**THESIS PROPOSAL**

**ON**

**KNOWLEDGE, PRACTICE, AND APPROACHES OF VACCINATORS TO ADVERSE EVENTS FOLLOWING IMMUNIZATION IN A DISTRICT OF BANGLADESH**

**This thesis proposal is prepared for the partial fulfillment of the requirements of the Master of Public Health (MPH) of North South University, Dhaka, Bangladesh**

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**TABLE OF CONTENTS**

|  |  |
| --- | --- |
| **Contents** | **Page No.** |
| Title Page |  |
| Submission Page |  |
| Evaluation Page |  |
| Executive Summary |  |
| Table of Content |  |
| Abbreviations |  |
| **CHAPTER I**:INTRODUCTION |  |
| 1.1 Introduction |  |
| 1.2 Justification of the Study |  |
| 1.3 Operational Definition |  |
| 1.4 Research Question |  |
| **CHAPTER II:** LITERATURE REVIEW |  |
| **CHAPTER III:** RESEACH METHODOLOGY |  |
| 3.1 Objectives of the Study |  |
| 3.1.1 General Objective |  |
| 3.1.2 Specific Objectives |  |
| 3.2 Conceptual Framework |  |
| 3.3 Study Design |  |
| 3.4 Target Population |  |
| 3.5 Study Site |  |
| 3.6 Study Period |  |
| 3.7 Sample Size |  |
| 3.8 Inclusion Criteria |  |
| 3.9 Exclusion Criteria |  |
| 3.10 Sampling Technique |  |
| 3.11 Data Collection Tools |  |
| 3.12 Data Management &Analysis Plan |  |

|  |  |
| --- | --- |
| **Contents** | **Page No.** |
| 3.13 Quality Control and Quality Assurance |  |
| 3.14 Ethical Consideration |  |
| 3.15 Expected Outcomes |  |
| 3.16 Action Plan |  |
| **REFERENCES** |  |
| **APPENDICES** |  |
| APPENDIX – A: Consent Form |  |
| APPENDIX – B: Consent Form (Bengali) |  |
| APPENDIX – C: Questionnaire |  |
| APPENDIX – D: Questionnaire (Bengali) |  |

**ABBREVIATIONS**

AE Adverse Event

AEFI Adverse Event Following Immunisation

AR Adverse Reaction

BCG Bacille Calmette Guerin

DM Diabetes Mellitis

EPI Expanded Programme on Immunisation

WHO World Health Organizations

VPD Vaccine Preventable Disease

HepB Hepatitis B

Hib Haemophilus influenzae type b

PCV Pneumococcal Vaccines

IPV Inactivated polio vaccine

MR Measles & Rubella

fIPV Fractional doses of the inactivated poliovirus vaccine

HPV Human Papillomavirus

**CHAPTER I**

**INTRODUCTION**

**1.1 Introduction**

In public health interventions, immunization stands out as a highly effective and successful measure for safeguarding individuals and the broader community from diseases that can be prevented through vaccines (WHO, 2023). Every year, immunization averts an estimated 2–3 million deaths attributed to diphtheria, pertussis, tetanus, and measles across all age groups. The targeted diseases, which are the leading causes of childhood morbidity and mortality, underscore the critical importance of consistently offering immunization at every available opportunity to eradicate these preventable illnesses (Meleko et al., 2017).

Bangladesh has made substantial strides in the eradication and management of Vaccine Preventable Diseases (VPDs). The last occurrence of wild poliovirus dates back to 2006, and the country has consistently maintained a polio-free status since then. The elimination of maternal and neonatal tetanus was achieved in 2008, and in 2018, Bangladesh successfully reached the control goal for rubella. Surveillance measures for Acute Flaccid Paralysis (AFP) and measles are consistently upheld at a standardized level (WHO, 2019).

While Bangladesh has achieved and sustained high coverage in routine immunization over the past several years, there remain challenging areas, particularly high-risk and difficult-to-reach regions, where a significant number of children are still not reached. In the last few decades, the country has introduced various new vaccines, including Hepatitis B (HepB) in 2003, Haemophilus influenzae type b (Hib) in 2009, rubella in 2012, Pneumococcal Vaccines (PCV) and Inactivated polio vaccine (IPV) in 2015, Measles & Rubella (MR) second dose in 2015, and Fractional doses of the inactivated poliovirus vaccine (fIPV) in 2017 (WHO, 2018).

The Expanded Program on Immunization (EPI) has prioritized and implemented strategies to enhance coverage in urban areas, as well as in hard-to-reach and high-risk areas. The government plans to introduce Rota and Human Papillomavirus (HPV) vaccines shortly. Ongoing surveillance efforts for Japanese Encephalitis (JE) and other VPDs are in place. The government has set ambitious targets to eliminate measles and rubella by 2020, maintain a polio-free status, and effectively control other VPDs such as diphtheria, typhoid, cholera, and others as needed (WHO, 2020).

Despite substantial advancements in the control of vaccine-preventable diseases, the field of immunization is not devoid of controversy. Increasing attention is now directed toward vaccine safety due to alleged safety concerns that have impacted vaccine programs globally. An adverse event following immunization (AEFI) is characterized as any unfavorable medical incident occurring post-immunization, not necessarily causally linked to the vaccine's usage. These events encompass unintended signs, abnormal laboratory findings, symptoms, or diseases. Typically, surveillance relies on healthcare professionals associating adverse events with vaccination and reporting them to the appropriate authorities. Adverse events are categorized into vaccine product-related, vaccine quality defect-related, immunization anxiety-related coincidental events, and immunization error-related events (Bellavite, 2020).

Ensuring the safety, efficacy, and quality of vaccines is a crucial aspect of their development and deployment. However, even when vaccines adhere to WHO safety standards during production and regulation, no vaccine is entirely without the risk of potential adverse reactions. Beyond the vaccines themselves, the immunization process also poses a potential source of adverse events. When public concerns about AEFIs reach a level where individuals refuse further immunizations for their children, there is an increased likelihood that the children will be susceptible to vaccine-preventable diseases, leading to potentially severe consequences (Puliyel & Naik, 2018).

The effectiveness of immunization programs is, in part, contingent on vaccinators, who play crucial roles as stakeholders within both their workplace facilities and the communities. A proficient understanding of vaccines and their associated adverse events among vaccinators can positively impact vaccination coverage. This is because vaccinators, equipped with this knowledge, can disseminate information to patients in their facilities and the broader community, consequently enhancing vaccine safety and fostering public trust in immunizations. Conversely, inadequate knowledge and perceptions among vaccinators regarding the storage and administration of vaccines, as well as potential adverse events linked to vaccine products, have been identified as contributing factors to the shortcomings of various immunization programs (Wiot et al., 2019).

The efficacy of vaccines is compromised when stored at temperatures outside the recommended cold chain range of 2 degrees Celsius to 8 degrees Celsius. Beyond potency loss due to improper cold chain maintenance, temperature fluctuations can lead to vaccine products transforming into toxic forms, potentially causing adverse events (Pambudi et al., 2022). An illustrative case occurred in May 2017, where 15 children in Kapoeta, South Sudan, succumbed to severe sepsis and toxicity resulting from contaminated measles vaccines, attributed to inadequate vaccine cold chain storage (Peck et al., 2023).

To avert such tragedies, it is imperative for vaccinators to routinely monitor vaccines, ensuring strict adherence to cold chain temperatures. Additionally, vaccinators must familiarize themselves with proper vaccine administration techniques to minimize discomfort for vaccine recipients and facilitate the desired immunological response. Ineffectual vaccination techniques pose a potential risk of adverse events and must be diligently avoided by healthcare professionals (Pambudi et al., 2022).

The World Health Organization (WHO) advises against utilizing the deltoid injection site (upper arm) for administering the inactivated polio vaccine to children under 15 months of age due to insufficient muscle mass in that region (Dolan et al., 2017). Injecting into the underdeveloped deltoid muscles of infants could result in pain, injury, and abscess formation at the injection site, all classified as AEFIs. Therefore, injection into the thigh muscle is the preferred alternative. Most vaccines are typically administered intramuscularly, and best practices dictate that the site of intramuscular administration should be stretched to reduce pain, redness, and the risk of abscess formation post-injection (Zuckerman, 2000).

Vaccinators need education to discontinue certain practices that can undermine vaccine efficacy, as the failure of a vaccine to produce the desired effect is a significant pharmacovigilance concern. For instance, administering analgesics like ibuprofen and paracetamol before and around the time of vaccination to alleviate pain, fever, and inflammation may interfere with the body's antibody response to the vaccine's antigenic agent, reducing its ability to prevent the multiplication of targeted disease-causing organisms. Nevertheless, post-vaccination administration of antipyretics, as indicated by a systematic review, effectively reduces vaccine-associated fever without compromising the necessary antibody response for disease prevention (Yamoah et al., 2019).

An exception to this general principle is the recommendation to administer paracetamol soon after immunization with the meningitis B vaccine at 2 and 4 months of age in the UK, rather than waiting for a fever to develop. This proactive approach is taken due to the potential severity of the fever associated with the meningitis B vaccine, which can even trigger convulsions (Health Security Agency, 2022).

In addition to enhancing vaccinators' understanding of AEFIs, it is crucial to eliminate negative perceptions surrounding AEFI reporting. These perceptions include but are not confined to, the belief that reporting an AEFI, such as an injection abscess, may induce feelings of guilt for causing harm and being responsible for the event. Another negative perception is the belief that combining core clinical duties with AEFI reporting is an unmanageable task. These misconceptions and lack of knowledge among vaccinators extend across various healthcare domains, often leading to neglect of duties, contributing significantly to numerous medical liability issues (Yamoah et al., 2019).

Therefore, in addition to promoting AEFI reporting, fostering extensive knowledge and cultivating positive perceptions regarding vaccination and AEFIs can play a pivotal role in mitigating instances of immunization negligence and the associated medical liabilities (Laryea et al., 2022).

The examination and documentation of vaccinators' perceptions regarding AEFI surveillance have been limited. A deficiency in motivation and heightened anxiety among staff concerning the potential repercussions of programmatic errors adversely impacts AEFI surveillance, particularly in terms of reporting adverse events. Factors contributing to this include ignorance, a lack of awareness regarding reporting systems, fear of legal consequences, and insufficient time(Lv et al., 2022).

**1.2 Justification of the Study**

Despite the common occurrence and widespread recognition of AEFIs, there is limited understanding of how healthcare workers identify or report them. Variations in the knowledge and reporting practices of healthcare professionals likely contribute to inconsistent data collection on adverse events. In Nigeria, research has indicated a decline in immunization coverage, attributed to factors such as the failure to assess the immunization status of children during health facility visits, the omission of necessary vaccines during simultaneous administration, and possibly concerns about adverse events, akin to trends observed in developed countries today (Ophori et al., 2014).

Inadequate AEFI surveillance has adverse implications for immunization efforts. To mitigate the occurrence of vaccine adverse events and uphold public trust in vaccines, there is a critical need to enhance the understanding of vaccine safety. This, in turn, can facilitate the development and utilization of safer vaccines (Sebastian et al., 2019).

This research in Bangladesh aims to investigate the understanding and attitudes of vaccinators towards AEFIs. The results are anticipated to provide a foundation for policy development, offering insights into how the knowledge, perceptions, and practices of vaccinators can be enhanced. This, in turn, can foster their commitment to reporting AEFIs and contribute to the overall improvement of vaccine safety in Bangladesh.

**1.3 Operational Definitions**

AEFI, adverse event following immunization;

**1.4 Research Question (s)**

* What is the AEFI knowledge of vaccinators in Bangladesh?
* What are the AEFI perceptions of vaccinators in Bangladesh?
* What are the AEFI practices of vaccinators in Bangladesh?
* What is the relationship between knowledge of AEFIs with vaccinators' socio-demographic characteristics?
* What is the relationship between perceptions of AEFIs with vaccinators' socio-demographic characteristics?
* What is the relationship between the practice of AEFIs among vaccinators' socio-demographic characteristics?

**CHAPTER II**

**LITERATURE REVIEW**

In many low and middle-income countries (LMICs) lacking robust pharmacovigilance systems, vaccinators play a crucial role in observing and documenting medicine-related harms. This involvement has frequently led to the enhancement or establishment of pharmacovigilance systems in countries lacking such frameworks (Kiguba et al., 2023). An analysis of data from the World Health Organization (WHO) vaccine safety database, Vigibase, in June 2015 revealed a lag in Africa's vaccine pharmacovigilance. Less than 1% of global AEFI reports originated from Africa, with 97% of these reports coming from 10 African countries: Egypt, the Democratic Republic of Congo, Morocco, South Africa, Sierra Leone, Zimbabwe, Tunisia, Ghana, Nigeria, and Senegal (Yamoah et al., 2019). This situation is critical given Africa's 54 countries and the increasing administration of vaccine doses on the continent due to rising infections and population growth. Consequently, more AEFIs are anticipated than the limited reports observed in the Vigibase analysis of the aforementioned African countries. In light of this, HCPs in Africa must possess knowledge about AEFIs, enabling accurate diagnosis and reporting to enhance vaccine safety and the effectiveness of pharmacovigilance systems. Additionally, understanding AEFIs contributes to improved treatment of life-threatening conditions associated with certain adverse events (Malande et al., 2021).

AEFIs are observed globally, with varying rates reported in different countries. In the USA, for every 10,000 vaccination cases, 1.14 cases of AEFIs were reported, resulting in 1.4% deaths [9]. In Australia, there were 14.1 reported AEFIs per 100,000 doses in 2009, and in Sri Lanka, the rate was 129.5 per 100,000 vaccine doses in 2012. Notably, a study in Ilorin, Nigeria, recorded a rate of 19.3% in 2005 (Afolaranmi et al., 2020). Another report from Port Harcourt in southern Nigeria indicated that approximately 57% of mothers acknowledged that their children experienced one or more AEFIs following pentavalent vaccine administration, with fever (88%), swelling (34%), and irritability (40%) being common (Maduka et al., 2015).

In Africa, concerns about the quality and safety of the poliomyelitis vaccine in Nigeria led to its suspension for a year due to allegations by religious leaders. This suspension resulted in a significant increase in polio cases after its resumption (Nasir et al., 2016). Hence, the surveillance and follow-up of vaccine safety are pivotal in addressing both real and perceived AEFI-related issues. This is crucial for bolstering public confidence and fostering the widespread acceptance of vaccination programs (Alicino et al., 2015).

Adverse events commonly observed following vaccination encompass pain, swelling, and redness at the injection site. Other potential effects include fever, rash, excessive crying, convulsions, anaphylaxis, encephalitis, drowsiness, or irritability (CDC, 2023). While prior studies in China categorized the occurrence of adverse events as very common (>10%), common (1–10%), uncommon (0.1–1%), rare (0.01– 0.1%), and very rare (<0.01%), no studies in Kenya have endeavored to identify and classify the incidence of Adverse Events Following Immunization (AEFI) (Masika et al., 2016).

According to the 2018 Nigerian Demographic and Health Survey, only 31% of children aged 12–23 months had received all essential vaccinations, with 21% having received vaccinations appropriate for their age. Various factors may have contributed to this relatively low vaccination coverage, with Adverse Events Following Immunization (AEFI) being identified as a potential influence. Improving the knowledge and practical skills of healthcare providers is seen as a strategy to minimize AEFI occurrences and enhance client satisfaction, particularly in areas with vaccine hesitancy and low vaccination coverage. Globally, as of 2015, 60% of countries in the World Health Organization (WHO) Region of the Americas reported at least 10 AEFI cases per 100,000 surviving infants. This percentage was 55% in the European Region, 43% in the Eastern Mediterranean Region, 33% in the Western Pacific Region, 27% in the South-East Asian Region, and 21% in the African Region. In Nigeria, the prevalence of AEFI varies, ranging from 35% in Kano, Northwestern Nigeria, to 42% in Benin City, Southern Nigeria (Omoleke et al., 2022).

During the 2017-18 measles vaccination campaign, Kebbi State recorded the highest suspected Adverse Events Following Immunization (AEFI) incidence, reaching 101.3 per 100,000 population, surpassing other states. Nevertheless, the AEFI reporting from Routine Immunization (RI) in the state was below the optimal level. Across the 21 Local Government Areas (LGAs) in Kebbi State, the reported cases of AEFI were 211, 2288, and 4980 in the years 2018, 2019, and 2020, respectively (Gbenewei et al., 2021).

In a study conducted by Yamoah et al (2019) in Africa, with a focus on Ghana, a cross-sectional quantitative design was employed from July 1, 2017, to December 31, 2017. The study included doctors, pharmacists, and nurses as participants. A 28-item paper-based questionnaire, distributed manually to the participants, served as the data collection tool. The analysis utilized Chi-square and binary logistic regression tests to examine associations between healthcare providers' (HCPs) characteristics and their knowledge and perceptions. The assessment of detailed knowledge regarding Adverse Events Following Immunization (AEFIs) comprised a set of 9 questions. High knowledge was indicated by correctly answering 8 or 9 questions, moderate knowledge by correctly answering 5 to 7 questions, and low knowledge by correctly answering fewer than 5 questions. Additionally, a set of 10 questions gauged HCPs' positive and negative perceptions of AEFIs. The results indicated that 49 (10.8%) participants had high knowledge, 213 (47.0%) had moderate knowledge, and 191 (42.2%) had low knowledge of AEFIs. No statistically significant correlation was found between AEFI knowledge and professions (Yamoah et al., 2019).

In a cross-sectional study conducted by Abdu et al (2022) in the Central Region of Eritrea, participants included all nurse practitioners directly or indirectly involved in immunization services across the region's health facilities. Data collection occurred between October 2019 and February 2020 through an interview-based questionnaire. Descriptive statistics utilized percentages and medians (Interquartile Range - IQR), while inferential analyses employed Mann–Whitney and Kruskal–Wallis tests. The study encompassed 130 respondents with a median age of 40 (IQR 23) years. Results indicated an overall median (IQR) knowledge score of 87.50 (19) out of 100 regarding Adverse Events Following Immunization (AEFI) surveillance. Additionally, the median (IQR) comprehensive perception score was 70 (20) out of 100, within a range of 40–95. Notably, the main barriers to reporting AEFIs were identified as a shortage of motivation and a lack of knowledge on how to report (Abdu et al., 2022).

Mohammed et al (2018) conducted a cross-sectional study in the Sabon Gari local government area of Kaduna state, utilizing a simple random sample method to select 110 Primary Healthcare (PHC) workers. The study revealed that a majority (92.2%) of the participants were aware of Adverse Events Following Immunization (AEFI), and over 80% of healthcare workers had received training on AEFI, demonstrating knowledge of its signs and symptoms. While more than 50% of respondents exhibited good knowledge of AEFI, only 17.8% demonstrated commendable reporting practices. The study found that 66% of healthcare workers had encountered an AEFI, and 56.7% had reported one at some point. The analysis identified statistically significant relationships between the age of healthcare workers (P = 0.001), previous training (P = 0.036), working experience (P = 0.001), and knowledge of AEFIs (Mohammed et al., 2018).

A study by Mehmeti et al (2017) conducted in Albania on 102 health professionals interviewed. The majority of the respondents working at health centers in the district of Tirana in general, had poor knowledge levels of AEFI surveillance. The lowest scores were received in knowledge about the role of different stakeholders involved in AEFI surveillance. The number of years practicing the profession did not influence the total score of “practice and attitude toward reporting and managing an AEFI”. Although the majority of healthcare professionals have encountered an AEFI during their practice (72/102, 70,5%), only half of them have never reported an AEFI (37/102, 36,2%). Barriers to reporting included lack of interest, unclear definition of AEFI, and lack of awareness of what to report. Nevertheless, the main reason for not reporting was because a respondent thought he or she had not observed an AEFI in the last years (44,1%). The majority of the respondents did not have any training about AEFI (68,6%, 70/102) (Mehmeti et al., 2017).

A study conducted by Lv et al. (2022) focused on 170 vaccination clinics, with one Healthcare Worker (HCW) from each clinic participating in a survey. The survey, administered through a secure online platform, utilized a structured online questionnaire to gather information. The study presented distributions of respondents' characteristics and compared training status, knowledge, attitude, and reporting behavior among different sub-groups of HCWs. Additionally, the study summarized identified barriers to and suggestions for Adverse Events Following Immunization (AEFI) reporting. Results from the 170 surveyed HCWs revealed that 61.76% had received training on AEFI surveillance, while 15.88% had not received any AEFI training. HCWs with longer working durations on AEFI surveillance or those who had received training exhibited higher levels of knowledge, more positive attitudes, and better-reporting behavior concerning AEFI surveillance. The primary barrier to reporting an AEFI was uncertainty about whether the AEFI was related to the vaccine, reported by 71.76% (122) of participants. Other barriers included reluctance to raise unnecessary public alarm about a vaccine (61.76%, 105) and perceived complexity of the reporting form or other methods (38.23%, 65) (Lv et al., 2022).

**CHAPTER III**

**RESEARCH METHODOLOGY**

**3.1 Study Objectives**

**General Objective:** The study aimed to assess the knowledge, perceptions, and practices of AEFIs among vaccinators in Bangladesh, with the hope that the findings would improve AEFI awareness elsewhere in Africa.

**Specific Objectives**

* To assess the AEFI knowledge of vaccinators in Bangladesh.
* To assess the AEFI perceptions of vaccinators in Bangladesh.
* To assess the AEFI practice of vaccinators in Bangladesh.
* To determine the relationship between knowledge of AEFIs and vaccinators’ socio-demographic characteristics.
* To determine the relationship between perceptions of AEFIs and vaccinators’ socio-demographic characteristics.
* To determine the relationship between practices of AEFIs and vaccinators’ socio-demographic characteristics.

**3.2 Conceptual Framework**

**Dependent Variable**

**Independent Variables**

**Professional**

AEFI training

Types of Profession

Years of Experience

Work Place Setting

**Socio Demographic**

Age

Sex

Education

Residence

Financial Condition

Knowledge, attitude and Practice of the vaccinators towards AEFI cases

**3.3 Study Design**

This study employed a descriptive, cross-sectional study design. This design was chosen as it facilitated the collection of data on various variables from participants at a single point in time. A community-based approach was adopted to enable the examination of knowledge, perceptions, and practices on AEFI among the participants.

**3.4 Target Population & Sample Population**

The target population in a study is the group to which the study aims to extend its findings, often known as the theoretical population. In this particular study, the target population encompasses all women within the reproductive age range of 18 years and above. Meanwhile, the study population pertains to the actual sampling frame from which a sample is selected. In this study, the study population consisted of women between the ages of 18 years and above in Bangladesh who met the specified inclusion and exclusion criteria.

**3.5 Study Site & Area**

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**3.6 Study Period**

Data collection was undertaken by three teams, each consisting of four interviewers, one measurer, and a supervisor. The fieldwork commenced on January 19, 2024, and was completed on June 1, 2024. Tablet computers running the Windows 10 operating system were employed for data collection, supported by a Bluetooth application for field operations. This application facilitated the transfer of assignments and completed questionnaires between the supervisor and interviewer tablets.

**3.7 Sample Size**

The sample size was calculated using the formula introduced by Fisher et al. in 1998, with a confidence level of 95 percent. In this calculation, it was assumed that the proportion of the population possessing the desired characteristics was unknown. As a result, for Bangladesh, a figure of 50% was employed as the estimated fraction of individuals exhibiting these preferred prevention practices.

The formula is: n =

Where, n = estimated sample size

Z = 1.96 (in 95% Confidence Interval)

p = prevalence, 50% (0.50),

q = 1- 0.50 = 0.50,

d = permissible error, 5% (0.05)

So, sample size (n) = {(1.96)2\*0.50\*0.50}/ (0.05)2 = 384.16 ≈ 400. The calculated sample size was 384.16 but we collected data as a round figure of 400 respondents.

**3.8 Inclusion Criteria**

Doctors, pharmacists, and nurses in the selected hospitals who consented to partake in the study were included.

**3.9 Exclusion Criteria**

Other clinical healthcare professionals apart from these were excluded from the study. Additionally, participants who had worked in the various institutions for less than 6 months were also excluded.

**3.10 Sampling Technique**

The research was carried out across four hospitals in Bangladesh, with a deliberate selection aimed at ensuring representation from all levels of care – primary, secondary, and tertiary – among the study participants. The selected hospitals included one primary healthcare (PHC) facility, two secondary healthcare facilities (SHC), and one tertiary healthcare (THC) facility. In the context of this study, a PHC facility caters to health services in villages and less affluent community areas, typically with limited medical specialist presence. SHC facilities, more advanced than PHCs, are typically situated in larger towns and peri-urban centers, with some medical specialists available for cases beyond the scope of PHCs. THC facilities, on the other hand, have a comprehensive roster of both medical specialists and consultants across various clinical specialties, serving as referral centers for both PHC and SHC facilities.

The population of vaccinators in the studied hospitals at the time of the research was XXXX. Employing a margin of error of 5%, a confidence level of 95%, and a response distribution of 50%, the calculated sample size for the various hospitals, based on their staff populations, was XXXX, resulting in a total sample size of 400. The selection of vaccinators from each institution was based on a list of personnel in each hospital, utilizing a simple random sampling approach to achieve the desired sample size, with the proportions of various cadres considered following the calculated sample populations for each institution, as outlined in Table X.

**3.11 Data Collection Tools**

The primary researcher and research assistants conducted interviews with the study participants to gather quantitative data. The questionnaire encompassed inquiries about demographic and socio-economic details, featuring a combination of open-ended and closed-ended questions. The questionnaire was structured into four sections: the first section, labeled as socio-demographic (Section A), the second section, focusing on the knowledge of participants (Section B), third, focusing on perceptions (Section C), fourth, focusing on practices (Section D).

**3.12 Data Management & Analysis Plan**

Data collection will involve conducting face-to-face interviews. Before initiating data collection, permission will be sought from the respective couples. A comprehensive explanation of the study's purpose will be provided to the respondents. The interviews will be conducted within the slum area. Respondents will receive assurance, from an ethical standpoint, that the content of the interview will remain confidential and will not be disclosed to any unauthorized individuals.

**Data Preparation:** The data will be thoroughly cleaned and prepared for analysis, which includes the identification of missing values, outliers, and any other irregularities within the data.

**Descriptive Statistics:** Descriptive statistics will be calculated for the variables of interest. This will involve determining measures such as the mean, median, standard deviation, and frequency distribution. These calculations will provide insights into the data's distribution and facilitate the identification of outliers or unusual observations.

**Inferential Statistics:** Inferential statistical tests will be conducted to examine the study's hypotheses. These tests may include a chi-square test and logistic regression to assess the association between KAP variables and various socioeconomic factors.

**Interpretation of Results:** The results of the statistical tests will be interpreted, taking into consideration elements such as p-values, effect sizes, and confidence intervals. Typically, a p-value below 0.05 is considered indicative of statistical significance, implying that there is less than a 5% probability that the results are due to random chance.

**3.13 Quality Control & Quality Assurance**

Before collecting data from the respondents, a friendly and welcoming environment was established, and the research objectives were clearly communicated to the participants. Throughout the data collection process, an effort was made to engage with the respondents in the local Bangla language.

**3.14 Ethical Considerations**

Written permission will be obtained from the relevant authorities and the respondents before commencing data collection. The investigator will provide the respondents with a detailed explanation of the study's objectives before collecting data.

**3.15 Expected Outcomes**

We anticipate that there is a noteworthy correlation between knowledge, perception, and practices with various socioeconomic factors. Our hypothesis suggests that vaccinators with low socio-economic conditions may be more vulnerable and less likely to have knowledge, perceptions, and practices than vaccinators from high socio-economic backgrounds.

**3.16 Work Plan**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Activities** | **Jun**  **2023** | **Jul**  **2023** | **Aug**  **2023** | **Sep**  **2023** | **Oct**  **2023** | **Nov**  **2023** | **Dec**  **2023** | **Jan**  **2023** |
| **Designing the Study** |  |  |  |  |  |  |  |  |
| **Review of Literature** |  |  |  |  |  |  |  |  |
| **Development & approval of proposal** |  |  |  |  |  |  |  |  |
| **Development of Data Collection Tools** |  |  |  |  |  |  |  |  |
| **Pre-testing Questionnaire** |  |  |  |  |  |  |  |  |
| **Data Collection, Entry & Analysis** |  |  |  |  |  |  |  |  |
| **Report Writing** |  |  |  |  |  |  |  |  |
| **Submission & Approval of Thesis** |  |  |  |  |  |  |  |  |
| **Printing, Binding, and Submission** |  |  |  |  |  |  |  |  |

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**APPENDICES**

**APPENDIX-A**

**CONSENT FORM**

Hello, my name is (your name). We are from the North South University (NSU). We are surveying the situation of children, families, and households. I would like to talk to you about your health and other topics. This interview usually takes about 45 minutes. We are also interviewing mothers about their children. All the information we obtain will remain strictly confidential and anonymous. If you wish not to answer a question or wish to stop the interview, please let me know. May I start now?

**APPENDIX-B**

**CONSENT FORM (BENGALI)**

হ্যালো, আমার নাম (আপনার নাম)। আমরা বাংলাদেশ পরিসংখ্যান ব্যুরো (বিবিএস) থেকে এসেছি। আমরা শিশু, পরিবার এবং পরিবারের অবস্থা সম্পর্কে একটি জরিপ পরিচালনা করছি। আমি আপনার স্বাস্থ্য এবং অন্যান্য বিষয় সম্পর্কে আপনার সাথে কথা বলতে চাই। এই সাক্ষাত্কারটি সাধারণত প্রায় 45 মিনিট সময় নেয়। আমরা তাদের সন্তানদের সম্পর্কে মায়েদের সাক্ষাৎকার নিচ্ছি। আমরা প্রাপ্ত সমস্ত তথ্য কঠোরভাবে গোপনীয় এবং বেনামী থাকবে। আপনি যদি কোনো প্রশ্নের উত্তর না দিতে চান বা ইন্টারভিউ বন্ধ করতে চান তাহলে অনুগ্রহ করে আমাকে জানান। আমি কি এখন শুরু করতে পারি?

**APPENDIX-C**

**QUESTIONNAIRE**

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**APPENDIX-D**

**QUESTIONNAIRE (BENGALI)**

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