Proposal Report on Prevalence of Hypertension and It's Associaton with High Salt Intake Among Individuals Aged 40 Years and Above in Satkhira District of Bangladesh

Course Title: NCD Epidemiology (PBH: 644.1)

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Master of Public Health (MPH)

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1. Introduction

1.1. Background

Hypertension (HTN) is a leading contributor to global morbidity and mortality, responsible for a substantial burden of cardiovascular diseases, stroke, and kidney disorders (Erem et al., 2009). Globally, the prevalence of hypertension has doubled between 1990 and 2019, affecting over 1.3 billion adults (Zhou et al., 2021). In Bangladesh, recent studies report prevalence rates ranging from 26.4% to 40.7% among adults (Khanam et al., 2019), with higher rates observed in older populations.

This research seeks to find the prevalence of hypertension and its association with salt intake among adults aged 40 years and above in Satkhira district. This district represent underserved populations with distinct dietary habits and limited access to preventive health services.

1.2. Justification of the Study

Hypertension is a major public health concern globally and in Bangladesh, with its prevalence rising steadily with age. Adults aged 40 years and above are particularly vulnerable to hypertension and its complications, including cardiovascular disease, stroke, and renal impairment. Despite this elevated risk, there is a notable lack of locally relevant evidence linking salt intake habits with hypertension in this high-risk demographic, especially outside major urban centers.

1.3. Research Questions

- What is the prevalence of hypertension among individuals aged 40 years and above in Satkhira district of Bangladesh?
- Is there an unadjusted association between extra salt intake and the prevalence of hypertension in this population?
- Does the association between extra salt intake and hypertension remain significant after adjusting for potential confounding variables such as Body Mass Index (BMI), Physical activity level, Age and sex?

2. Literature Review

Hypertension (HTN) is a leading risk factor for noncommunicable diseases and represents a significant global public health challenge due to its widespread prevalence across diverse geographic regions (Erem et al., 2009).

The significant risk factors associated with developing HTN are age, sex, occupation, BMI, obesity, fat intake, stress, positive family history of hypertension, past history of hypertension (e.g. gestational hypertension), diabetes, physical inactivity, extra salt intake, smoking history etc(Awan et al., 2024). Among these risk factors, excessive dietary salt (sodium chloride) intake is a well-established modifiable risk factor for hypertension. High dietary sodium intake is estimated to account for nearly 30% of global hypertension cases, potentially affecting between 400 and 500 million individuals worldwide (Campbell et al., 2023). The World Health Organization recommends limiting salt consumption to less than 5 grams per day to reduce cardiovascular risk (Zhou et al., 2021). Existing literature indicates that the average daily salt consumption in Bangladesh is around 10 grams nearly twice the World Health Organization's recommended threshold of 5 grams per day aimed at reducing the risk of HTN (Riaz et al., 2020).

3. Research Methodology

3.1. General Objective

The general objectives of this study are to estimate the prevalence of hypertension and its association with extra salt intake among individuals aged 40 years and above in Satkhira district of Bangladesh.

3.2. Specific Objectives

- To estimate the prevalence of hypertension among individuals aged 40 years and above in Satkhira district.
- To assess the unadjusted association between extra salt intake and the prevalence of hypertension.
- To determine the association between extra salt intake and hypertension after con-

trolling for potential confounding variables, including age, sex, Body Mass Index (BMI) and physical activity

3.3. Conceptual Framework

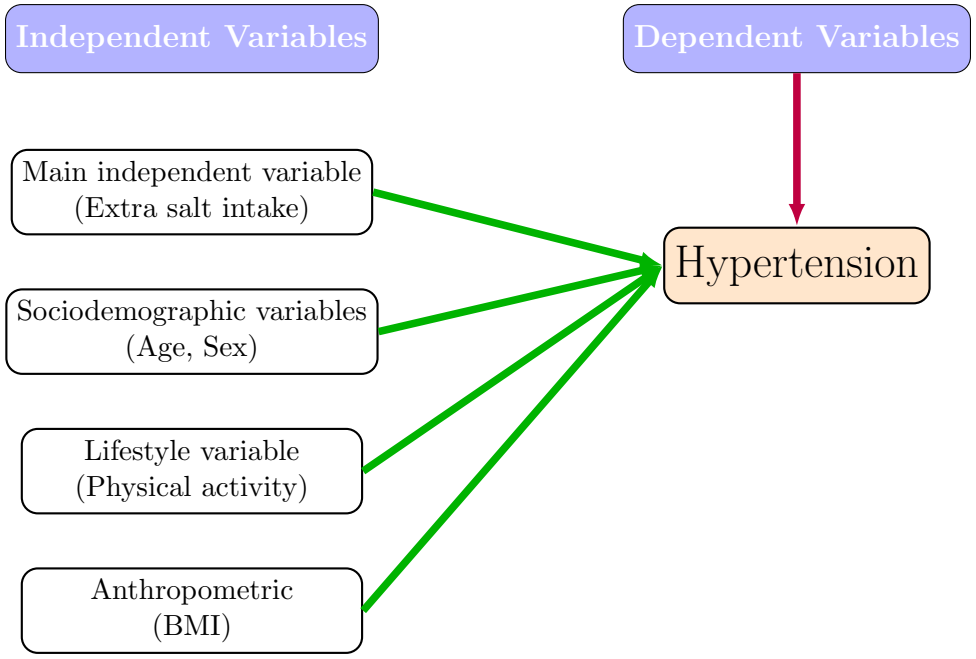


Figure 1: The associations among different variables

3.4. Study Design

This study will use a cross-sectional survey to measure prevalence of hypertension and its association with salt intake among individuals aged 40 years and above between variables at one point in time.

3.5. Target Population & Sample Population

The target population for this study comprises adults aged 40 years and above residing in Satkhira district of Bangladesh.

3.6. Study Site & Area

The study will be conducted in Satkhira district, situated in the southern region of Bangladesh. This district encompass a mix of rural and semi-urban communities, making them suitable for examining dietary behaviors and hypertension prevalence among adults aged 40 years and above.

3.7. Study Period

The study will be conducted over a nine-month period, from December 2025 to August 2026. This timeline encompasses all key phases of the research process, including literature review, field data collection, statistical analysis, and report writing.

3.8. Sample Size

Using a simple random sampling approach, and assuming a 95% confidence level (Z = 1.96), an estimated prevalence of hypertension of 23.7%, and a margin of error of 4%, the initial sample size was calculated to be 434. Given the use of cluster sampling in field implementation, a design effect (DEFF) of 1.48 was applied, yielding an adjusted sample size of 643. To accommodate a potential 10% non-response rate,the final sample size was increased to 714 participants.

3.9. Sampling Technique

This study will employ a multistage cluster sampling technique to ensure representativeness across the target population of adults aged 40 years and above. In the first stage, a total of 25 clusters will be selected using Probability Proportional to Size (PPS) sampling based on population distribution data. Each cluster will correspond to a defined administrative unit, such as a village or ward. In the second stage, systematic random sampling will be used to select eligible participants within each cluster.

3.10. Data Collection Tools

To ensure the accuracy and reliability of data collection, this study will use validated and standardized tools to measure sociodemographic, anthropometric data, and laboratory data for quantification of salt intake. These tools will allow for comprehensive data analysis and meaningful interpretation.

3.11. Inclusion Criteria

Participants will be included in the study if they meet the following criteria:

- Age 40 years or above
- Residing within the study site for at least 1 year

- Willing and able to provide informed consent

3.12. Exclusion Criteria

Participants will be excluded from the study if they meet the following criteria:

- Pregnant women
- Lactating mothers
- Patients on dialysis or with chronic kidney diseases
- Individuals with an acute or severe illness that prevents participation in the study procedures

3.13. Data Analysis Plan

All statistical analyses will be performed by using R Programming (Version 4.5.1). For this study, data analysis will be carried out in three sequential steps: univariate, bivariate, and multivariate analysis.

- Univariate Analysis: This analysis will provide a descriptive summary of the study variables. Continuous variables such as age and BMI will be presented as mean with standard deviation (SD), or median with interquartile range (IQR) where appropriate, along with visualizations such as histograms or boxplots. Categorical variables, including sex, physical activity, salt intake, and blood pressure categories, will be summarized as frequencies and percentages, and displayed using bar charts.
- Bivariate Analysis: This analysis will be used to examine the crude associations between independent variables and blood pressure status (high vs. low). For categorical predictors (e.g., salt intake, sex, and physical activity), Chi-square tests or Fisher's exact tests will be applied depending on cell counts. For continuous predictors (e.g., age and BMI), independent-sample t-tests will be used when assumptions of normality are met; otherwise, the Mann–Whitney U test will be employed as a non-parametric alternative.
- Multivariate Analysis: This analysis will be performed using binary logistic regression to assess the independent effects of the predictors on the odds of having high blood pressure, while adjusting for potential confounders. The model will provide

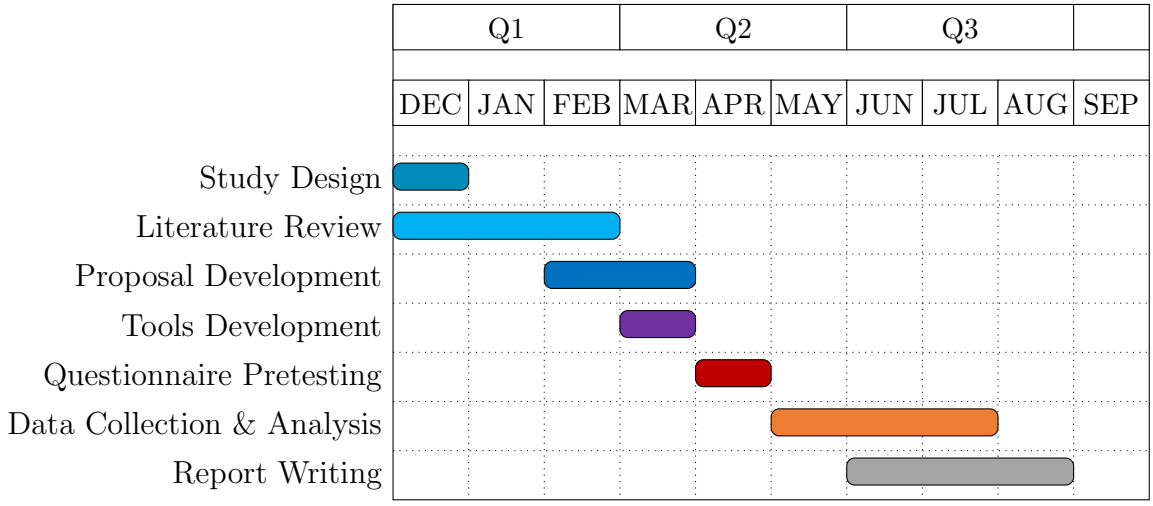
adjusted odds ratios (AORs) with corresponding 95% confidence intervals, allowing us to quantify the strength of association between salt intake, demographic characteristics, lifestyle factors, and blood pressure outcomes

3.14. Ethical Considerations

This study will strictly adhere to ethical guidelines to protect the rights, dignity, and well-being of all participants.

- Institutional Review Board (IRB) Approval: Prior to data collection, ethical approval will be obtained from the Institutional Review Board (IRB) of North South University.
- Informed Consent: Participants will receive detailed information about the study's purpose, procedures, potential risks, and benefits. Written informed consent will be obtained before participation.

3.15. Work Plan



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