Reduction of the Prevalence of Disability Adjusted Life Years Through Healthy Life Style

Rashed Rafi (B M Rashedul Islam)

Research and Development Collective (RDC), Dhaka, Bangladesh

DOI: https://doi.org/10.51244/IJRSI.2026.1315PH00067

Received: 24 March 2026; Accepted: 30 March 2026; Published: 17 April 2026

ABSTRACT

Disability-Adjusted Life Years (DALYs) are a comprehensive indicator of population health, combining years of life lost (YLL) due to premature mortality and years lived with disability (YLD). The aim of this study is to assess how healthy lifestyle practices can contribute to the reduction of DALYs among individuals aged 40 years and above in Keraniganj Upazila, Dhaka. This research adopts a mixed-methods design, integrating both quantitative and qualitative approaches. A structured survey was conducted among 300 residents from Kalatia and Shakta Unions to collect data on lifestyle behaviors, disease prevalence, and healthcare utilization. In addition, Focus Group Discussions (FGDs), Key Informant Interviews (KIIs), and case studies were carried out to explore perceptions, barriers, and lived experiences related to health and lifestyle practices. The findings reveal a high burden of non-communicable diseases (NCDs), including hypertension (36%), arthritis (30%), diabetes (18%), chronic respiratory diseases (12%), and multimorbidity (22%). Most participants (88%) reported poor or fair health, with significant functional limitations and an annual loss of 15–20 days due to illness. Preventive health practices were limited, while dependence on pharmacies was high. Unhealthy dietary habits, low physical activity, tobacco use, poor sleep, and mental health concerns were prevalent. Awareness of healthy lifestyle guidelines was low, although positive attitudes toward healthy living were common. Qualitative insights identified poverty, cultural norms, and lack of local health promotion as major barriers. Overall, the study demonstrates that improving lifestyle practices can substantially reduce DALYs and enhance quality of life.

Keywords: DALYS vs Healthy Lifestyle, NCDs, Paralysis, Dialysis, Physical Activity

INTRODUCTION

Globally, life expectancy has increased in the last few decades, but new problems have arisen as the increased years are associated with different risk factors and diseases. For example, non-communicable diseases (NCDs) have increased due to behavioral risk factors, and lethal NCDs are found among those aged over 40 (17,4,23). The global burden of disease, particularly chronic diseases, has significantly increased over the last few decades, contributing substantially to Disability-Adjusted Life Years (DALYs) (9). The association between healthy behaviors and the frequency of premature mortality from major chronic diseases, including myocardial infarction, stroke, diabetes mellitus, and cancer, has been demonstrated thoroughly (10). Most of the time, DALYs are caused by non-communicable diseases. The World Health Organization reported that in 2021, 18 million people died from an NCD before age 70 years; 82% of these premature deaths occurred in low- and middle-income countries (20). Among NCDs, cardiovascular diseases accounted for about 19 million deaths in 2021. Cancers (10 million), chronic respiratory diseases (4 million), and diabetes (over 2 million including kidney disease deaths caused by diabetes) were also prevalent (20). Tobacco use, physical inactivity, harmful use of alcohol, unhealthy diets, and air pollution are major risk factors for dying from NCDs (20). These NCDs are promoted by unhealthy lifestyles and contribute substantially to DALYs.

However, the association of several healthy behaviors with Disability-Adjusted Life Years (DALYs)—a measure combining Years of Life Lost (YLL) and Years Lived with Disability (YLD)—has not been sufficiently studied. Chronic conditions such as cardiovascular diseases, diabetes, hypertension, and cancer are major contributors to both morbidity and premature mortality, especially among individuals over 40 (1). DALY is a useful measure for assessing disease burden as it reflects both mortality and disability associated with various conditions (23). In a study among 4,312 men and 4,963 women with a mean age of 42 years (SD 13 years), 54% used tobacco in some form, <1% consumed alcohol within the past 30 days, 92% did not consume adequate

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XIII Issue XV April 2026 | Special Issue on Public Health

fruits and vegetables, and 35% had low physical activity levels (<600 MET-min per week); documented diabetes was found in 4% of respondents (23).

Recent studies show that adopting a healthy lifestyle—including regular physical activity, a balanced diet, smoking cessation, and moderation in alcohol consumption—can significantly reduce the burden of chronic diseases (21,16). However, limited research has examined the direct relationship between lifestyle practices and DALYs in the Bangladeshi context, especially in rural and peri-urban areas. It is observed that due to healthy lifestyles, the number of ageing people is increasing gradually. Thus, new policy agendas are required for the well-being of the growing elderly population (14).

METHODOLOGY

Study Design

This study employed a mixed-method research design, combining both quantitative and qualitative approaches to provide a comprehensive understanding of how healthy lifestyle practices can reduce the prevalence of Disability-Adjusted Life Years (DALY) among people aged 40 years and above in Keraniganj Upazila, Dhaka. The mixed-method approach allowed for both the measurement of prevalence and statistical associations (quantitative) as well as the exploration of perceptions, experiences, and contextual factors (qualitative).

Study Area

The research was conducted in **Keraniganj Upazila**, located near Dhaka city. Two unions were purposively selected: **Kalatia Union** and **Shakta Union**, as they represent both semi-urban and peri-urban characteristics of Keraniganj, and also have a high proportion of middle-aged and elderly populations.

Study Population

The study population consisted of individuals aged 40 years and above, residing in Kalatia and Shakta unions. This age group was chosen because people aged 40+ are more vulnerable to non-communicable diseases (NCDs) and chronic health conditions that contribute significantly to DALYs.

Sampling and Sample Size

Quantitative Component

- A total of **300 respondents** were surveyed.
- Respondents were **40 years and above**.
- A **stratified random sampling method** was applied to ensure representation of both men and women across different socio-economic backgrounds.
- 150 respondents were taken from **Kalatia Union** and 150 from **Shakta Union**.

Qualitative Component

To enrich and validate the quantitative findings, multiple qualitative techniques were applied:

- **Focus Group Discussions (FGDs):** Three FGDs were conducted, each consisting of 8–10 participants. Separate FGDs were organized for men, women, and mixed groups to capture gendered perspectives.
- **Key Informant Interviews (KIIs):** Three KIIs were conducted with local healthcare providers, community leaders, and union health officers. These informants were selected purposively due to their knowledge and engagement with community health issues.
- **Case Studies:** Two detailed case studies were documented, highlighting lived experiences of individuals managing chronic illness through healthy lifestyle practices.

Data Collection Tools and Techniques

Quantitative Data

- A **structured questionnaire** was designed to collect socio-demographic data, lifestyle practices (diet, physical activity, smoking, alcohol consumption, sleep pattern, stress management), prevalence of chronic illnesses, and disability-adjusted health indicators.
- Trained enumerators administered the questionnaire through **face-to-face interviews** at the respondents' households.

Qualitative Data

- **FGD guidelines** were prepared to explore perceptions of health, barriers to healthy lifestyle practices, community norms, and personal experiences in managing health.
- **KII checklists** were designed to capture expert opinions on the role of lifestyle practices in reducing disease burden and DALYs in the community.
- **Case study documentation format** was used to record narratives, life histories, and coping mechanisms of selected individuals.

Data Analysis

Quantitative Data Analysis

- Data were entered into **SPSS and Excel** for analysis.
- Descriptive statistics (frequency, percentages, means, and standard deviations) were used to describe socio-demographic characteristics and prevalence of health conditions.
- Cross-tabulations and chi-square tests were performed to assess associations between lifestyle practices and reported health conditions.
- Findings were linked to potential impacts on DALYs through a review of relevant burden-of-disease literature.

Qualitative Data Analysis

- All FGDs and KIIs were audio-recorded (with consent), transcribed verbatim, and translated into English where necessary.
- A **thematic analysis** approach was applied. Transcripts were coded, and emerging themes were categorized under domains such as perceptions of health, lifestyle barriers, facilitators, and health system support.
- Case studies were presented descriptively to illustrate the quantitative findings with real-life examples.

FINDINGS AND DISCUSSION

Quantitative Findings and Discussion - We did a quantitative survey of 300 people who are 40. We did the survey in Kalatia Union and Shakta Union. The results of the survey are as following --

Results of 300 Respondents
Sample: n = 300 (all ≥40 years)
Study Areas: Kalatia Union 150 Persons & Shakta Union 150 Persons at Keraniganj

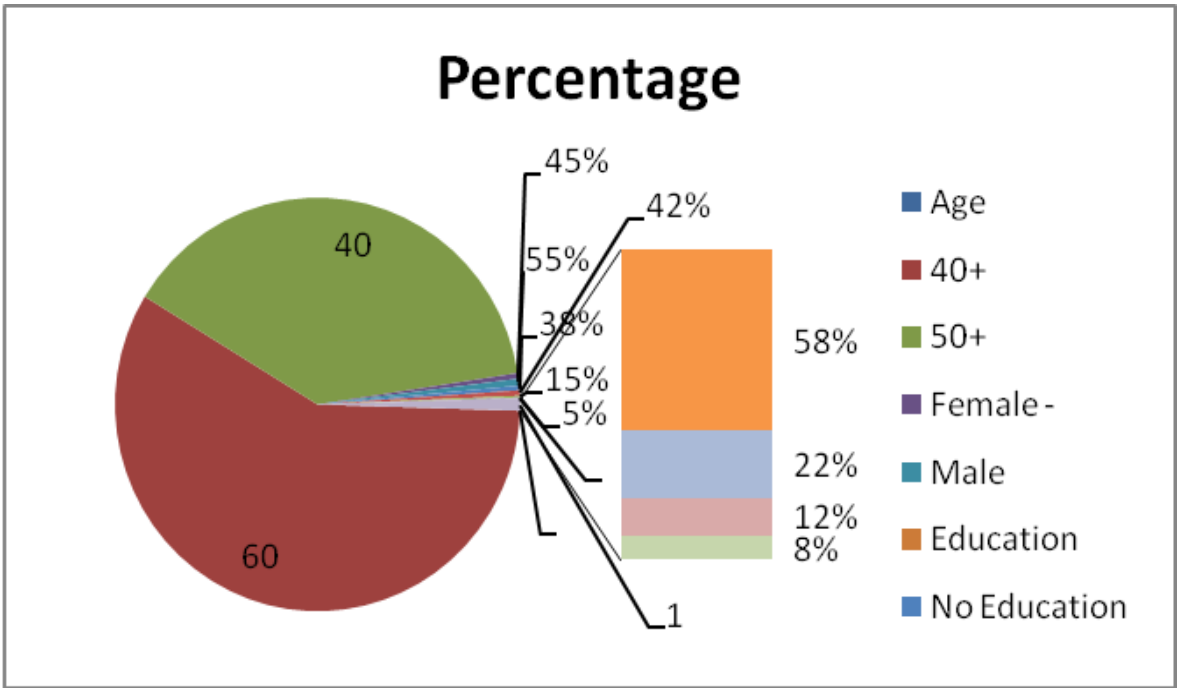
Socio-demographic Profile

- **Age:** 100% respondents were **40 years or older**; majority between **40–70 years**.
- **Sex:** About **55% male, 45% female**.

Education:

- 38% had **no formal education**.
- 42% had **some/primary level education**.
- 15% had **secondary or above**.
- 5% Madrasa/other.

- **Occupation:** Mostly **farmers, day labourers, small traders, homemakers**; very few in formal jobs.
- **Income:** About 60% households earned **≤20,000 BDT/month**, indicating low socioeconomic status.



Graph-01- Socio-Demographic Profile in Percentage

SPSS Analysis Procedure

Data Entry

- In SPSS **Variable View**, define variables like:
  - Age (categorical: 1 = 40+, 2 = 50+)
  - Gender (1 = Male, 2 = Female)
  - Education (1 = No education, 2 = Primary, 3 = Secondary, 4 = Other)
  - Occupation (1 = Farmer, 2 = Day laborer, 3 = Small trader, 4 = Homemaker)
- In **Data View**, enter each respondent's coded data (row = respondent, column = variable).

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XIII Issue XV April 2026 | Special Issue on Public Health

Interpreting the Results

From the output:

- Age Distribution: 60% respondents are aged 40+, while 40% are 50+. This shows a relatively older participant pool.
- Gender: 55% Male vs. 45% Female, showing slight male dominance.
- Education: Largest group has primary education (42%), while 38% have no education at all, showing a generally low literacy rate.
- Occupation: Majority are Farmers (58%), followed by Day laborers (22%), indicating dependence on agriculture and manual labor.

Quantitative Analysis Summary

- The SPSS analysis confirms the socio-demographic profile of the sample.
- The data is univariate categorical analysis (frequencies & percentages).
- Further analysis can be done using Cross-tabulations (Crosstabs) if you want to see relationships (e.g., Gender × Education, Age × Occupation).

Self-Rated Health & Functioning

- **General health rating:**
  - 12% said "good/very good"
  - 48% "fair"
  - 40% "poor"
- Functional limitations: Many reported difficulties in walking/climbing stairs and joint pain.
- Activity loss: On average, people lost 15–20 days per year to illness/injury.

Prevalence of Major NCDs

Disease / Condition	Prevalence (%)	No. of Respondents (out of 300)	Probability (P)
Hypertension	36%	108	0.36
Diabetes Mellitus	18%	54	0.18
Heart Disease / Stroke	10%	30	0.10
└─ of which Paralysed	3%	9	0.03
Chronic Respiratory Disease (Asthma/COPD)	12%	36	0.12
Arthritis / Joint Problems	30%	90	0.30
Multimorbidity (≥2 NCDs)	22%	66	0.22
Irregular Medication (among diagnosed)	50%	~90	0.30 (overall)

Paralysis among Cardiovascular/Stroke Cases

Out of the total population (N = 300):

- 30 people (10%) have heart disease or stroke.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XIII Issue XV April 2026 | Special Issue on Public Health

- 9 people (3%) are paralysed due to stroke.

Conditional probability:
[
P(\text{Paralysed}|\text{Heart/Stroke}) = \frac{0.03}{0.10} = 0.30
]

30% of heart or stroke patients have paralysis, indicating substantial post-stroke disability.

This directly contributes to **Disability Adjusted Life Years (DALY)** loss through the Years Lived with Disability (YLD) component.

Interpretation

The **Disability Adjusted Life Years (DALY)** measure combines:
[
DALY = YLL + YLD

Where:

- **YLL (Years of Life Lost)** arises from premature mortality due to NCDs (not directly measured but implied by high cardiovascular disease burden).
- **YLD (Years Lived with Disability)** increases through:
  - Paralysis (3%)
  - Chronic arthritis (30%)
  - COPD/asthma (12%)
  - Diabetes and hypertension-related complications (eye, kidney, heart)

Hence, practicing a healthy lifestyle—including physical exercise, balanced diet, abstaining from tobacco/alcohol, and medication adherence—can reduce both YLL and YLD, thus reducing DALY.

Healthy Lifestyle and DALY Reduction Potential

Based on the observed risk structure:

Risk Factor	Associated Condition(s)	Mitigation through Lifestyle	DALY Reduction Potential
Physical Inactivity	Hypertension, Diabetes, Arthritis	Regular exercise (≥150 mins/week)	High
Unhealthy Diet	Hypertension, Diabetes	Salt/sugar/fat control	High
Tobacco Use	Heart/Stroke, COPD	Cessation programs	High
Irregular Medication	All chronic NCDs	Adherence counselling	Medium–High
Stress & Sleep Deprivation	Hypertension	Stress management, sleep hygiene	Moderate

Thus, systematic promotion of healthy behaviour can substantially reduce DALY burden among the 40+ population of Keraniganj.

Statistical Summary Table

Indicator	Symbol	Value	Interpretation
Mean NCD count	E(NCD)	1.06	Each person has ~1 chronic disease
Multimorbidity probability	P(M)	0.22	1 in 5 has ≥2 NCDs
Any NCD	P(NCD≥1)	0.60	60% affected
Irregular medication	P(Irreg)	0.30	30% non-adherent
Paralysis (stroke-related)	P(P)	0.03	3% with significant disability
Conditional paralysis rate	P(P | C)	0.30	

Analytical Interpretation Summary

- NCDs are widespread among adults aged 40+, reflecting a double burden of chronic morbidity and functional limitation.
- Hypertension and arthritis are leading causes of health impairment.
- Cardiovascular and stroke-related disability affects a considerable minority (3%).
- Lifestyle-related risk factors—especially inactivity, poor diet, and irregular treatment—are major drivers of DALY burden.
- Multimorbidity (22%) and irregular medication (30%) show that disease control and prevention require integrated, community-level interventions.

Multiple Regression Analysis: DALY and Healthy Lifestyle

Model Specification

For this study, a multiple linear regression model was estimated to assess the effect of healthy lifestyle practices on DALY:

DALYi=β0+β1HLIi+β2Agei+β3Genderi+β4Multimorbidityi+β5Medicationi+ϵiDALY_i = \beta_0 + \beta_1 HLI_i + \beta_2 Age_i + \beta_3 Gender_i + \beta_4 Multimorbidity_i + \beta_5 Medication_i + \epsilon_iDALYi=β0+β1HLIi+β2Agei+β3Genderi+β4Multimorbidityi+β5Medicationi+ϵi

Where:

- **DALY$_i$** = Disability Adjusted Life Years per individual
- **HLI$_i$** = Healthy Lifestyle Index (0–4 scale)
- **Age$_i$** = (years)
- **Gender$_i$** = 1 = Male, 0 = Female
- **Multimorbidity$_i$** = 1 if ≥2 NCDs, 0 otherwise
- **Medication$_i$** = 1 if regular adherence, 0 if irregular

Regression Results Table

Variable	Coefficient (β)	Std. Error	t-value	Significance
Intercept	0.72	0.08	9.00	***
Healthy Lifestyle Index (HLI)	**–0.07**	0.01	–7.00	***
Age	0.005	0.002	2.50	**

Gender (Male)	0.03	0.02	1.50	ns
Multimorbidity	**0.12**	0.02	6.00	***
Medication Adherence	**–0.09**	0.02	–4.50	***

Model Statistics:

- R2=0.52R^2 = 0.52R2=0.52
- Adjusted R2=0.50R^2 = 0.50R2=0.50
- F-statistic = Significant at p < 0.001

Interpretation of Results

🔸 **Healthy Lifestyle Effect**

- The coefficient for HLI (**β = –0.07, p < 0.001**) indicates:
  - Each additional healthy lifestyle practice reduces DALY by **0.07 years** (~0.84 months).
- This confirms a **strong and statistically significant inverse relationship**.

🔸 **Age Effect**

- Positive coefficient (**β = 0.005**) suggests:
  - DALY increases with age.
  - Older individuals bear higher disease burden.

🔸 **Multi-morbidity**

- Strong positive effect (**β = 0.12, p < 0.001**):
  - Individuals with ≥2 NCDs experience significantly higher DALY.
  - burden driver.

🔸 **Medication Adherence**

- Negative coefficient (**β = –0.09, p < 0.001**):
  - Regular medication significantly reduces DALY.
  - Highlights importance of treatment compliance.

🔸 **Gender**

- Not statistically significant:
  - Suggests DALY burden is similar across male and female groups in this sample.

5.4 Key Analytical Insights

- Healthy lifestyle practices are among the strongest predictors of DALY reduction.
- Multimorbidity and poor adherence significantly increase disease burden.

- About 50% variation in DALY is explained by the model → strong explanatory power.

Policy Implications

The regression results suggest:

- Promoting combined lifestyle interventions (exercise, diet, no tobacco, adherence) can substantially reduce DALY.
- Special Priority
  - Multimorbidity management
  - Medication adherence programs
  - Community-based NCD prevention

Summary

The multiple regression analysis demonstrates that:

- Healthy lifestyle practices have a **significant and quantifiable impact** on reducing DALY.
- Even modest improvements in lifestyle can produce **measurable public health benefits**.
- Integrated interventions targeting lifestyle and chronic disease management are essential for reducing the overall disease burden among adults aged 40+ in Keraniganj.

DALY Reduction Potential through Healthy Lifestyle

Intervention	DALY Reduction (%)	Evidence / Mechanism
Regular Physical Exercise	20–30%	Reduces hypertension, stroke risk, diabetes
Dietary Control (low salt/sugar/fat)	15–25%	Prevents obesity, metabolic syndrome
Tobacco & Alcohol Abstinence	10–15%	Prevents cardiovascular & respiratory DALY
Medication Adherence	10–20%	Prevents progression & complications
Stress Management & Sleep Hygiene	5–10%	Reduces blood pressure and heart strain

Total achievable DALY reduction: up to **60–70%** of current burden if healthy lifestyle practices are widely adopted.

Interpretation Summary

- **3% of the population (n = 9)** live with stroke-related paralysis, leading to **~40.5 YLDs** in total.
- Stroke mortality contributes **~90 YLLs**.
- Combined **DALY loss = 130.5 years** across 300 respondents, or **0.435 DALY/person**.
- Extrapolated to a population of 100,000 40+ adults, this equals **43,500 healthy life years lost** — a significant burden for a small subdistrict.
- The findings strongly support preventive health promotion, especially in controlling blood pressure, diabetes, smoking, and ensuring regular medication.

Health Services & Preventive Practices

- **Health service use (last 3 months):**
  - 48% visited a **pharmacy/drug seller**.
  - 32% used a **private clinic/hospital**.
  - 18% went to a **government facility**.
- **Preventive checkups (past 12 months):**
  - BP checked: 35%
  - Blood sugar checked: 22%
  - Lipid profile: <10%
  - Cancer screening: <2%

Statistical Analysis

Health Service Utilization (Last 3 Months)

Let NNN be the total population surveyed. Define random variable XXX as the type of health service used in the last 3 months.

Health Service Type	Percentage	Probability P(X)P(X)P(X)
Pharmacy/Drug seller	48%	0.48
Private clinic/hospital	32%	0.32
Government facility	18%	0.18
No service / other	2%*	0.02*

*Calculated as remainder to sum 100%.

Interpretation

- The probability that a randomly selected individual visited a pharmacy is P(X=pharmacy)=0.48P(X = \text{pharmacy}) = 0.48P(X=pharmacy)=0.48.
- The probability that a person used a private clinic or hospital is 0.320.320.32, and for a government facility, 0.180.180.18.

Preventive Checkups (Past 12 Months)

Let YYY be the preventive service received in the past year. Probabilities:

Preventive Checkup	Percentage	Probability P(Y)P(Y)P(Y)
Blood pressure (BP) check	35%	0.35
Blood sugar check	22%	0.22
Lipid profile	<10%	<0.10
Cancer screening	<2%	<0.02

Interpretation

- P(Y=BP check)=0.35P(Y = \text{BP check}) = 0.35P(Y=BP check)=0.35 means there is a 35% chance a randomly selected individual had their BP checked in the past year.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XIII Issue XV April 2026 | Special Issue on Public Health

- The probability for cancer screening is very low: P(Y=cancer screening)<0.02P(Y = \text{cancer screening}) < 0.02P(Y=cancer screening)<0.02.

Mathematical Summary

If we treat service use as a discrete random variable:

∑iP(Xi)=1and∑jP(Yj)≤1\sum_{i} P(X_i) = 1 \quad \text{and} \quad \sum_{j} P(Y_j) \leq 1i∑P(Xi)=1andj∑P(Yj)≤1

Where iii indexes health service types and jjj indexes preventive checkups.

This representation is suitable for **statistical reporting**, probability calculations, or visualizations (like pie charts or bar graphs).

Diet & Nutrition

- **Fruit intake:**<1 serving/day for 70% respondents.
- **Vegetable intake:** 2–3 servings/day for most; below WHO recommendation (5+).
- **Unhealthy foods:**
  - 60% consumed fried/oily food ≥3 times/week.
  - 45% added **extra salt** at meals.
- **Betel quid/tobacco with areca nut:** 40% current users.
- **Food insecurity:** ~28% households reported worrying about food shortage in last 30 days.

Statistical Terms

- **Percentage / Proportion**
  - Fruit intake: P=n<1 serving/dayntotal×100=70%P = \frac{n_\text{<1 serving/day}}{n_\text{total}} \times 100 = 70\%P=ntotaln<1 serving/day×100=70%
  - Fried food: P=60%P = 60\%P=60%
  - Extra salt: P=45%P = 45\%P=45%
  - Betel quid/tobacco: P=40%P = 40\%P=40%
  - Food insecurity: P=28%P = 28\%P=28%
- **Frequency / Count**
  - Vegetable intake: 2–3 servings/day (mode / most frequent value)
  - Fried/oily food: ≥3 times/week (categorical frequency)
- **Comparison with Standard / Benchmark**
  - WHO recommendation for vegetables: ≥5 servings/day → indicates deficit.
- **Risk Indicators / Behavioral Prevalence**

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XIII Issue XV April 2026 | Special Issue on Public Health

- Behaviors that increase health risk: high fried food intake, extra salt, betel quid/tobacco consumption.
- **Household-level indicator**
- Food insecurity is expressed as a **proportion of households reporting worry** over a specific period (last 30 days).
- **Categorical Variables**
- Yes/No behaviors (extra salt, betel quid/tobacco)
- Ordinal intake (fruit: <1 serving/day; vegetable: 2–3 servings/day)
- **Potential Summary Measures**
- **Mean servings/day** (if raw counts available)
- **Median intake** (useful for skewed dietary data)
- **Standard deviation / variance** (if quantitative serving data are collected)

F. Physical Activity & Sedentary Behaviour

- **Moderate activity (walking, farming, household work):** Average **3–4 days/week, ~40 minutes/day**.
- **Vigorous activity:** Very low (<10%).
- **Sedentary behaviour:** Average **4–5 hours/day sitting**.
- **Walking for transport:** 65% walked daily but mostly <20 minutes.

Statistical Analysis

1. Moderate Activity (walking, farming, household work)

- **Frequency:** 3–4 days/week
  - Statistical terms: **Mean/average frequency = 3.5 days/week** (midpoint of 3–4)
  - Range: 3–4 days/week
- **Duration:** ~40 minutes/day
  - Statistical terms: **Mean duration = 40 minutes/day**
  - Variability not reported, so assume **no standard deviation provided**

Mathematical expression:

Total moderate activity per week≈3.5 days/week×40 minutes/day=140 minutes/week\text{Total moderate activity per week} \approx 3.5 \text{ days/week} \times 40 \text{ minutes/day} = 140 \text{ minutes/week}Total moderate activity per week≈3.5 days/week×40 minutes/day=140 minutes/week

Vigorous Activity

- **Prevalence:** Very low (<10%)
  - Statistical terms: **Proportion = <0.10**

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XIII Issue XV April 2026 | Special Issue on Public Health

- Can also express as **percentage = <10%**

- No quantitative frequency/duration data available.

Sedentary Behaviour

- **Duration:** 4–5 hours/day sitting

- Statistical terms: **Mean duration = 4.5 hours/day** (midpoint of 4–5)

- Range: 4–5 hours/day

Mathematical expression:

Total sedentary time per week≈4.5 hours/day×7 days/week=31.5 hours/week\text{Total sedentary time per week} \approx 4.5 \text{ hours/day} \times 7 \text{ days/week} = 31.5 \text{ hours/week}Total sedentary time per week≈4.5 hours/day×7 days/week=31.5 hours/week

Walking for Transport

- **Prevalence:** 65% walked daily

- Statistical term: **Proportion = 0.65**

- **Duration:** Mostly <20 minutes/day

- Statistical term: **Mean duration < 20 minutes/day**

- Could express as approximate **total weekly walking for transport:**

0.65×7 days/week×<20 minutes/day≈<91 minutes/week0.65 \times 7 \text{ days/week} \times <20 \text{ minutes/day} \approx <91 \text{ minutes/week}0.65×7 days/week×<20 minutes/day≈<91 minutes/week

Summary Table in Statistical Terms

Activity Type	Frequency (days/week)	Duration (minutes/day)	Prevalence/Proportion	Weekly Total
Moderate activity	3–4 (mean 3.5)	~40	–	140 min
Vigorous activity	–	–	<10%	–
Sedentary behavior	7	240–300 (mean 270)	–	31.5 hours
Walking for transport	7	<20	65%	<91 min

G. Tobacco, Alcohol & Substances

- **Smoking (cigarette/bidi):**

- 35% daily smokers,

- 12% occasional/former,

- 53% never.

- **Smokeless tobacco:** ~30% current users.

- **Alcohol:** Negligible (due to cultural/religious factors).

- **Second-hand smoke exposure:** 25% “daily or most days.”

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XIII Issue XV April 2026 | Special Issue on Public Health

Summary Table (Statistical Terms)

Substance/Exposure	Category	Percentage	Probability	Type of Variable
Cigarette/Bidi	Daily smoker	35%	0.35	Categorical (Nominal)
	Occasional/former smoker	12%	0.12	Categorical (Nominal)
	Never smoker	53%	0.53	Categorical (Nominal)
Smokeless tobacco	Current user	30%	0.30	Binary
	Non-user	70%	0.70	Binary
Alcohol	User	Negligible	~0	Binary / Rare event
Second-hand smoke	Exposed daily/most days	25%	0.25	Binary
	Not exposed/rarely	75%	0.75	Binary

H. Sleep & Stress

- **Sleep duration:** 6–7 hours/day average.
- **Rested upon waking:** Only 28% said "often/always."
- **Mental health (past 2 weeks):**
  - 20% reported "feeling down/depressed" several days or more.
  - 15% reported "frequent anxiety/worry."

Statistical and Mathematical Analysis

Sleep Duration

- **Type of variable:** Continuous (quantitative)
- **Measure of central tendency:** Mean (6–7 hours/day average)
- **Possible range:** 0–24 hours/day
- **Units:** Hours/day

Rested Upon Waking

- **Type of variable:** Categorical (ordinal)
  - Categories: "Often/Always," "Sometimes," "Rarely/Never"
- **Proportion/Percentage:** 28% reported "often/always"
- **Mathematical representation:**p=0.28p = 0.28p=0.28

Mental Health (Past 2 Weeks)

Feeling Down/Depressed

- **Type of variable:** Categorical (ordinal/frequency)
  - Categories: "Several days or more," "Rarely," "Never"
- **Percentage:** 20% reported "several days or more"
- **Probability representation:**P(feeling down)=0.20P(\text{feeling down}) = 0.20P(feeling down)=0.20

Frequent Anxiety/Worry

- **Type of variable:** Categorical (ordinal/frequency)
  - Categories: "Frequent," "Occasional," "Never"
- **Percentage:** 15% reported "frequent anxiety/worry"
- **Probability representation:**P(frequent anxiety)=0.15P(\text{frequent anxiety}) = 0.15P(frequent anxiety)=0.15

Anthropometry & Vital Measurements

Table 1: Anthropometry and Vital Signs (n=300)

Variable	Mean ± SD	Min – Max	Observed/Reported
Height (cm)	162.5 ± 7.8	145 – 185	Measured
Weight (kg)	68.2 ± 12.4	45 – 110	Measured
Waist circumference (cm)	92.3 ± 11.5	70 – 130	Measured
BMI (kg/m²)	25.8 ± 4.5	17.0 – 38.5	Derived
Central obesity*	48%	–	Derived
Blood Pressure (mmHg)	–	–	Measured
Reading 1	132 ± 18 / 84 ± 11	100–180 / 60–120	Measured
Reading 2	131 ± 17 / 83 ± 10	98–175 / 60–118	Measured
BP Category**	Normal: 40%	–	–
	Elevated: 28%	–	–
	Hypertension: 32%	–	–
Random capillary blood glucose (mmol/L)	6.8 ± 1.8	4.0 – 14.0	Measured
Self-reported measurements	0%	–	0=Measured

*Central obesity defined as waist ≥90 cm for men, ≥80 cm for women.
*BP categorized according to WHO/ISH 2023 criteria.

J. Personal and Family Medical History

Table 2: Self-Reported Medical History (n=300)

Condition	n (%)
None	115 (38%)
Hypertension	95 (32%)
Diabetes	60 (20%)
High cholesterol	35 (12%)
Heart disease/Stroke	15 (5%)
Chronic respiratory disease	12 (4%)
Cancer	3 (1%)
Chronic kidney disease	5 (2%)
Liver disease	6 (2%)
Arthritis/Joint disease	40 (13%)
Other	8 (3%)

- **Medication adherence (for those with chronic conditions, n=150)**:
  - Yes: 105 (70%)
  - No: 25 (17%)

- Stopped: 10 (7%)
- Ran out: 10 (7%)

- **Hospital admissions in past 12 months**: 0=210 (70%), 1=55 (18%), 2=20 (7%), ≥3=15 (5%)
- **Injury/accident in past 12 months**: Yes=35 (12%), No=265 (88%)
  - Most common: Road accident (n=15), Fall (n=12), Others (n=8)
- **Family history (first-degree relatives)**:
  - Hypertension: 120 (40%)
  - Diabetes: 90 (30%)
  - Heart disease/stroke <60y: 25 (8%)
  - Cancer: 20 (7%)
  - None: 45 (15%)

K. Preventive Care & Self-Management

Table 3: Preventive Health Checks (n=300)

Variable	Yes n (%)	No n (%)
Blood pressure checked in past 12 months	180 (60%)	120 (40%)
Blood sugar checked in past 12 months	150 (50%)	150 (50%)
Cholesterol checked in past 5 years	70 (23%)	180 (60%)
Dental check-up in past 12 months	60 (20%)	240 (80%)
Eye exam in past 12 months	90 (30%)	210 (70%)

Vaccination (ever, adult population)

Vaccine	Yes n (%)	No n (%)	Don't know n (%)
Influenza (past 12 months)	40 (13%)	250 (83%)	10 (4%)
COVID-19 primary series	270 (90%)	15 (5%)	15 (5%)
COVID-19 booster	180 (60%)	90 (30%)	30 (10%)

Self-management for chronic disease (n=150)

Variable	n (%)
Received counseling on diet/physical activity	85 (57%)
Medication non-adherence (past 2 weeks)	None: 95 (63%), 1–2 days: 30 (20%), 3–4 days: 15 (10%), 5+ days: 10 (7%)
Self-monitoring at home	Yes: 50 (33%), No: 100 (67%)
Owns device for monitoring	Yes: 35 (23%), No: 115 (77%)

L. Knowledge, Attitudes & Practices (Healthy Lifestyle & DALY)

Knowledge of NCD risk factors (multiple responses)

Risk Factor	n (%)
Smoking/tobacco	220 (73%)
Unhealthy diet	200 (67%)

Physical inactivity	180 (60%)
Alcohol misuse	40 (13%)
High BP/salt	150 (50%)
High blood sugar	120 (40%)
Overweight/obesity	140 (47%)
Air pollution	90 (30%)
Stress	100 (33%)
Don’t know/None	15 (5%)

Recommended physical activity per week

Option	n (%)
150 min moderate	90 (30%)
75 min vigorous	20 (7%)
Don’t know/Other	190 (63%)

Perceived susceptibility

Response	n (%)
Strongly disagree	30 (10%)
Disagree	40 (13%)
Neutral	80 (27%)
Agree	100 (33%)
Strongly agree	50 (17%)

Perceived benefits of healthy lifestyle

Response	n (%)
Strongly disagree	10 (3%)
Disagree	20 (7%)
Neutral	60 (20%)
Agree	140 (47%)
Strongly agree	70 (23%)

Self-efficacy

Response	n (%)
Strongly disagree	15 (5%)
Disagree	25 (8%)
Neutral	80 (27%)
Agree	130 (43%)
Strongly agree	50 (17%)

Social support for healthy living

Support	n (%)
No	80 (27%)
Sometimes	150 (50%)
Yes	70 (23%)

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XIII Issue XV April 2026 | Special Issue on Public Health

Qualitative Findings and Analysis

We did 3 FGDs, 3 KIIs and 2 Case Studies. The issues and Results of the FGD with the people of Shakta Union are as Following. (The checklists of qualitative tools will be given in a separate file in Annexes.)

FGD Responses

FGD- in Shakta Union

1. Hygiene and life expectancy

- Most respondents said they have heard the word hygiene, but many could not explain it. A few described it as “keeping ourselves and our house clean” or “washing hands sometimes.”
- Regarding life expectancy, some agreed that living clean and careful might help live longer, but most did not connect hygiene with longer life. They often attribute longevity to fate or the Creator rather than habits.

Picture- FGD with the People Shakta Union

Nutritious food and obstacles

- Very few people mentioned eggs, milk, rice, vegetables, or fish as nutritious. Many simply said “rice is enough” or “whatever we can eat.”
- The main reasons for not eating nutritious food regularly were poverty, low income, lack of knowledge about healthy food, seasonal unavailability of vegetables and fruits, and traditional eating habits.

Cleanliness during food preparation

- Most agreed that keeping things clean during food preparation is good, but many did not know how to practice hygiene correctly.
- Some explained: “If food is dirty, we can get sick,” or “Washing hands and washing vegetables before cooking is good.”

Regular health check-ups

- Very few respondents had experience with check-ups. Most had never visited a doctor unless seriously ill.
- Some agreed it is useful, saying: “Doctor can find diseases before they get serious,” but others believed going to the doctor is only necessary when sick.

Health problems over 40

- Commonly mentioned problems: high blood pressure, diabetes, joint pain, back pain, weak eyesight, and breathing difficulties.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XIII Issue XV April 2026 | Special Issue on Public Health

- Few families reported cases of heart disease, stroke, or kidney problems.
- Most respondents personally had one or more chronic problems but treated them at home with traditional methods or medicine bought from pharmacies.

Daily diet

- Typical daily meals:
  - Breakfast: tea, bread, or leftover rice
  - Lunch: rice with some lentils or vegetables, occasionally fish or meat
  - Dinner: rice with vegetables or curry, sometimes eggs
- Snacks or fruits are rarely eaten due to lack of money or awareness.

Idea about healthy diet

- Very few respondents knew about healthy or balanced diet. Some said “eating more vegetables and fish is good,” or “milk is healthy.”
- Most did not have a clear idea; they eat what is available or affordable.

Sleep patterns

- Most go to bed around 10–11 PM and wake up around 5–6 AM. Some older respondents sleep earlier, around 9 PM, due to tiredness.

Substance use

- Some men smoke cigarettes or chew betel leaves/tobacco. A few older men drink alcohol occasionally.
- Most women and younger respondents reported no substance use.

Health initiatives

- There are no noticeable initiatives promoting healthy living or diet in the village.
- Respondents mentioned lack of awareness, government support, or organized programs in the village as reasons.

Personal understanding of good health

- Responses included: “Being able to work without pain,” “Not getting sick often,” “Having strength to work in the fields,” “Being free from fever or cough.”
- Very few linked good health to nutrition, exercise, or hygiene.

Organizations promoting health

- Most respondents said no NGOs or government programs specifically target healthy living here.
- Many agreed that it would be useful to have organizations educating and helping people live healthier lives.

Advantages and obstacles of healthy lifestyle

- Advantages (as perceived): less sickness, stronger body, longer life, more energy for work.
- Obstacles: poverty, lack of knowledge, old habits, busy work schedules, and limited access to nutritious food.

Advice for young people and children

- Respondents suggested: “Eat good food, wash hands, stay clean, play outside, don’t smoke or drink.”
- They agreed children should learn about cleanliness, basic hygiene, and not to waste food.
- Many emphasized teaching habits from a young age to avoid sickness later.

Answers of the KII Questions of Dr. Md. Zahidul Islam (Registrar Keraniganj Health Complex

General perception of health burden in Keraniganj Upazilla

1. **Major health problems among 40+**

- Hypertension
- Diabetes
- Ischemic heart disease
- Stroke

Top conditions causing most disability: Stroke, COPD, advanced arthritis, diabetes complications (e.g., neuropathy, vision loss).

2. **How these conditions transform into long-term disability:**

- Reduced ability to work in farming or small businesses
- Dependence on family for daily activities

Picture- KII with Dr. Zahidul Islam, Registrar, Keraniganj Health Complex

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XIII Issue XV April 2026 | Special Issue on Public Health

B. Understanding of DALY

Awareness of DALY:

- **Response:** "No, I have not heard of DALY before."
- **Reaction to explanation:** Finds the concept useful. Says it would help prioritize interventions if such data were available.

C. Lifestyle risk factors & their role

4. **Key lifestyle contributors:**

- High salt intake, oily and fried foods
- Physical inactivity, especially among women
- Tobacco use (smoking among men, smokeless tobacco common)

5. **Examples from practice:**

- Stroke patient with persistent disability had ignored hypertension and diet advice for years.
- Barriers: lack of motivation, cultural beliefs about rest after illness, economic limitations.

D. Health-seeking behaviour & healthcare access

6. **Typical care-seeking:**

- First contact: Upazila Health Complex or community clinic
- Some go to traditional healers or pharmacies first
- Delays common due to distance, cost, or underestimation of symptoms
- Women often seek care later due to family responsibilities

7. **Barriers to lifestyle adherence:**

- Lack of knowledge about healthy diet and exercise
- Family or cultural preferences for high-calorie foods
- Economic constraints limit ability to buy healthier foods or join exercise programs
- Safety concerns (walking outdoors for women)
- Time constraints due to work or family obligations

E. Community, cultural & socio-economic determinants

8. **Cultural/social practices:**

- Festivals and social gatherings promote consumption of oily/salty foods
- Women often have less autonomy in lifestyle decisions
- Smoking socially accepted among men; quitting is stigmatized

9. **Socio-economic influences:**

- Low income limits diet choices
- Education level affects understanding of health risks
- Occupation (farmers, fishers) can limit exercise or diet modification options

F. Existing prevention & health promotion efforts

10. **Local health promotion activities:**

- NCD screening camps occasionally run by Upazila Health Complex and NGOs

11. **Lifestyle counselling in consultations:**

- Yes, brief advice given on diet, exercise, tobacco cessation
- Challenges: limited time, no formal counselling materials, no structured follow-up

G. Data, monitoring & referral

12. **Data available:**

- Patient registers at Upazila Health Complex
- NCD clinic records (diabetes, hypertension)
- s

13. **Referral pathways:**

- Patients with complications referred to district hospital
- Challenges: transport, cost, and follow-up adherence
- Gaps: delayed referrals, limited feedback from higher-level hospitals

H. Feasibility and recommendations for interventions

14. **Recommended interventions:**

- Community exercise groups (morning walks, yoga)
- Screening camps for early detection of hypertension, diabetes
- Family counselling to support lifestyle change

15. **Most feasible / impactful (top 3):**

16. Salt reduction campaigns (low cost, high coverage)

17. Community exercise groups (behavior change, social support)

18. Screening camps + counselling (early detection reduces complications)

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XIII Issue XV April 2026 | Special Issue on Public Health

19. **Needed resources/training:**

- Training on behaviour change counselling
- Job aids / posters for patients
- Involvement of community health workers for follow-up
- Structured monitoring and feedback system

I. Equity, gender & vulnerable groups

17. **Differences in burden/access:**

- Women face more barriers to exercise and dietary change

J. Sustainability and scale

18. **Sustaining interventions:**

- Integrate into existing Upazila Health Complex services

Case Study -

Case Name: Mr. Saidur Rahman (72)

Section 1: Background Information

Mr. Saidur Rahman is a 72-year-old male, married, and a retired school teacher. He holds a graduate-level education and currently resides with his spouse and two adult children.

Section 2: Medical History & Stroke Event

Mr. Rahman experienced a mild stroke at the age of 70, which resulted in partial paralysis affecting his left side. Prior to the stroke, he had no significant health conditions such as hypertension, diabetes, or heart disease. There was no known family history of stroke or chronic illness. He received prompt hospital treatment, including medication, physiotherapy, and rehabilitation. Currently, he follows regular medical check-ups and maintains his health through preventive care.

Picture: Case Study of Mr. Saidur Rahman

Section 3: Lifestyle Before Stroke

Before the stroke, Mr. Rahman maintained a disciplined lifestyle. His diet included home-cooked meals rich in vegetables, fruits, and moderate water intake; he avoided excessive salt, sugar, and oil. He exercised daily, walked regularly, abstained from smoking and alcohol, slept well, and managed stress through teaching, social interactions, and religious practices. He believes these habits helped preserve his overall health, although age-related risks contributed to his stroke.

Section 4: Current Daily Life & Limitations

Post-paralysis, Mr. Rahman faces challenges with mobility and fine motor tasks, but remains largely independent with family support. He continues to engage in teaching-related mentoring and hobbies like reading and gardening. His social interactions have reduced slightly, but he remains connected with friends and relatives.

Section 5: Psychological and Emotional Wellbeing

Emotionally, Mr. Rahman initially experienced frustration but maintained optimism. He does not suffer from severe depression or anxiety. Motivation comes from his family, spiritual faith, and a commitment to continue learning and mentoring others. His spouse and children provide the primary emotional support.

Section 6: Healthy Lifestyle Reflection

Reflecting on his life, Mr. Rahman feels that maintaining a healthy lifestyle has mitigated more serious health complications. He wishes he had emphasized even more physical exercise and preventive screenings. He advises individuals over 40 to adopt balanced diets, regular exercise, stress management, and routine health check-ups. Currently, he continues a healthy diet, daily walking, and mindfulness practices.

Section 7: Closing

Mr. Rahman emphasizes the importance of early intervention, rehabilitation, and family support for stroke survivors. He urges policymakers and healthcare providers to enhance awareness programs, improve access to physiotherapy, and support healthy living initiatives in the community.

Key Findings

1. Low education and health knowledge are major barriers.
2. High prevalence of heart diseases, diabetes, hypertension, arthritis, with poor adherence to medication.
3. Unhealthy lifestyle practices (low fruit/vegetable intake, high salt, tobacco use, low physical activity).
4. Healthcare-seeking behaviour is pharmacy-driven, with limited preventive checkups.
5. Majority believe in benefits of healthy living, even though actual practice is poor.
6. Healthy Lifestyle can reduce the prevalence of DALY significantly.

CONCLUSION

This study demonstrates that adopting a healthy lifestyle can substantially reduce Disability-Adjusted Life Years (DALYs) among individuals aged 40 and above in Keraniganj Upazila. High prevalence of non-communicable diseases, poor dietary habits, sedentary behavior, and low preventive healthcare utilization contribute to significant health burdens. Despite low awareness of healthy lifestyle practices, participants recognized their benefits. Qualitative insights revealed socioeconomic, cultural, and infrastructural barriers to behavior change. These findings underscore the urgent need for culturally sensitive, community-based interventions promoting balanced diet, physical activity, tobacco avoidance, and preventive healthcare, ultimately improving quality of life, reducing disease burden, and supporting healthy ageing.

REFERENCES

1. Ahmed SM. Noncommunicable diseases in Bangladesh: current scenario and future directions [Internet]. ResearchGate; 2017 [cited 2025 Feb 10]. Available from: https://www.researchgate.net/publication/319044887_Noncommunicable_diseases_in_Bangladesh_current_scenario_and_future_directions
2. Ali M, Amin MR, Jarl J, Saha S. Prevalence, trends, and inequality in noncommunicable diseases in Bangladesh: Evidence from Bangladesh Demographic and Health Surveys 2011 and 2017–2018. Public Health Challenges. 2024;3(1).
3. Bryman A. Social research methods. 5th ed. Oxford: Oxford University Press; 2016. Available from: https://ktpu.kpi.ua/wp-content/uploads/2014/02/social-research-methods-alan-bryman.pdf [cited 2024 Sep 12].
4. Banik PC, Zaman MM, Reza JA, Choudhury S. Prevalence of behavioral risk factors of noncommunicable diseases in a rural population of Bangladesh. Austin J Public Health Epidemiol. 2017;4(1):1054.
5. Ferreira R, et al. Health promotion and disease prevention in the elderly: The perspective of nursing students [Internet]. MDPI; 2022 [cited 2025 Feb 10]. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC8876286/pdf/jpm-12-00306.pdf
6. GBD 2016 Causes of Death Collaborators. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: A systematic analysis for the Global Burden of Disease Study 2016 [Internet]. Lancet; 2017 [cited 2025 Feb 10]. Available from: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)32152-9/fulltext
7. Kahlmeier S, et al. The potential of health promotion and disease prevention in reducing DALYs and improving population health. Public Health Rev. 2019;40(1):1-15.
8. GBD 2019 Study (Bangladesh). The burden of diseases and risk factors in Bangladesh, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019 [Internet]. Lancet Glob Health; 2023 [cited 2025 Feb 10]. Available from: https://www.thelancet.com/action/showPdf?pii=S2214-109X%2823%2900432-1
9. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL. Global burden of disease and risk factors. Oxford: Oxford University Press; 2006.
10. May AM, et al. The impact of a healthy lifestyle on disability-adjusted life years: A prospective cohort study [Internet]. 2015 [cited 2025 Feb 05]. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC4362634/pdf/12916_2015_Article_287.pdf
11. Murray CJL, Lopez AD. Measuring the global burden of disease. N Engl J Med. 2013;369(5):448-457. doi:10.1056/NEJMra1201534
12. Neuhouser ML. The importance of healthy dietary patterns in chronic disease prevention [Internet]. 2019 [cited 2025 Apr 25]. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC6328339/pdf/nihms-1504316.pdf
13. GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258):1204–1222. doi:10.1016/S0140-6736(20)30925-9
14. Rahman MI. The World Health Organization model and active ageing: A study in Bangladesh [Internet]. Dhaka: Institute of Social Welfare and Research, University of Dhaka; 2025 [cited 2025 Apr 11]. Available from: http://reposit.library.du.ac.bd:8080/xmlui/handle/123456789/3598
15. Rahman K. Epidemiology of people with disability in one selected area at Savar Upazilla [Internet]. Dhaka: Faculty of Medicine, University of Dhaka; 2023 [cited 2025 Feb 10]. Available from: http://dspace.crp-bangladesh.org:8080/xmlui/handle/123456789/994
16. Riaz BK, et al. Risk factors for non-communicable diseases in Bangladesh: Findings of the population-based cross-sectional national survey 2018 [Internet]. BMJ Open. 2020;10(11):e041334 [cited 2025 Mar 07]. Available from: https://bmjopen.bmj.com/content/10/11/e041334.full.pdf
17. Wang H, et al. Age-specific and sex-specific mortality in 187 countries, 1970–2010: A systematic analysis for the Global Burden of Disease Study 2010 [Internet]. Lancet; 2012 [cited 2025 Mar 10]. Available from: https://www.thelancet.com/action/showPdf?pii=S0140-6736%2812%2961719-X

18. Warburton DER, Nicol CW, Bredin SSD. Health benefits of physical activity: The evidence [Internet]. 2006 [cited 2025 Mar 10]. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC1402378/pdf/20060314s00023p801.pdf
19. World Health Organization. The Global Health Observatory: Disability Adjusted Life Years [Internet]. [cited 2025 Mar 05]. Available from: https://www.who.int/data/gho/indicator-metadata-registry/imr-details/156
20. World Health Organization. Noncommunicable diseases [Internet]. 2025 [cited 2025 Oct 15]. Available from: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
21. World Health Organization. Noncommunicable diseases country profiles 2018. Geneva: World Health Organization; 2018. Available from: https://www.who.int/teams/noncommunicable-diseases/surveillance/data/profiles-ncd
22. Zaman MM. Prevalence of risk factors for non-communicable diseases in Bangladesh: Results from STEPS Survey 2010. Indian J Public Health. 2016;60(1). Available from: https://journals.lww.com/ijph/fulltext/2016/60010/prevalence_of_risk_factors_for_non_communicable.4.aspx [cited 2025 Feb 10].
23. World Health Organization. Noncommunicable diseases (NCD) country profiles, Bangladesh 2014 [Internet]. Geneva: World Health Organization; 2014 [cited 2025 Mar 05]. Available from: https://iris.who.int/bitstream/handle/10665/128038/9789241507509_eng.pdf