .001), level of community health promotion activities (p = .009), and patients' self-efficacy in managing their chronic disease (p = .011) [Table:2].

***Regression analysis between health behavior and chronic diseases***

Every unit increase in age, the probability of having a chronic disease increase by 3.8% (OR = 1.038, p = 0.001). After adjusting for other variables, the aOR remains significant, indicating that age is a significant predictor of chronic disease (aOR = 1.036, p = 0.004). Not engaging in physical exercise is associated with a higher likelihood of having a chronic disease (aOR = 1.372, p = 0.019). Having mild symptoms of depression or anxiety is significantly associated with a lower likelihood of having a chronic disease (aOR = 0.132, p = 0.001). Individuals at increased risk for adverse health outcomes due to air pollution have significantly 3 times higher risk of having a chronic disease (aOR = 3.012, p = 0.016) than others. Patients with higher self-efficacy have significantly lower odds of having a chronic disease compared to those with lower self-efficacy (aOR = .001, p = 0.001) [Table 3].

### ***Structural Equation Modeling***

Several fit indices were used to compare the estimated model to the saturated model. The estimated model has a better fit in terms of standardized root mean square residual, as seen by lower values for SRMR (0.089 compared to 0.127 in the saturated model). The estimated model also showed higher d\_ULS (3.06 vs. 1.497 in the saturated model) and d\_G (0.577 vs. 0.327 in the saturated model) values, which pointed to a wider disparity between the observed and calculated covariance matrices. Additionally, the estimated model's chi-square score was higher (1389.626 as opposed to 765.139 in the saturated model), demonstrating a good fit. Additionally demonstrating a decent match, the estimated model's NFI (normed fit index) was significantly lower (0.216 compared to 0.568 in the saturated model). Overall, compared to the saturated model, the estimated model showed good fit indices, indicating that it accurately represented the data [Table 4]. Based on structural equation chronic diseases most significant impact on Patient's self-efficacy in managing their chronic disease (B=.593), then diet (B=.118), and then physical exercise (B=.116). And access to healthcare, mental health and air pollution had a negative association with chronic diseases [Figure 1].

**Discussion**

This study explored to give a complete examination of the numerous aspects associated to health behavior and their association with chronic diseases. The prevalence’s of chronic diseases was 35.2% slum area in Bangladesh. Education level, employment status, marital status, employment status, physical exercise, mental health, dietary habits, exposure to freeway air pollution, level of community health promotion activities, and patients' self-efficacy in managing their chronic disease was a significant factor for chronic diseases.

According to our structural modelling finding chronic diseases most significant impact on patient's self-efficacy in managing their chronic disease, then diet, and then physical exercise that align with others studies(23) (21)(24). A study highlighted the impact that chronic diseases management related to one's sense of self-efficacy(25). According to the findings of a study, people who have chronic diseases frequently have to deal with persistent health issues, which can have an influence on their confidence in their capacity to properly manage their symptoms(26). This lends credence to the idea that chronic diseases can have a major impact on a person's sense of their own ability(27)(28). In addition, nutrition plays in self-efficacy among people who are living with chronic conditions (29). Patients' confidence in their ability to control their diseases was favorably influenced by adopting a healthy diet (30). This is in line with the findings of the current study, which found that nutrition was a key factor that impacted self-efficacy. In yet another piece of research, looked into the connection that people with chronic conditions have between doing regular exercise and feeling confident in their ability to manage their health (31). According to the findings of the study, those who engaged in regular physical activity saw the beneficial benefits of exercise on their health and well-being, which led to an increase in their levels of self-efficacy. This lends credence to the findings of the current study, which discovered that patients who engaged in regular physical activity had higher levels of self-efficacy. These data, taken as a whole, provide light on how important it is to address chronic conditions in order to improve patients' sense of self-efficacy. Because of the significant impact that they have on patients' levels of self-efficacy and general well-being, healthcare practitioners should place a primary emphasis on the provision of support and interventions that are geared towards the management of chronic diseases(32).

Access to healthcare, mental health, air pollution, and chronic disease have all been the subject of several research, and those studies have all reported that there is a negative correlation between the four factors. Concerning access to healthcare, research has repeatedly demonstrated that a lack of access to healthcare services that are both economical and of high quality is connected with a higher prevalence of chronic diseases (33). As an illustration, conducted a study in which they discovered that people who lacked adequate access to healthcare were more likely to have uncontrolled chronic diseases in comparison to those who had greater access (34). In a comprehensive study in which they found that decreased access to healthcare services was connected with increasing incidence of chronic diseases such as cardiovascular diseases and diabetes (35).

Studies have shown that those who suffer from mental health problems, such as anxiety or depression, may be at a greater risk of getting chronic diseases or experiencing a worsening of existing chronic diseases than those who do not suffer from mental health disorders (27). For instance, the findings of a meta-analysis, depression was connected with an increased risk of developing chronic diseases such as heart disease, diabetes, and stroke(36). Individuals who suffer from anxiety disorders have a higher risk of developing chronic diseases over time (37).

Air pollution has both been related to the occurrence of chronic diseases as well as the worsening of their symptoms(38). Exposure to air pollutants, in particular fine particulate matter and nitrogen dioxide, has been demonstrated in a great number of studies to be connected with an increased risk of acquiring respiratory diseases, cardiovascular disorders, and other chronic conditions(7)(39).

Overall, the findings of these research lend credence to the hypothesis that access to healthcare, mental health, and air pollution are each associated with an increased risk of developing a chronic illness. These findings underscore how important it is for healthcare policies and programs to target these characteristics in order to successfully prevent and manage chronic illnesses.

**Limitations of the study**

Cross-sectional designs reduce health behavior-chronic illness causality. Association's temporal sequence isn't shown. The study may only apply to Dhaka slums. Self-reported health practices and chronic conditions may cause recall and social desirability bias.

**Conclusion**

Prioritizing health-related behaviors such as taking self-preventative steps for chronic diseases, getting regular exercise and eating right can have positive effects on avoiding, managing, or lessening the severity of chronic diseases. Encouraging and aiding individuals in making healthier lifestyle choices can play a vital role in reducing the burden of chronic diseases and improving the health of the population as a whole. Recognizing the importance of changing health behaviors and adopting tailored interventions to encourage better choice and reduce the burden of chronic diseases is crucial for individuals, healthcare professionals, and policy makers.

**Abbreviation:**

SRMR: Standardized Root Mean Square Residual

d\_ULS: Degrees of freedom (d) for the Unweighted Least Squares method

d\_G: Degrees of freedom (d) for the Geomin method

NFI: Normed Fit Index, a goodness-of-fit index used in structural equation modeling

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**Code availability:** On request

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### **Tables**

**Table 1: Demographic characteristics of the respondents**

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | | Frequency | Percent (%) |
| Gender | Female | 347 | 71.1 |
| Male | 141 | 28.9 |
| Education Level | No education | 142 | 29.1 |
| Primary | 218 | 44.7 |
| SSC | 86 | 17.6 |
| HSC | 28 | 5.7 |
| Graduate or higher | 14 | 2.9 |
| Employment status | Student | 14 | 2.9 |
| Employed | 59 | 12.1 |
| Businessman | 23 | 4.7 |
| Housewife | 222 | 45.5 |
| Day labor | 85 | 17.4 |
| Servant | 64 | 13.1 |
| Unemployment | 13 | 2.7 |
| Others | 8 | 1.6 |
| Monthly Income | less than 15000 | 382 | 78.3 |
| ≥15000 | 106 | 21.7 |
| Marital status | Unmarried | 37 | 7.6 |
| Married | 413 | 84.6 |
| Divorce/ separated | 16 | 3.3 |
| Widower | 22 | 4.5 |
| Religion | Islam | 439 | 90.0 |
| Hindu | 49 | 10.0 |
| Physical exercise (150min/week) | No | 343 | 70.3 |
| Yes | 145 | 29.7 |
| Smoking Status | Never smoked | 370 | 75.8 |
| Former smoker | 29 | 5.9 |
| Current smoker | 89 | 18.2 |
| Mental Health | No symptoms of depression or anxiety | 105 | 21.5 |
| Mild symptoms of depression or anxiety | 327 | 67.0 |
| Moderate to severe symptoms of depression or anxiety | 56 | 11.5 |
| Health Screenings | Up-to-date on recommended health screenings | 185 | 37.9 |
| Not up-to-date on recommended health screenings | 303 | 62.1 |
| Access to Healthcare | Has access to affordable and high-quality healthcare | 53 | 10.9 |
| Does not have access to affordable and high-quality healthcare | 435 | 89.1 |
| BMI Category | Underweight | 95 | 19.5 |
| Normal Weight | 314 | 64.3 |
| Overweight | 79 | 16.2 |
| Dietary habits of the community | Unhealthy Diet | 199 | 40.8 |
| Health Diet | 289 | 59.2 |
| Individual's exposure to freeway air pollution and health impacts | Individuals at lower risk for adverse health outcomes | 75 | 15.4 |
| Individuals at increased risk for adverse health outcomes | 413 | 84.6 |
| Level of community health promotion activities | Lower level of community health promotion activities | 469 | 96.1 |
| Higher level of community health promotion activities | 19 | 3.9 |
| Patient's self-efficacy in managing their chronic disease | Patients’ high self-efficacy | 383 | 78.5 |
| Patients’ low self-efficacy | 105 | 21.5 |
| Patients' knowledge, skills, and confidence in managing their health and healthcare | Level 1 | 180 | 36.9 |
| Level 2 | 42 | 8.6 |
| Level 3 | 83 | 17.0 |
| Level 4 | 183 | 37.5 |
| Having chronic disease | No | 316 | 64.8% |
| Yes | 172 | 35.2% |

**Table 2: Chi square association between health behavior and chronic diseases**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | | **Chronic Diseases** | | | | | **Chi-Square** | | **P value** |
| **No (N, %)** | | | **Yes (N, %)** | |
| Gender | Female | 227(71.8%) | | | 120(69.8%) | | .232 | | .630 |
| Male | 89(28.2%) | | | 52(30.2%) | |
| Education Level | No education | 62(19.6%) | | | 80(46.5%) | | 41.28 | | .001 |
| Primary | 158(50.0%) | | | 60(34.9%) | |
| SSC | 68(21.5%) | | | 18(10.5%) | |
| HSC | 19(6.0%) | | | 9(5.2%) | |
| Graduate or higher | 9(2.8%) | | | 5(2.9%) | |
| Employment status | Student | 10(3.2% | | | 4(2.3%) | | 25.515 | | .001 |
| Employed | 45(14.2%) | | | 14(8.1%) | |
| Businessman | 13(4.1%) | | | 10(5.8%) | |
| Housewife | 145(45.9%) | | | 77(44.8%) | |
| Day labor | 60(19.0%) | | | 25(14.5%) | |
| Servant | 39(12.3%) | | | 25(14.5%) | |
| Unemployment | 2(0.6%) | | | 11(6.4%) | |
| Others | 2(0.6%) | | | 6(3.5%) | |
| Monthly Income | less than 15000 | 243(76.9%) | | | 139(80.8%) | | 1.433 | | .489 |
| 15000 to 30000 | 72(22.8%) | | | 33(19.2%) | |
| 30000 to 45000 | 1(0.3%) | | | 0(0.0%) | |
| Marital status | Unmarried | 27(8.5%) | | | 10(5.8%) | | 10.638 | | .031 |
| Married | 269(85.1%) | | | 144(83.7%) | |
| Divorce | 9(2.8%) | | | 4(2.3%) | |
| Widower | 8(2.5%) | | | 14(8.1%) | |
| Separated | 3(0.9%) | | | 0(0.0%) | |
| Religion | Islam | 286(90.5%) | | | 153(89.0%) | | .297 | | .586 |
| Hindu | 30(9.5%) | | | 19(11.0%) | |
| Physical exercise (150min/week) | No | 235(74.4%) | | | 108(62.8%) | | 7.147 | | .008 |
| Yes | 81(25.6%) | | | 64(37.2%) | |
| Smoking Status | Never smoked | 245(77.5%) | | | 125(72.7%) | | 1.494 | | .474 |
| Former smoker | 18(5.7%) | | | 11(6.4%) | |
| Current smoker | 53(16.8%) | | | 36(20.9%) | |
| Mental Health | No symptoms of depression or anxiety | | 81(25.6%) | 24(14.0%) | | | | 27.895 | .001 |
| Mild symptoms of depression or anxiety | | 215(68.0%) | 112(65.1%) | | | |
| Moderate to severe symptoms of depression or anxiety | | 20(6.3%) | 36(20.9%) | | | |
| Health Screenings | Up-to-date on recommended health screenings | | 125(39.6%) | 60(34.9%) | | | | 1.033 | .309 |
| Not up-to-date on recommended health screenings | | 191(60.4%) | 112(65.1%) | | | |
| Access to Healthcare | Has access to affordable and high-quality healthcare | | 34(10.8%) | 19(11.0%) | | | | .009 | .992 |
| Does not have access to affordable and high-quality healthcare | | 282(89.2%) | 153(89.0%) | | | |
| BMI Category | Underweight | | 67(21.2%) | 28(16.3%) | | | | 2.863 | .239 |
| Normal Weight | | 203(64.2%) | 111(64.5%) | | | |
| Overweight | | 46(14.6%) | 33(19.2%) | | | |
| Dietary habits of the community | Unhealthy Diet | | 142(44.9%) | 57(33.1%) | | | | 6.419 | .011 |
| Healthy Diet | | 174(55.1%) | 115(66.9%) | | | |
| Readiness of the community to address a particular issue or problem | Preparation stage or higher | | 316(100.0%) | 172(100.0%) | | | |  |  |
| Individual's exposure to freeway air pollution and health impacts | Individuals at lower risk for adverse health outcomes | | 32(10.1%) | 43(25.0%) | | | | 18.943 | .001 |
| Individuals at increased risk for adverse health outcomes | | 284(89.9%) | 129(75.0%) | | | |
| Level of community health promotion activities | Lower level of community health promotion activities | | 309(97.8%) | | | 160(93.0%) | | 6.748 | .009 |
| Higher level of community health promotion activities | | 7(2.2%) | | | 12(7.0%) | |
| Patient's self-efficacy in managing their chronic disease | Patients’ high self-efficacy | | 314(99.4%) | | | 69(40.1%) | | 6.419 | .011 |
| Patients’ low self-efficacy | | 2(0.6%) | | | 103(59.9%) | |
| Patients' knowledge, skills, and confidence in managing their health and healthcare | Level 1 | | 119(37.7%) | | | 61(35.5%) | | 3.170 | .366 |
| Level 2 | | 29(9.2%) | | | 13(7.6%) | |
| Level 3 | | 58(18.4%) | | | 25(14.5%) | |
| Level 4 | | 110(34.8%) | | | 73(42.4%) | |

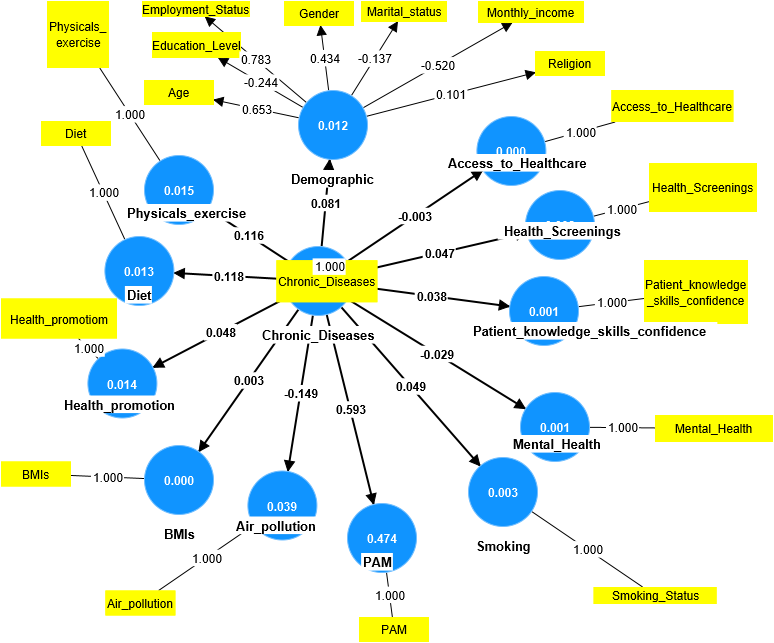
**Table 3: Regression analysis between health behavior and chronic diseases**

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | | crude(95%CI), p-value | aOR(95%CI), p-value |
| Age | | 1.038(1.023-1.052), .001 | 1.036(1.011-1.061), .004 |
| Gender | Female | .905(.602-1.360), .630 | 1.661(.306-9.007), .556 |
| Male | Ref | Ref |
| Education Level | No education | 2.323(.741-7.280), .148 | 3.079(.130-73.18), .487 |
| Primary | .684(.220-2.122), .510 | 1.869(.086-40.722), .691 |
| SSC | .476(.142-1.598), .230 | 1.017(.045-23.012), .992 |
| HSC | .853(.221-3.291), .817 | 1.084(.026-45.012), .996 |
| Graduate or higher | Ref | Ref |
| Employment status | Student | .133(.018-.962), .046 | .281(.002-35.254), .607 |
| Employed | .104(.019-.573), .009 | .128(.003-4.895), .269 |
| Businessman | .256(.042-1.551), .138 | 1.033(.033-32.126), .985 |
| Housewife | .177(.035-.898), .037 | .410(.017-10.076), .585 |
| Day labor | .139(.026-.736), .020 | .857(.035-20.897), .925 |
| Servant | .214(.040-1.143), .071 | .403(.015-10.924), .589 |
| Unemployment | 1.833(.204-16.512), .589 | 1.438(.033-62.571), .850 |
| Others | Ref | Ref |
| Monthly Income | less than 15000 | 1.265(.798-2.006), .317 | .770(.302-1.962), .584 |
| 15000 to 30000 | Ref | Ref |
| Marital status | Unmarried | .212(.068-.656), .007 | .759(.068-8.519), .823 |
| Married | .306(.125-.746), .009 | 1.526(.345-6.752), .577 |
| Divorce/Separated | .190(.046-.793), .023 | .575(.058-5.743), .637 |
| Widower | Ref | Ref |
| Religion | Islam | .845(.460-1.550), .586 | 1.650(.420-6.484), .473 |
| Hindu | Ref | Ref |
| Physical exercise (150min/week) | No | 1.719(1.153-2.563), .008 | .372(.164-.847), .019 |
| Yes | Ref | Ref |
| Smoking Status | Never smoked | .751(.467-1.208), .238 | 2.991(.742-12.067), .124 |
| Former smoker | .900(.380-2.129), .810 | 4.099(.979-17.164), .054 |
| Current smoker | Ref | Ref |
| Mental Health | No symptoms of depression or anxiety | .165(.081-.335), .001 | .223(.060-.826), .025 |
| Mild symptoms of depression or anxiety | .289(.160-.523), .001 | .132(.045-.383), .001 |
| Moderate to severe symptoms of depression or anxiety | Ref | Ref |
| Health Screenings | Up-to-date on recommended health screenings | .819(.556-1.204), .310 | 1.506(.614-3.695), .371 |
| Not up-to-date on recommended health screenings | Ref | Ref |
| Access to Healthcare | Has access to affordable and high-quality healthcare | .971(.536-1.760), .009 | .553(.109-2.810), .475 |
| Does not have access to affordable and high-quality healthcare | Ref | Ref |
| BMI Category | Underweight | .583(.311-1.092), .092 | .471(.150-1.473), .196 |
| Normal Weight | .762(.461-1.261), .290 | .553(.237-1.292), .171 |
| Overweight | Ref | Ref |
| Dietary habits of the community | Unhealthy Diet | .607(.412-.895), .012 | .864(.421-1.772), .690 |
| Health Diet | Ref | Ref |
| Individual's exposure to freeway air pollution and health impacts | Individuals at increases risk for adverse health outcomes | 2.958(1.790-4.891), .001 | 3.012(1.229-7.385), .016 |
| Individuals at lower risk for adverse health outcomes | Ref | Ref |
| Level of community health promotion activities | Lower level of community health promotion activities | .302(.117-.782), .014 | .379(.052-2.772), .339 |
| Higher level of community health promotion activities | Ref | Ref |
| Patient's self-efficacy in managing their chronic disease | Patients’ high self-efficacy | .004(.001-.018), .001 | .001(.000-.003),.001 |
| Patients’ low self-efficacy | Ref | Ref |
| Patients' knowledge, skills, and confidence in managing their health and healthcare | Level 1 | .772(.504-1.185), .237 | 4.996(1.445-17.268), .011 |
| Level 2 | .675(.329-1.385), .284 | 4.765(1.036-21.924), .045 |
| Level 3 | .650(.373-1.131), .127 | 3.315(.916-11.997), .068 |
| Level 4 | Ref | Ref |

**Table 4: Structural Equation Modeling fitted**

|  |  |  |
| --- | --- | --- |
|  | Saturated model | Estimated model |
| SRMR | 0.127 | 0.089 |
| d\_ULS | 1.497 | 3.06 |
| d\_G | 0.327 | 0.577 |
| Chi-square | 765.139 | 1389.626 |
| NFI | 0.568 | 0.216 |

**Figure**



**Figure 1: Structural Equation Modeling**