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Implementing WASH FIT in Bangladesh: A study on rural and Urban health care facility challenges and opportunities

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Abstract

The Water, Sanitation, and Hygiene Facility Improvement Tool (WASH FIT), developed by WHO and UNICEF, is a critical framework for enhancing WASH services in healthcare facilities, particularly in low- and middle-income countries. This tool focuses on water supply, sanitation, hygiene, management, and environmental cleaning, aiming to reduce healthcare-associated infections and improve patient outcomes. The implementation of WASH FIT fosters a culture of continuous improvement and accountability, crucial for meeting international WASH standards and achieving broader public health goals, including the Sustainable Development Goals.

In Bangladesh, the study identifies significant disparities between rural and urban healthcare facilities. Rural areas often lack adequate infrastructure, reliable water supply, and trained professionals, exacerbated by logistical challenges. Urban facilities, despite better resources, face issues related to overcrowding, maintenance of sanitation infrastructure, and environmental challenges like pollution. Both settings share common problems, such as inadequate funding and governance inefficiencies.

The study's objectives include evaluating these challenges, conducting a comparative analysis between rural and urban facilities, and exploring opportunities for improvement through community engagement, technological innovations, and policy reforms. The findings emphasize the need for tailored strategies to address the specific needs of different settings, highlighting potential government and NGO initiatives. The recommendations aim to provide a framework for sustainable improvements in WASH services, enhancing health outcomes and the quality of care across Bangladesh.

Keywords: WASH FIT; Rural healthcare; Urban healthcare; Sanitation infrastructure; Health care-associated; Infections; Water supply; Community engagement; Policy reforms

1. Introduction

1.1. Background on WASH FIT (Water, Sanitation, and Hygiene Facility Improvement Tool)

The Water, Sanitation, and Hygiene Facility Improvement Tool (WASH FIT) is an innovative framework designed to support health care facilities in low- and middle-income countries in improving their water, sanitation, and hygiene (WASH) services. Developed by the World Health Organization (WHO) and UNICEF, WASH FIT provides a systematic approach to managing and enhancing WASH infrastructure, ensuring the safety, cleanliness, and functionality of health care environments (World Health Organization, 2017).

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WASH FIT is structured around four key domains: (1) water supply, (2) sanitation, (3) hygiene, and (4) management and environmental cleaning. Each domain includes a set of standards and performance indicators that facilities can use to assess their current conditions and identify areas for improvement. The tool promotes a continuous cycle of assessment, planning, implementation, and evaluation, enabling facilities to maintain high standards of WASH services (WHO, 2017).

The implementation of WASH FIT is critical for reducing health care-associated infections, ensuring patient and staff safety, and improving overall health outcomes. Inadequate WASH facilities can lead to the spread of infectious diseases, impacting both patients and health care workers. Therefore, enhancing WASH services in health care facilities is essential for achieving universal health coverage and sustainable development goals (WHO, 2017).

Despite its potential benefits, the implementation of WASH FIT faces several challenges, particularly in resource-constrained settings. Factors such as limited funding, inadequate infrastructure, lack of trained personnel, and cultural barriers can hinder the effective adoption of WASH FIT. Understanding these challenges and identifying potential solutions is crucial for the successful implementation of WASH FIT in diverse contexts, including both rural and urban health care facilities in Bangladesh.

As Bangladesh strives to improve its health care system, the application of WASH FIT presents both significant opportunities and challenges. This study aims to explore the specific difficulties and prospects associated with implementing WASH FIT in Bangladesh's rural and urban health care facilities, providing insights into how these challenges can be addressed to enhance health outcomes across the country.

1.2. Importance of WASH FIT in health care facilities

The importance of the Water, Sanitation, and Hygiene Facility Improvement Tool (WASH FIT) in health care facilities cannot be overstated. Health care facilities are critical environments where the prevention of infections and the maintenance of hygiene standards are paramount. The implementation of WASH FIT is integral to achieving these goals, especially in low- and middle-income countries where resources are often limited (World Health Organization, 2017).

WASH FIT provides a comprehensive framework that helps health care facilities improve their water, sanitation, and hygiene services, which are essential for ensuring the safety and well-being of patients and health care workers. By adhering to WASH FIT standards, facilities can significantly reduce the risk of health care-associated infections (HAIs), which are a major cause of morbidity and mortality in health care settings (World Health Organization, 2017). HAIs can prolong hospital stays, increase medical costs, and lead to severe health complications, including death. Therefore, improving WASH services through WASH FIT is vital for enhancing patient care and outcomes.

Moreover, WASH FIT promotes a culture of continuous improvement and accountability within health care facilities. It encourages regular monitoring and evaluation of WASH services, enabling facilities to identify gaps and implement corrective actions promptly. This proactive approach ensures that health care facilities remain compliant with international WASH standards and can provide a safe environment for both patients and staff (WHO, 2017).

The implementation of WASH FIT is also crucial for achieving broader public health goals. Improved WASH services in health care facilities contribute to the overall health and well-being of communities by preventing the spread of infectious diseases. This is particularly important in settings where health care facilities serve large populations and are often the first point of contact for health care services (WHO, 2017).

In the context of Bangladesh, where both rural and urban health care facilities face unique challenges, the adoption of WASH FIT can play a transformative role. In rural areas, where infrastructure and resources are often inadequate, WASH FIT can help facilities establish basic WASH services and improve hygiene practices. In urban areas, where facilities may be overcrowded and resource-constrained, WASH FIT can help manage the high patient load and ensure the maintenance of hygiene standards (WHO, 2017).

By addressing the specific challenges faced by health care facilities in Bangladesh, the implementation of WASH FIT can enhance the quality of health care services and improve health outcomes across the country. This study aims to explore the challenges and opportunities associated with implementing WASH FIT in Bangladesh's rural and urban health care facilities, providing insights into how these challenges can be overcome to achieve better health outcomes.

1.3. Overview of the health care system in Bangladesh

The health care system in Bangladesh is characterized by a mix of public and private providers, with services ranging from primary to tertiary care. Despite significant improvements in health indicators over the past few decades, the system faces numerous challenges, particularly in terms of infrastructure, resource allocation, and service delivery (Ahmed et al., 2015).

The public health care system is organized into several tiers: community clinics, union health and family welfare centers, upazila (sub-district) health complexes, district hospitals, and specialized tertiary care hospitals. Community clinics and union health centers provide primary health care services, including maternal and child health, immunizations, and basic treatment for common ailments. Upazila health complexes and district hospitals offer more comprehensive services, including inpatient care and specialist consultations (Ministry of Health and Family Welfare, 2016).

Despite the structured framework, public health facilities often struggle with inadequate infrastructure, shortages of medical supplies and equipment, and a lack of trained health care professionals. These challenges are more pronounced in rural areas, where access to quality health care services is limited due to geographical and logistical constraints. Rural health care facilities frequently operate under severe resource limitations, making it difficult to maintain adequate water, sanitation, and hygiene (WASH) standards (Ahmed et al., 2015).

In urban areas, health care facilities face different but equally significant challenges. Rapid urbanization has led to overcrowded health facilities, putting immense pressure on service delivery. Urban hospitals and clinics often struggle with high patient loads, inadequate space, and insufficient staffing. These conditions can compromise the quality of care and make it challenging to maintain WASH standards, which are crucial for preventing health care-associated infections and ensuring patient safety (Rahman et al., 2017).

The private sector in Bangladesh plays a substantial role in providing health care services, particularly in urban areas. Private hospitals and clinics offer a wide range of services, often with better infrastructure and resources compared to public facilities. However, the cost of private health care is high, making it inaccessible to a significant portion of the population, especially those in low-income brackets (Ministry of Health and Family Welfare, 2016).

Efforts to improve the health care system in Bangladesh have been ongoing, with various government initiatives and international collaborations aimed at enhancing service delivery and health outcomes. Implementing tools like WASH FIT is a critical step towards addressing the challenges faced by health care facilities in both rural and urban areas. By improving WASH services, health care facilities can provide safer and more effective care, ultimately contributing to better health outcomes for the population (World Health Organization, 2017).

1.4. Purpose and significance of the study

The primary purpose of this study is to evaluate the implementation of the Water, Sanitation, and Hygiene Facility Improvement Tool (WASH FIT) in both rural and urban health care facilities in Bangladesh. By identifying the specific challenges and opportunities encountered in these settings, the study aims to provide actionable insights that can enhance the effectiveness of WASH FIT initiatives. The significance of this study lies in its potential to inform policy and practice, ultimately contributing to improved health outcomes across diverse health care environments in Bangladesh.

In Bangladesh, the health care system faces numerous challenges related to infrastructure, resource allocation, and service delivery, which are particularly acute in the areas of water, sanitation, and hygiene (WASH). The effective implementation of WASH FIT can address these challenges by providing a structured approach to improving WASH services in health care facilities. However, the contextual differences between rural and urban health care settings necessitate a tailored approach to WASH FIT implementation (Ahmed et al., 2015).

Understanding the unique barriers and facilitators in both rural and urban health care facilities is crucial for several reasons. First, it allows for the development of context-specific strategies that can enhance the feasibility and sustainability of WASH FIT interventions. Second, it helps identify best practices and lessons learned that can be scaled up or adapted to other settings within the country. Finally, it contributes to the broader global knowledge base on WASH in health care facilities, offering insights that can benefit similar low- and middle-income countries facing comparable challenges (Rahman et al., 2017).

The study's findings are expected to have significant implications for policymakers, health care administrators, and development partners involved in the planning and implementation of WASH programs. By highlighting the critical issues and potential solutions, the study aims to support the formulation of evidence-based policies and the allocation

of resources in a manner that maximizes impact. Additionally, the study seeks to raise awareness about the importance of WASH in health care settings and to advocate for greater investment in this area (World Health Organization, 2017).

Ultimately, the significance of this study extends beyond immediate health care improvements. Enhanced WASH services in health care facilities contribute to overall public health by preventing the spread of infections, improving patient outcomes, and promoting a healthier environment for health care workers and communities. As Bangladesh continues to strive towards universal health coverage and the Sustainable Development Goals, the successful implementation of WASH FIT can play a pivotal role in achieving these targets (Ministry of Health and Family Welfare, 2016).

1.5. Research questions and objectives

This study aims to explore the implementation of the Water, Sanitation, and Hygiene Facility Improvement Tool (WASH FIT) in Bangladesh, focusing on both rural and urban health care facilities. To comprehensively address the challenges and opportunities presented by WASH FIT implementation, the study is guided by the following research questions and objectives.

Research Questions:

- What are the specific challenges faced by rural health care facilities in Bangladesh in implementing WASH FIT?
- What are the specific challenges faced by urban health care facilities in Bangladesh in implementing WASH FIT?
- How do the challenges of implementing WASH FIT differ between rural and urban health care facilities in Bangladesh?
- What opportunities exist for improving WASH FIT implementation in rural and urban health care facilities in Bangladesh?
- What best practices and strategies can be identified for the successful implementation of WASH FIT in diverse health care settings within Bangladesh?

Objectives

- Identify and Analyze Challenges:
  - To identify and analyze the unique challenges faced by rural health care facilities in implementing WASH FIT, including issues related to infrastructure, resources, and training.
  - To identify and analyze the unique challenges faced by urban health care facilities in implementing WASH FIT, with a focus on overcrowding, resource allocation, and management.
- Compare Rural and Urban Settings:
  - To conduct a comparative analysis of the challenges faced by rural and urban health care facilities in Bangladesh, highlighting both common and distinct issues.
- Explore Opportunities for Improvement:
  - To explore opportunities for enhancing WASH FIT implementation in rural health care facilities, including potential government and non-governmental organization (NGO) initiatives, community involvement, and technological innovations.
  - To explore opportunities for enhancing WASH FIT implementation in urban health care facilities, such as policy reforms, public-private partnerships, and capacity-building programs.
- Recommend Best Practices
  - To identify and recommend best practices and strategies for overcoming challenges and maximizing the impact of WASH FIT in health care facilities, tailored to both rural and urban contexts.

By addressing these research questions and objectives, this study aims to provide a comprehensive understanding of the implementation of WASH FIT in Bangladesh. The findings will offer valuable insights into how health care facilities can overcome challenges and leverage opportunities to improve WASH services, ultimately contributing to better health outcomes and supporting national health goals.

2. Literature Review

2.1. Review of existing studies on WASH FIT implementation globally

The Water, Sanitation, and Hygiene Facility Improvement Tool (WASH FIT) has been implemented in various health care settings worldwide, demonstrating significant potential for improving health outcomes through better WASH

services. This section reviews existing studies on WASH FIT implementation globally, highlighting key findings, challenges, and best practices.

A study by Cronk and Bartram (2018) evaluated the implementation of WASH FIT in 20 health care facilities across six countries. The study found that WASH FIT effectively improved the management of water, sanitation, and hygiene services, leading to better infection control and patient outcomes. However, the study also identified several challenges, including inadequate funding, insufficient training of health care staff, and lack of community engagement.

In a similar vein, Maina et al. (2019) conducted a comprehensive assessment of WASH FIT implementation in Kenya, Uganda, and Zambia. Their findings indicated that WASH FIT led to significant improvements in facility cleanliness, availability of clean water, and proper waste disposal practices. Despite these successes, the study noted that the sustainability of these improvements was often compromised by resource constraints and the need for continuous monitoring and support.

A study by Weber et al. (2020) explored the implementation of WASH FIT in Nepal, focusing on rural health care facilities. The research highlighted the tool's adaptability to different contexts and its effectiveness in promoting a culture of safety and hygiene. Key challenges included geographic and logistical barriers that hindered regular monitoring and maintenance of WASH infrastructure. The study emphasized the importance of tailoring WASH FIT guidelines to local conditions to enhance its effectiveness.

In Ethiopia, a study by Gizaw et al. (2021) assessed the impact of WASH FIT on maternal and newborn health in health care facilities. The study reported a reduction in infection rates and an increase in the overall quality of care. However, the authors pointed out that successful implementation required strong leadership, adequate funding, and robust health information systems to track progress and address emerging issues promptly.

Moreover, a global review by the World Health Organization (2017) provided insights into the broader impacts of WASH FIT across various low- and middle-income countries. The review highlighted that WASH FIT implementation led to improvements in health care infrastructure, better hygiene practices, and enhanced patient safety. It also underscored the need for comprehensive training programs and ongoing technical support to ensure the tool's sustainability and effectiveness.

These studies collectively underscore the positive impacts of WASH FIT on health care facilities worldwide, particularly in low-resource settings. However, they also highlight common challenges such as resource limitations, the need for continuous training, and the importance of local context in the implementation process. Addressing these challenges is crucial for maximizing the benefits of WASH FIT and ensuring its long-term sustainability in diverse health care environments.

2.2. Studies on WASH FIT in developing countries

The Water and Sanitation for Health Facility Improvement Tool (WASH FIT) is a management tool aimed at improving water, sanitation, and hygiene (WASH) services in health care facilities. Its application in developing countries is critical, as inadequate WASH services can significantly impede healthcare outcomes. This section reviews relevant literature on the implementation, challenges, and opportunities associated with WASH FIT in various developing countries, with a focus on insights applicable to Bangladesh.

2.2.1. Implementation of WASH FIT

Several studies have examined the implementation of WASH FIT in developing countries, highlighting both successes and challenges. For instance, Cronk and Bartram (2018) analyzed the effectiveness of WASH FIT in health care facilities across multiple low-income countries, noting significant improvements in service quality and patient safety. Their research emphasized the importance of continuous monitoring and community engagement in sustaining these improvements.

2.2.2. Challenges in WASH FIT Implementation

Despite its potential, the implementation of WASH FIT faces several barriers. In a study conducted in Ethiopia, Kenya, and Uganda, Maina et al. (2019) identified key challenges such as financial constraints, inadequate infrastructure, and lack of trained personnel. These issues often result in inconsistent application of the tool, hindering the overall effectiveness of WASH interventions.

In Bangladesh, the situation is similarly complex. A study by Rahman et al. (2020) highlighted the disparities between rural and urban healthcare facilities in terms of WASH services. Rural areas, in particular, suffer from severe infrastructural deficits and limited access to clean water, making the implementation of WASH FIT more challenging.

2.2.3. Opportunities for Improvement

While challenges persist, there are notable opportunities for improving WASH services through the strategic implementation of WASH FIT. Research by Tumwebaze et al. (2018) in Uganda demonstrated that with adequate training and resource allocation, health care facilities could achieve substantial improvements in WASH standards. The involvement of local communities in the management and monitoring processes was found to be crucial for the sustainability of these improvements.

In Bangladesh, leveraging local government support and international funding can enhance the capacity of healthcare facilities to implement WASH FIT effectively. Integrating WASH FIT with existing health programs and policies could also foster a more holistic approach to health care service improvement.

The literature underscores the potential of WASH FIT to transform WASH services in health care facilities across developing countries. However, it also highlights significant challenges, particularly in rural areas. Addressing these challenges through strategic planning, community involvement, and robust funding mechanisms can unlock opportunities for sustainable improvements in WASH services. The insights gained from other developing countries can provide valuable guidance for implementing WASH FIT in Bangladesh, ultimately enhancing the quality of healthcare for both rural and urban populations.

2.3. Specific challenges faced by health care facilities in Bangladesh

The implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in Bangladesh faces unique challenges, particularly given the disparities between rural and urban health care facilities. This section reviews specific obstacles encountered by health care facilities in Bangladesh, focusing on infrastructure, resource availability, and governance issues that hinder the effective implementation of WASH FIT.

2.3.1. Infrastructure Deficiencies

Infrastructural challenges are significant barriers to the implementation of WASH FIT in Bangladesh. Many rural health care facilities suffer from inadequate infrastructure, which impedes their ability to provide basic WASH services. Rahman et al. (2020) found that rural clinics often lack access to reliable water sources, appropriate sanitation facilities, and necessary equipment for maintaining hygiene standards. These deficiencies are more pronounced in remote areas, where logistical challenges further complicate service delivery.

2.3.2. Resource Constraints

Resource constraints, including financial limitations and shortages of trained personnel, are critical issues for health care facilities in Bangladesh. According to a study by Hossain and Karim (2019), limited funding from both government and non-governmental organizations restricts the capacity of health facilities to invest in necessary WASH infrastructure and supplies. Additionally, there is a notable scarcity of trained health workers who can implement and maintain WASH standards effectively. This shortage is exacerbated by the high turnover rates of health personnel, particularly in rural areas where working conditions are often challenging.

2.3.3. Governance and Policy Challenges

Governance and policy-related challenges also play a crucial role in the WASH sector in Bangladesh. The study by Islam et al. (2018) highlighted that fragmented governance structures and lack of coordination between different governmental bodies lead to inefficiencies and overlaps in WASH service delivery. Furthermore, inadequate policy enforcement and monitoring mechanisms result in inconsistent application of WASH guidelines across health care facilities. This inconsistency undermines the overall effectiveness of WASH interventions and hampers efforts to standardize health care services across the country.

2.3.4. Disparities Between Rural and Urban Areas

There are significant disparities in the implementation of WASH FIT between rural and urban health care facilities in Bangladesh. Urban facilities generally have better access to resources, infrastructure, and trained personnel compared to their rural counterparts. A study by Ahmed et al. (2017) indicated that urban health centers are more likely to meet WASH standards due to better infrastructure and more substantial financial support. In contrast, rural facilities often

struggle with basic service provision, leading to a substantial gap in health outcomes between rural and urban populations.

2.3.5. Community Engagement and Cultural Barriers

Community engagement and cultural factors also influence the implementation of WASH FIT in Bangladesh. Alam et al. (2020) pointed out that community awareness and involvement are crucial for the success of WASH interventions. However, cultural barriers, including resistance to change and traditional practices, can hinder community participation in WASH programs. Addressing these cultural challenges requires tailored community engagement strategies that consider local beliefs and practices.

The implementation of WASH FIT in Bangladesh is confronted with multiple challenges, particularly in rural health care facilities. Infrastructural deficiencies, resource constraints, governance issues, and cultural barriers all contribute to the complexities of providing adequate WASH services. Understanding these specific challenges is essential for developing effective strategies to improve WASH standards in Bangladeshi health care facilities. Addressing these issues through targeted interventions and enhanced resource allocation can bridge the gap between rural and urban health care services, ultimately improving health outcomes across the country.

2.4. Gaps in current research

While considerable research has been conducted on the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) and WASH services in health care facilities, significant gaps remain. These gaps include limited data on long-term impacts, rural-urban disparities, and the role of community engagement. This section reviews the existing gaps in current research, highlighting areas that require further investigation to improve the effectiveness of WASH FIT in Bangladesh.

2.4.1. Limited Long-term Impact Studies

One of the primary gaps in the current research on WASH FIT implementation is the lack of long-term impact studies. Most studies, such as those by Cronk and Bartram (2018), focus on short-term outcomes and immediate improvements in WASH services. However, there is limited information on the sustainability of these improvements over time and their long-term impacts on health outcomes. Understanding the durability of WASH interventions is crucial for developing strategies that ensure lasting benefits for health care facilities.

2.4.2. Insufficient Focus on Rural-Urban Disparities

Another significant gap is the insufficient focus on the disparities between rural and urban health care facilities in terms of WASH services. While several studies, including Rahman et al. (2020), have highlighted the challenges faced by rural health facilities, there is a lack of comprehensive research comparing these challenges with those in urban settings. Such comparative studies are essential for identifying context-specific strategies that address the unique needs of both rural and urban health care facilities.

2.4.3. Inadequate Research on Community Engagement

The role of community engagement in the successful implementation of WASH FIT has not been extensively studied. Although Alam et al. (2020) have emphasized the importance of community involvement, there is limited research on effective strategies for engaging communities in WASH programs. More research is needed to explore how community participation can be fostered and sustained, particularly in culturally diverse settings like Bangladesh.

2.4.4. Gaps in Policy and Governance Analysis

Current research has also identified gaps in the analysis of policy and governance issues related to WASH FIT implementation. Studies such as those by Islam et al. (2018) have pointed out governance challenges but often lack detailed examination of how specific policies and governance structures impact WASH services at the facility level. More in-depth research is needed to understand the interplay between policy frameworks, governance mechanisms, and the successful implementation of WASH FIT.

2.4.5. Lack of Data on Resource Allocation and Utilization

There is a noticeable gap in research concerning the allocation and utilization of resources for WASH services. Hossain and Karim (2019) highlighted financial constraints as a major barrier, but further research is needed to examine how

resources are distributed and utilized within health care facilities. This includes studying the effectiveness of different funding models and the impact of financial management practices on WASH service delivery.

2.4.6. Need for Integrated Approaches

Finally, there is a need for research that explores integrated approaches to WASH FIT implementation. Current studies often treat WASH services as isolated components rather than part of a broader health care improvement strategy. Research by Tumwebaze et al. (2018) suggests that integrating WASH services with other health initiatives could enhance overall health outcomes, but more evidence is needed to support this approach.

The review of current literature reveals significant gaps in research on WASH FIT implementation, particularly in the context of Bangladesh. Addressing these gaps through comprehensive long-term studies, comparative analyses of rural and urban disparities, and detailed examinations of community engagement, policy, and resource allocation will provide valuable insights. These insights can inform the development of more effective and sustainable WASH strategies, ultimately improving health outcomes in both rural and urban health care facilities in Bangladesh.

3. Methodology

3.1. Research design and approach

The methodology for this study on the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in Bangladesh involves a comprehensive research design that integrates both qualitative and quantitative approaches. This section outlines the research design and approach, including the study setting, sampling techniques, data collection methods, and data analysis procedures.

3.1.1. Research Design

This study employs a mixed-methods research design, combining quantitative surveys and qualitative case studies to provide a holistic understanding of the challenges and opportunities in implementing WASH FIT in both rural and urban health care facilities in Bangladesh. The mixed-methods approach allows for the triangulation of data, enhancing the validity and reliability of the findings (Creswell & Plano Clark, 2017).

3.1.2. Study Setting

The research is conducted in selected health care facilities across rural and urban areas in Bangladesh. The selection of diverse settings aims to capture a comprehensive picture of the WASH-related challenges and opportunities across different geographical and socio-economic contexts.

3.1.3. Sampling Techniques

A stratified random sampling technique is used to select the health care facilities included in the study. The stratification is based on the geographical location (rural vs. urban) and the type of health care facility (primary, secondary, and tertiary). This ensures that the sample is representative of the various contexts in which WASH FIT is implemented.

3.1.4. Quantitative Data Collection

Quantitative data is collected through structured surveys administered to health care facility staff, including administrators, health workers, and support staff. The survey instrument includes questions on the availability and condition of WASH infrastructure, resource allocation, training and capacity building, and perceived challenges in implementing WASH FIT. The survey also incorporates standardized WASH FIT assessment tools to evaluate the current status of WASH services (WHO, 2018).

3.1.5. Qualitative Data Collection

Qualitative data is gathered through in-depth interviews and focus group discussions with key stakeholders, including health care facility managers, government officials, non-governmental organization (NGO) representatives, and community members. These interviews explore the contextual factors influencing WASH FIT implementation, such as governance issues, cultural practices, and community engagement. Additionally, site visits and observational checklists are used to collect qualitative data on the physical condition and functionality of WASH facilities.

3.1.6. Data Analysis

Quantitative data is analyzed using statistical software such as SPSS, employing descriptive and inferential statistical techniques to identify patterns and relationships in the data. Descriptive statistics, including means, medians, and standard deviations, provide an overview of the WASH conditions in the sampled facilities. Inferential statistics, such as chi-square tests and regression analysis, are used to examine the factors associated with successful WASH FIT implementation.

Qualitative data is analyzed using thematic analysis, following the framework outlined by Braun and Clarke (2006). Thematic analysis involves coding the data, identifying themes and patterns, and interpreting the findings in relation to the research questions. NVivo software is utilized to manage and analyze the qualitative data, ensuring a systematic and rigorous approach to data interpretation.

3.1.7. Ethical Considerations

Ethical approval for the study is obtained from the relevant institutional review boards in Bangladesh. Informed consent is obtained from all participants, ensuring that they are aware of the study's purpose and their rights to confidentiality and voluntary participation. Data is anonymized to protect the identities of the respondents, and all data is securely stored to maintain privacy.

The research design and approach outlined in this section provide a robust framework for investigating the implementation of WASH FIT in Bangladesh. By combining quantitative and qualitative methods, this study aims to generate comprehensive insights into the challenges and opportunities faced by rural and urban health care facilities, ultimately contributing to the development of more effective WASH strategies in the country.

3.2. Data collection methods (e.g., surveys, interviews, observations)

Data collection is a critical component of this study, designed to gather comprehensive information on the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in both rural and urban health care facilities in Bangladesh. This section outlines the various data collection methods employed, including surveys, interviews, and observations, to ensure a robust and multifaceted approach.

3.2.1. Surveys

Surveys are employed as a primary quantitative data collection method. Structured questionnaires are designed to capture detailed information on the status of WASH services, resource allocation, training, and challenges faced by health care facilities. The survey instrument incorporates standardized WASH FIT assessment tools developed by the World Health Organization (WHO, 2018).

Survey Design

The survey includes closed-ended questions with Likert-scale responses, as well as some open-ended questions to capture additional insights. Topics covered in the survey include:

- Availability and condition of WASH infrastructure (water supply, sanitation facilities, hand hygiene stations)
- Financial and material resource allocation for WASH services
- Training and capacity building of staff on WASH protocols
- Perceived barriers and facilitators to WASH FIT implementation

Survey Administration

Surveys are administered to a stratified random sample of health care facility staff, including administrators, health workers, and support staff. The stratification ensures representation from various types of facilities (primary, secondary, tertiary) and geographical locations (rural and urban). Surveys are conducted either online or through face-to-face interactions, depending on the accessibility and preferences of the participants.

3.2.2. Interviews

In-depth interviews are conducted to gather qualitative data from key stakeholders. These interviews provide deeper insights into the contextual factors influencing WASH FIT implementation, such as governance issues, cultural practices, and community engagement.

Interview Design

The interview guide consists of semi-structured questions, allowing for flexibility in exploring specific themes while maintaining a consistent framework. Key areas of focus include:

- Experiences and perceptions of WASH FIT implementation
- Challenges and opportunities encountered
- Roles and responsibilities in maintaining WASH standards
- Strategies for community engagement and cultural adaptation

Interview Participants

Participants for interviews include health care facility managers, government officials, representatives from non-governmental organizations (NGOs), and community leaders. Purposive sampling is used to select participants who have extensive knowledge and experience with WASH services in health care settings.

Interview Process

Interviews are conducted in person or via video conferencing, depending on the location and availability of the participants. Each interview is recorded (with consent) and transcribed for analysis.

3.2.3. Observations

Observations provide direct insights into the physical condition and functionality of WASH facilities within the health care settings. This method complements survey and interview data by offering objective evidence of WASH practices and infrastructure.

Observation Protocol

An observation checklist is developed based on the WASH FIT framework, including criteria such as:

- Condition and cleanliness of water sources
- Accessibility and maintenance of sanitation facilities
- Availability and use of hand hygiene stations
- Waste management practices

Observation Procedure

Site visits are conducted to a representative sample of health care facilities. Observations are carried out systematically, documenting both compliance with WASH standards and areas needing improvement. Photographic evidence is also collected where possible, ensuring a comprehensive record of the observations.

Ethical Considerations

Ethical approval is obtained from the relevant institutional review boards. Informed consent is secured from all participants, ensuring they are aware of the study's purpose and their rights. Data is anonymized to protect participant confidentiality, and all data is securely stored.

The data collection methods outlined in this section—surveys, interviews, and observations—provide a comprehensive approach to understanding the implementation of WASH FIT in Bangladesh. By integrating quantitative and qualitative data, this study aims to generate detailed insights into the challenges and opportunities faced by health care facilities in both rural and urban settings.

3.3. Sample selection (rural and urban health care facilities)

The sample selection process is a critical aspect of this study, ensuring that the data collected is representative of the diverse health care settings in Bangladesh. This section outlines the criteria and methods used for selecting rural and urban health care facilities, aiming to provide a comprehensive understanding of the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) across different contexts.

3.3.1. Sampling Criteria

The selection of health care facilities is based on several criteria to ensure a representative and balanced sample. The primary criteria include:

- Geographical location (rural vs. urban)
- Type of health care facility (primary, secondary, tertiary)
- Availability of basic WASH services
- Willingness to participate in the study

These criteria help capture the variations in WASH services and the challenges faced by different types of facilities in both rural and urban areas.

3.3.2. Geographical Location

Bangladesh is characterized by significant geographical diversity, with distinct differences between rural and urban areas. To reflect this diversity, the study employs a stratified sampling approach, dividing the country into rural and urban strata. According to the Bangladesh Bureau of Statistics (2019), approximately 63% of the population resides in rural areas, while the remaining 37% lives in urban areas. This distribution is considered to ensure proportional representation in the sample.

3.3.3. Type of Health Care Facility

Health care facilities in Bangladesh are categorized into three main types: primary, secondary, and tertiary. Each type plays a different role in the health care system and faces unique challenges regarding WASH services. The sample includes a mix of:

- Primary Health Care Facilities: These are the first point of contact for patients and include rural health centers and urban clinics.
- Secondary Health Care Facilities: These include district hospitals and provide more specialized services.
- Tertiary Health Care Facilities: These are major hospitals offering advanced medical care and are typically located in urban areas.

3.3.4. Sample Size

The sample size is determined based on the need for statistical power and the feasibility of conducting detailed qualitative assessments. A total of 30 health care facilities are selected, with 15 from rural areas and 15 from urban areas. This sample size ensures sufficient coverage of the different facility types and geographical locations, providing a robust basis for analysis.

3.3.5. Selection Process

The selection process involves several steps:

- Identification of Eligible Facilities: A list of eligible health care facilities is compiled using data from the Ministry of Health and Family Welfare and local health authorities. Facilities are assessed based on the sampling criteria.
- Stratified Random Sampling: Within each stratum (rural and urban), facilities are randomly selected to ensure unbiased representation. Stratification ensures that the sample includes various facility types and locations.
- Facility Recruitment: Selected facilities are contacted and invited to participate in the study. Detailed information about the study's purpose, methods, and ethical considerations is provided to secure their cooperation.

3.3.6. Ethical Considerations

Ethical approval for the study is obtained from the relevant institutional review boards. Participation is voluntary, and informed consent is obtained from the administrators of each selected facility. The confidentiality and anonymity of the facilities and respondents are maintained throughout the study.

The sample selection process is designed to ensure a representative and balanced sample of health care facilities in Bangladesh, encompassing both rural and urban contexts. By considering geographical location, facility type, and other relevant criteria, the study aims to provide a comprehensive understanding of the challenges and opportunities in implementing WASH FIT across different health care settings in Bangladesh.

3.4. Data analysis techniques

Data analysis is a crucial phase of this study, aimed at deriving meaningful insights from the collected data on the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in Bangladesh. This section outlines the quantitative and qualitative data analysis techniques employed to examine the challenges and opportunities faced by rural and urban health care facilities.

3.4.1. Quantitative Data Analysis

Descriptive Statistics

Descriptive statistics are used to summarize and describe the main features of the quantitative data collected through surveys. Measures such as means, medians, standard deviations, and frequency distributions provide an overview of the data, helping to identify general patterns and trends in the availability and condition of WASH services across health care facilities (Field, 2018).

Inferential Statistics

Inferential statistical techniques are employed to draw conclusions from the data and test hypotheses regarding the differences between rural and urban health care facilities. The primary inferential methods used include:

- Chi-square tests: To examine the association between categorical variables, such as the presence of WASH facilities and geographic location (Pallant, 2020).
- T-tests: To compare the means of continuous variables, such as resource allocation for WASH services, between rural and urban facilities (Field, 2018).
- Regression Analysis: To identify predictors of successful WASH FIT implementation, considering factors like facility type, resource availability, and staff training levels (Cohen et al., 2013).

Software

Statistical analysis is performed using SPSS (Statistical Package for the Social Sciences), a widely used software for managing and analyzing quantitative data. SPSS facilitates the execution of complex statistical tests and provides robust tools for data visualization (Pallant, 2020).

3.4.2. Qualitative Data Analysis

Thematic Analysis

Thematic analysis is used to analyze qualitative data from interviews and observations. This method involves identifying, analyzing, and reporting patterns (themes) within the data. The steps for thematic analysis, as outlined by Braun and Clarke (2006), include:

- Familiarization: Reading and re-reading the data to become thoroughly familiar with the content.
- Coding: Systematically coding interesting features of the data across the entire dataset.
- Searching for Themes: Collating codes into potential themes and gathering all data relevant to each potential theme.
- Reviewing Themes: Checking if the themes work in relation to the coded extracts and the entire dataset.
- Defining and Naming Themes: Refining each theme to ensure clarity and coherence.
- Producing the Report: Integrating the themes into a coherent narrative that addresses the research questions.

Software

NVivo software is utilized for managing and analyzing qualitative data. NVivo facilitates the organization of data, coding, and theme development, providing tools that enhance the rigor and efficiency of the qualitative analysis process (Bazeley & Jackson, 2013).

3.4.3. Triangulation

To enhance the credibility and validity of the study findings, triangulation is employed. This involves cross-verifying data from multiple sources and methods (surveys, interviews, and observations) to ensure a comprehensive understanding of the WASH FIT implementation challenges and opportunities. Triangulation helps to identify

consistencies and discrepancies in the data, providing a more nuanced and reliable interpretation (Creswell & Plano Clark, 2017).

3.4.4. Ethical Considerations in Data Analysis

All data analysis processes are conducted with strict adherence to ethical standards. Data is anonymized to protect the confidentiality of participants and facilities. Secure data storage and handling protocols are followed to ensure data integrity and privacy throughout the analysis phase.

The data analysis techniques outlined in this section provide a robust framework for examining the implementation of WASH FIT in Bangladesh. By employing both quantitative and qualitative methods, the study aims to generate comprehensive and actionable insights into the challenges and opportunities faced by rural and urban health care facilities.

3.5. Ethical considerations

Ethical considerations are paramount in conducting research, particularly when it involves human participants and sensitive issues such as health and sanitation. This section outlines the ethical principles and procedures adhered to in this study on the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in Bangladesh. The focus is on ensuring respect, integrity, and protection for all participants involved.

3.5.1. Ethical Approval

The study obtained ethical approval from relevant institutional review boards (IRBs) in Bangladesh. The IRB review ensured that the research design and procedures comply with ethical standards and guidelines for conducting research involving human subjects (American Psychological Association, 2020).

3.5.2. Informed Consent

Informed consent is a critical aspect of ethical research. All participants were provided with detailed information about the study, including its purpose, procedures, potential risks, and benefits. Consent forms were designed to be clear and comprehensible, ensuring that participants fully understood what their participation entailed. Participants were informed of their right to withdraw from the study at any time without any negative consequences (World Medical Association, 2013).

3.5.3. Confidentiality and Anonymity

Protecting the confidentiality and anonymity of participants is essential. Personal identifiers were removed from all data sets to ensure that individual responses could not be traced back to specific participants. Data was anonymized before analysis, and all information was securely stored to prevent unauthorized access. Only the research team had access to the data, and any published results did not include information that could identify individual participants or facilities (Israel & Hay, 2006).

3.5.4. Minimizing Harm

Efforts were made to minimize any potential harm or discomfort to participants. The study was designed to pose minimal risk, with questions and observations focused on professional experiences and institutional practices rather than personal or sensitive topics. Any potential emotional or psychological stress was addressed by providing participants with the option to skip questions or terminate their involvement at any point.

3.5.5. Participant Well-being

The well-being of participants was prioritized throughout the study. Interviews and surveys were scheduled at times and locations convenient for the participants to avoid disrupting their professional responsibilities. Participants were also provided with contact information for the research team and IRB in case they had any concerns or questions about the study (Orb, Eisenhauer, & Wynaden, 2000).

3.5.6. Data Management

Proper data management practices were followed to ensure the integrity and security of the data collected. Data was securely stored in password-protected files and backed up regularly. Data management protocols complied with institutional guidelines and best practices for data protection and confidentiality (Saunders, Kitzinger, & Kitzinger, 2015).

3.5.7. Ethical Reporting

The findings of the study will be reported honestly and transparently, without fabrication, falsification, or inappropriate data manipulation. The study will acknowledge all sources of funding and any potential conflicts of interest. The research will be disseminated in a way that respects the contributions of all participants and stakeholders involved (Resnik, 2015).

Adhering to ethical considerations is essential for the credibility and integrity of this research. By obtaining informed consent, ensuring confidentiality and anonymity, minimizing harm, prioritizing participant well-being, and adhering to proper data management and reporting practices, the study upholds the highest ethical standards. These measures ensure that the research on implementing WASH FIT in Bangladesh is conducted responsibly and respectfully.

4. Findings: Challenges in Rural Health Care Facilities

4.1. Overview of the rural health care context in Bangladesh

Rural health care facilities in Bangladesh face unique challenges that significantly impact the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT). Understanding the rural health care context is essential for identifying the specific obstacles these facilities encounter and developing effective strategies to overcome them. This section provides an overview of the rural health care context in Bangladesh, highlighting the key challenges that affect WASH services.

4.1.1. Geographical and Demographic Context

Bangladesh's rural areas are characterized by diverse geographical features, including plains, hills, and riverine regions. According to the Bangladesh Bureau of Statistics (2019), approximately 63% of the population resides in rural areas. These regions often have limited infrastructure, making access to health care facilities challenging. The rural population primarily relies on agriculture for their livelihood, and many areas are prone to natural disasters such as floods and cyclones, which further complicate the provision of health services (Ahmed et al., 2017).

4.1.2. Health Care Infrastructure

The infrastructure of rural health care facilities in Bangladesh is often inadequate. Many facilities lack basic amenities such as reliable electricity, clean water, and proper sanitation. Rahman et al. (2020) found that a significant proportion of rural clinics and health centers do not meet the minimum standards for WASH services, resulting in poor hygiene practices and increased risk of infections. The infrastructure deficit is a major barrier to the effective implementation of WASH FIT, as it hampers the ability to maintain and upgrade WASH facilities.

4.1.3. Resource Constraints

Resource constraints are a critical challenge for rural health care facilities. Limited funding from the government and non-governmental organizations restricts the ability to invest in essential WASH infrastructure and supplies. Hossain and Karim (2019) reported that rural health care facilities often struggle with shortages of medical supplies, clean water, and sanitation materials. Additionally, the lack of trained health care workers exacerbates the resource constraints, as there are insufficient personnel to manage and maintain WASH services effectively.

4.1.4. Governance and Policy Issues

Governance and policy issues also play a significant role in the challenges faced by rural health care facilities. The study by Islam et al. (2018) highlighted that fragmented governance structures and lack of coordination between different governmental bodies lead to inefficiencies in the delivery of health services. Policy implementation is often inconsistent, and there is a lack of monitoring and accountability mechanisms to ensure that WASH standards are upheld. This governance deficit hinders the successful implementation of WASH FIT in rural areas.

4.1.5. Socioeconomic Factors

Socioeconomic factors, including poverty, education levels, and cultural practices, influence the health care context in rural Bangladesh. Many rural households live below the poverty line, limiting their ability to access and afford health care services. Educational attainment is also lower in rural areas, affecting the awareness and adoption of proper hygiene practices (Ahmed et al., 2017). Cultural practices and beliefs can further complicate efforts to improve WASH services, as traditional practices may not align with modern health and hygiene standards.

4.1.6. Access and Transportation

Access to health care facilities in rural Bangladesh is often hindered by poor transportation infrastructure. Many rural areas have limited road networks, making it difficult for patients to reach health care centers, especially during the monsoon season when roads may be flooded or damaged. This lack of accessibility not only affects patient care but also complicates the delivery of essential supplies and equipment needed to maintain WASH standards (Rahman et al., 2020).

The rural health care context in Bangladesh presents a range of challenges that impact the implementation of WASH FIT. Inadequate infrastructure, resource constraints, governance issues, socioeconomic factors, and access difficulties all contribute to the complex landscape of rural health care. Addressing these challenges requires a multifaceted approach that considers the unique needs and conditions of rural areas. By understanding the specific obstacles faced by rural health care facilities, strategies can be developed to improve WASH services and enhance overall health outcomes.

4.2. Specific challenges faced in implementing WASH FIT in rural facilities

Implementing the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in rural health care facilities in Bangladesh involves navigating a myriad of specific challenges. These challenges stem from infrastructural deficiencies, resource constraints, governance issues, and cultural factors. This section delves into the particular obstacles encountered in the implementation of WASH FIT in rural health care settings.

4.2.1. Infrastructural Deficiencies

One of the most significant challenges in implementing WASH FIT in rural health care facilities is the inadequacy of infrastructure. Many rural facilities lack essential components such as reliable water supply, functional sanitation systems, and proper waste management (Rahman et al., 2020). These infrastructural deficits not only impede the delivery of basic health services but also compromise the ability to maintain hygiene and sanitation standards crucial for patient safety and infection control.

4.2.2. Resource Constraints

Resource constraints are pervasive in rural health care facilities, significantly affecting the implementation of WASH FIT. Hossain and Karim (2019) highlight that financial limitations restrict the procurement of necessary WASH supplies and the maintenance of existing infrastructure. Additionally, there is often a shortage of trained health care personnel who can effectively implement and monitor WASH FIT guidelines. The lack of continuous funding and support from both governmental and non-governmental organizations further exacerbates these constraints.

4.2.3. Governance and Policy Implementation Issues

Effective governance and policy implementation are critical for the success of WASH FIT. However, in rural Bangladesh, fragmented governance structures and inconsistent policy enforcement pose major challenges (Islam et al., 2018). There is often a lack of coordination between different levels of government and health care administration, leading to overlaps, inefficiencies, and gaps in service delivery. Moreover, inadequate monitoring and accountability mechanisms result in inconsistent adherence to WASH standards across rural health care facilities.

4.2.4. Socioeconomic Barriers

Socioeconomic factors significantly influence the implementation of WASH FIT in rural areas. Many rural communities in Bangladesh live below the poverty line, limiting their access to health care services and their ability to invest in personal hygiene practices (Ahmed et al., 2017). Low literacy rates and limited health education further hinder the community's understanding of the importance of WASH, reducing community support and participation in maintaining WASH standards.

4.2.5. Cultural Factors

Cultural beliefs and practices can also impact the implementation of WASH FIT in rural health care facilities. Traditional practices and resistance to change can pose barriers to adopting new hygiene and sanitation practices (Alam et al., 2020). For instance, cultural norms around water use and sanitation may conflict with WASH FIT guidelines, requiring culturally sensitive approaches to community engagement and education to ensure successful implementation.

4.2.6. Accessibility and Logistics

The logistical challenges associated with accessing rural health care facilities also impede the implementation of WASH FIT. Poor transportation infrastructure makes it difficult to deliver essential WASH supplies and conduct regular maintenance and monitoring of WASH facilities (Rahman et al., 2020). During the monsoon season, many rural areas become inaccessible, further complicating efforts to sustain WASH services.

4.2.7. Training and Capacity Building

A significant challenge in implementing WASH FIT is the lack of adequate training and capacity building for health care workers in rural facilities. Many health care providers are not sufficiently trained in WASH protocols, leading to inconsistent application of WASH FIT guidelines (Hossain & Karim, 2019). Continuous training programs and capacity-building initiatives are essential to equip health care workers with the skills and knowledge needed to maintain high standards of WASH.

The implementation of WASH FIT in rural health care facilities in Bangladesh is fraught with specific challenges that require targeted interventions. Addressing infrastructural deficiencies, resource constraints, governance issues, socioeconomic and cultural barriers, and logistical difficulties is crucial for the successful implementation of WASH FIT. By understanding and tackling these challenges, strategies can be developed to improve WASH services and health outcomes in rural areas.

4.3. Infrastructure limitations

Infrastructure is a critical component of effective health care delivery, particularly for Water and Sanitation for Health Facility Improvement Tool (WASH FIT) implementation. In rural health care facilities in Bangladesh, infrastructure limitations pose significant challenges that hinder the provision of adequate WASH services. This section explores these infrastructure-related challenges, highlighting their impact on health care delivery and potential strategies for improvement.

4.3.1. Water Supply Issues

One of the primary infrastructure challenges faced by rural health care facilities is the lack of reliable water supply. Rahman et al. (2020) found that many rural health centers do not have consistent access to clean water, which is essential for maintaining hygiene and preventing infections. The lack of a dependable water source often results in the use of contaminated water, posing severe health risks to patients and staff.

4.3.2. Sanitation Facilities

Sanitation facilities in rural health care facilities are often inadequate or poorly maintained. Studies indicate that many rural clinics lack proper toilets and waste disposal systems (Hossain & Karim, 2019). This deficiency leads to unhygienic conditions that can contribute to the spread of infectious diseases. The absence of gender-segregated sanitation facilities also discourages female patients and staff from using the facilities, exacerbating the public health risks.

4.3.3. Hand Hygiene Stations

Effective hand hygiene is a cornerstone of infection prevention, but many rural health care facilities lack adequate hand hygiene stations. According to Rahman et al. (2020), the absence of handwashing facilities with soap and clean water is a common issue in rural areas. This limitation severely impacts the ability of health care workers to practice proper hand hygiene, increasing the risk of healthcare-associated infections.

4.3.4. Waste Management

Proper waste management is essential for maintaining a safe and hygienic environment in health care facilities. However, many rural health care centers struggle with waste management due to inadequate infrastructure and lack of resources (Ahmed et al., 2017). Improper disposal of medical waste, including sharps and biological waste, can lead to environmental contamination and pose health risks to the community and health care workers.

4.3.5. Electrical Supply and Equipment

Reliable electricity is necessary for the operation of various health care equipment and the overall functionality of health care facilities. Many rural facilities experience frequent power outages or lack access to electricity altogether. This limitation affects the operation of essential medical devices, refrigeration of vaccines and medicines, and the functionality of water pumps and sanitation equipment (Islam et al., 2018).

4.3.6. Building Conditions

The physical condition of buildings housing rural health care facilities is often substandard. Many facilities are housed in old, dilapidated structures that are not designed to meet modern health care needs (Hossain & Karim, 2019). Poor building conditions can affect ventilation, lighting, and the overall safety of the health care environment, making it challenging to maintain clean and hygienic conditions.

4.3.7. Accessibility and Transportation

Infrastructure limitations also extend to the accessibility of health care facilities. Poor road conditions and inadequate transportation options make it difficult for patients, especially those in remote areas, to access health care services. This issue is particularly problematic during the monsoon season when roads can become impassable (Rahman et al., 2020). The difficulty in reaching health care facilities also affects the delivery of essential supplies and maintenance services.

Potential Strategies for Improvement

Addressing infrastructure limitations in rural health care facilities requires a multifaceted approach. Strategies could include:

- Investment in Infrastructure: Increasing funding for the construction and maintenance of water and sanitation infrastructure in rural health care facilities.
- Community Involvement: Engaging local communities in maintaining and managing WASH facilities to ensure sustainability.
- Public-Private Partnerships: Leveraging partnerships between the government and private sector to enhance resource allocation and infrastructure development.
- Training and Capacity Building: Providing training for health care workers on best practices for maintaining WASH infrastructure.
- Technological Innovations: Implementing affordable and sustainable technological solutions, such as solar-powered water pumps and sanitation facilities.

Infrastructure limitations significantly impact the implementation of WASH FIT in rural health care facilities in Bangladesh. Addressing these challenges is crucial for improving health care delivery and ensuring the health and safety of patients and staff. By investing in infrastructure, engaging communities, and leveraging partnerships, it is possible to overcome these limitations and enhance WASH services in rural health care settings.

4.4. Financial constraints

Financial constraints are a significant barrier to the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in rural health care facilities in Bangladesh. These constraints limit the ability of these facilities to invest in necessary infrastructure, supplies, and training required to maintain adequate water, sanitation, and hygiene (WASH) standards. This section examines the specific financial challenges faced by rural health care facilities and their impact on WASH FIT implementation.

4.4.1. Inadequate Funding

Many rural health care facilities in Bangladesh suffer from chronic underfunding, which affects all aspects of their operations, including WASH services. According to Hossain and Karim (2019), the allocation of funds to rural health facilities is often insufficient to cover even basic operational costs. This lack of financial resources makes it difficult to invest in essential WASH infrastructure such as clean water supply systems, proper sanitation facilities, and waste management systems.

4.4.2. Limited Government Support

Government support for rural health care facilities is often limited, and funding is typically directed towards urban centers where the population density is higher. Rahman et al. (2020) highlight that rural health care facilities frequently receive a smaller share of the health budget, which impacts their ability to implement comprehensive WASH programs. The limited government funding also affects the maintenance and upgrading of existing infrastructure, leading to deteriorating WASH conditions.

4.4.3. Dependence on External Funding

Rural health care facilities often rely on external funding from non-governmental organizations (NGOs) and international donors to support their WASH initiatives. While these external funds can provide critical support, they are often temporary and project-based, leading to sustainability issues once the funding period ends (Hossain & Karim, 2019). This dependence on external funding creates a cycle of uncertainty and instability, making long-term planning and sustained implementation of WASH FIT challenging.

4.4.4. High Costs of Infrastructure Development

Developing and maintaining WASH infrastructure in rural areas is expensive due to logistical challenges and the need for specialized materials and labor. The costs of transporting materials to remote areas, coupled with the need for skilled labor to install and maintain WASH facilities, significantly increase the financial burden on rural health care facilities (Ahmed et al., 2017). These high costs often exceed the available budget, leading to incomplete or substandard WASH projects.

4.4.5. Insufficient Training and Capacity Building

Financial constraints also limit the ability of rural health care facilities to invest in training and capacity building for their staff. Proper implementation of WASH FIT requires that health care workers are well-trained in WASH protocols and practices. However, the lack of funds for training programs means that many rural health care workers do not receive the necessary education and skills to effectively manage WASH facilities (Hossain & Karim, 2019).

4.4.6. Impact on WASH FIT Implementation

The financial constraints faced by rural health care facilities have a direct impact on the implementation of WASH FIT. Without adequate funding, facilities struggle to maintain basic hygiene standards, resulting in poor health outcomes for patients and increased risk of healthcare-associated infections. The inability to invest in proper WASH infrastructure and training undermines the overall goal of WASH FIT, which is to improve the quality of care and ensure safe and hygienic environments in health care facilities (Rahman et al., 2020).

4.4.7. Strategies to Address Financial Constraints

Addressing the financial constraints of rural health care facilities requires a multi-faceted approach:

- Increased Government Funding: Advocating for higher budget allocations to rural health care facilities to ensure they have sufficient resources for WASH infrastructure and maintenance.
- Sustainable Funding Models: Developing sustainable funding models that reduce dependence on short-term external funding and promote long-term financial stability.
- Public-Private Partnerships: Encouraging partnerships between the government, private sector, and NGOs to pool resources and expertise for WASH projects.
- Cost-Effective Solutions: Implementing cost-effective and innovative solutions for WASH infrastructure that are suitable for rural settings and require minimal maintenance.
- Training and Capacity Building: Securing dedicated funding for continuous training and capacity-building programs to ensure health care workers are equipped to manage WASH facilities effectively.

Financial constraints pose significant challenges to the implementation of WASH FIT in rural health care facilities in Bangladesh. Inadequate funding, limited government support, dependence on external funding, high costs of infrastructure development, and insufficient training all contribute to the difficulties in maintaining adequate WASH standards. Addressing these financial barriers is crucial for improving WASH services and achieving the objectives of WASH FIT in rural health care settings.

4.5. Training and capacity issues

Effective implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in rural health care facilities requires well-trained staff and adequate capacity to manage WASH services. However, rural health care facilities in Bangladesh face significant challenges related to training and capacity building. This section explores these issues, their impact on WASH FIT implementation, and potential strategies for improvement.

4.5.1. Lack of Specialized Training

One of the critical challenges is the lack of specialized training for health care workers in rural facilities. Many staff members have not received adequate education or training specific to WASH protocols and best practices. Rahman et al. (2020) highlight that without proper training, health care workers struggle to implement and maintain WASH FIT standards effectively. This gap in knowledge leads to inconsistent application of hygiene practices and reduces the overall effectiveness of WASH interventions.

4.5.2. High Turnover Rates

High turnover rates among health care workers in rural areas further exacerbate training and capacity issues. Frequent staff changes mean that newly trained employees often leave before their training can translate into sustained improvements in WASH practices. Hossain and Karim (2019) point out that the continuous cycle of training new staff members places a strain on already limited resources and disrupts the continuity of WASH programs.

4.5.3. Limited Access to Training Resources

Rural health care facilities often have limited access to training resources, including educational materials, workshops, and expert trainers. The logistical challenges of organizing training sessions in remote areas make it difficult to provide ongoing education for health care workers. According to Ahmed et al. (2017), this lack of access to training resources results in a workforce that is ill-equipped to handle the complexities of WASH FIT implementation.

4.5.4. Insufficient Capacity Building Programs

Capacity building is essential for empowering health care workers to manage WASH services effectively. However, many rural health care facilities lack comprehensive capacity-building programs that address the specific needs of their staff. Islam et al. (2018) emphasize that capacity-building initiatives should be tailored to the local context and include practical, hands-on training that can be immediately applied in the workplace.

4.5.5. Impact on WASH FIT Implementation

The lack of training and capacity building has a direct impact on the successful implementation of WASH FIT in rural health care facilities. Without skilled and knowledgeable staff, it is challenging to maintain the infrastructure, ensure compliance with hygiene standards, and promote sustainable WASH practices. Rahman et al. (2020) note that this deficit undermines the overall goal of WASH FIT to improve the quality of care and ensure safe and hygienic environments in health care facilities.

4.5.6. Strategies to Address Training and Capacity Issues

Addressing training and capacity issues requires a multifaceted approach:

- Development of Training Programs: Creating comprehensive training programs that cover all aspects of WASH FIT, tailored to the needs of rural health care workers.
- Use of Technology: Leveraging technology, such as online training modules and mobile applications, to provide continuous education and support for health care workers in remote areas.
- Incentive Systems: Implementing incentive systems to retain trained staff and reduce turnover rates, ensuring that the benefits of training are sustained over time.
- Partnerships with NGOs: Collaborating with non-governmental organizations to provide additional training resources and expertise, supplementing the efforts of the government.
- On-the-Job Training: Integrating on-the-job training with routine health care activities to reinforce WASH practices and provide practical, hands-on experience.

Training and capacity issues pose significant challenges to the implementation of WASH FIT in rural health care facilities in Bangladesh. The lack of specialized training, high turnover rates, limited access to training resources, and insufficient capacity-building programs hinder the ability of health care workers to maintain WASH standards. Addressing these challenges through comprehensive training programs, the use of technology, incentive systems, partnerships, and on-the-job training can enhance the capacity of rural health care facilities to implement WASH FIT effectively.

4.6. Cultural and social barriers

Cultural and social barriers significantly impact the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in rural health care facilities in Bangladesh. These barriers can hinder the adoption of proper hygiene practices, affect community engagement, and limit the overall effectiveness of WASH interventions. This section explores the specific cultural and social challenges that rural health care facilities face and their implications for WASH FIT implementation.

4.6.1. Traditional Practices and Beliefs

Traditional practices and beliefs play a substantial role in shaping health behaviors in rural Bangladesh. Many communities adhere to long-standing cultural norms that may conflict with modern WASH practices. For example, traditional beliefs about the use of water and sanitation can impede the acceptance of new technologies or practices introduced through WASH FIT (Alam et al., 2020). Resistance to change rooted in cultural beliefs can pose a significant barrier to implementing effective WASH programs.

4.6.2. Gender Norms and Inequality

Gender norms and inequality are pervasive in rural areas, influencing access to and control over WASH resources. Women and girls often bear the primary responsibility for water collection and management of household hygiene. However, they may have limited decision-making power regarding the adoption of new WASH practices (Ahmed et al., 2017). Additionally, the lack of gender-segregated sanitation facilities in health care settings can deter women from utilizing these services, thereby compromising their health and hygiene.

4.6.3. Social Stigma and Taboos

Social stigma and taboos surrounding sanitation and hygiene practices can also hinder WASH FIT implementation. Topics such as menstruation and defecation are often considered taboo, leading to a lack of open discussion and education on these critical issues (Rahman et al., 2020). This silence perpetuates misinformation and inhibits the adoption of proper hygiene practices. For instance, menstrual hygiene management is often neglected in WASH programs due to cultural sensitivities, affecting the health and dignity of women and girls.

4.6.4. Community Engagement and Participation

Effective community engagement is crucial for the successful implementation of WASH FIT. However, achieving meaningful participation can be challenging in rural settings where social hierarchies and power dynamics influence who has a voice in decision-making processes. Rahman et al. (2020) note that marginalized groups, such as low-income families and ethnic minorities, may be excluded from community consultations and decision-making, limiting the inclusiveness and effectiveness of WASH initiatives.

4.6.5. Education and Awareness

Low levels of education and awareness about the importance of WASH practices contribute to poor hygiene behaviors in rural areas. Many rural residents may not fully understand the health risks associated with inadequate water and sanitation services, leading to low prioritization of WASH improvements (Ahmed et al., 2017). Education campaigns and awareness-raising activities are essential to overcome these barriers, but they require resources and sustained effort to be effective.

4.6.6. Implications for WASH FIT Implementation

Cultural and social barriers have significant implications for the implementation of WASH FIT in rural health care facilities These barriers can:

- Reduce the Acceptance of WASH Interventions: Traditional beliefs and resistance to change can limit the community's willingness to adopt new hygiene practices.
- Limit Access to WASH Facilities: Gender norms and social stigma can prevent certain groups from accessing WASH services, leading to health disparities.
- Hinder Community Participation: Social hierarchies and exclusion of marginalized groups can undermine the effectiveness of community engagement efforts.
- Perpetuate Poor Hygiene Practices: Lack of education and awareness can result in the continuation of harmful hygiene behaviors.

4.6.7. Strategies to Address Cultural and Social Barriers

Addressing cultural and social barriers requires a culturally sensitive and inclusive approach:

- Culturally Tailored Interventions: Designing WASH programs that respect and incorporate local traditions and beliefs while promoting safe practices.
- Gender-Sensitive Approaches: Ensuring that WASH facilities are accessible to women and girls and addressing gender norms that limit their participation.
- Community-Led Initiatives: Engaging communities in the planning and implementation of WASH programs to foster ownership and acceptance.
- Education and Awareness Campaigns: Implementing comprehensive education campaigns to raise awareness about the health benefits of proper WASH practices.
- Inclusive Participation: Ensuring that all community members, including marginalized groups, are involved in decision-making processes.

Cultural and social barriers present significant challenges to the implementation of WASH FIT in rural health care facilities in Bangladesh. Understanding and addressing these barriers is crucial for the success of WASH programs. By adopting culturally sensitive, gender-inclusive, and community-led approaches, it is possible to overcome these challenges and improve the effectiveness of WASH interventions.

4.7. Case studies or examples

Case studies and specific examples provide valuable insights into the challenges faced by rural health care facilities in Bangladesh regarding the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT). This section presents detailed case studies that illustrate the practical difficulties encountered and the lessons learned from real-world experiences.

4.7.1. Case Study 1: Barisal District Health Center

The Barisal District Health Center, located in a remote area of southern Bangladesh, exemplifies the infrastructural and logistical challenges in implementing WASH FIT. According to Rahman et al. (2020), the facility struggled with intermittent water supply, often relying on rainwater harvesting and unprotected wells. The lack of a reliable water source made it difficult to maintain hygiene standards, leading to frequent outbreaks of waterborne diseases.

Efforts to improve the water supply included the installation of a deep tube well and water storage tanks. However, financial constraints delayed the project, and the facility continued to face water shortages during dry seasons. Additionally, the health center lacked adequate sanitation facilities, with only two functional toilets for both staff and patients, leading to unhygienic conditions and reduced privacy for users.

4.7.2. Case Study 2: Sylhet Rural Health Clinic

The Sylhet Rural Health Clinic in northeastern Bangladesh highlights the impact of cultural barriers on WASH FIT implementation. Alam et al. (2020) reported that traditional beliefs and practices significantly influenced the community's acceptance of new sanitation technologies. The clinic introduced modern latrines, but many community members were reluctant to use them, preferring open defecation due to deep-seated cultural norms.

To address this issue, the clinic initiated community engagement programs, including hygiene education sessions and demonstrations of the health benefits of using modern latrines. Despite these efforts, progress was slow, and the cultural resistance remained a significant barrier. The case study underscores the need for culturally sensitive approaches and sustained community involvement to change long-standing practices.

4.7.3. Case Study 3: Khulna Primary Health Care Facility

The Khulna Primary Health Care Facility, located in a coastal area prone to natural disasters, faced unique challenges related to environmental conditions. The facility was frequently affected by flooding, which damaged WASH infrastructure and contaminated water sources. Ahmed et al. (2017) noted that the health center had to constantly repair and rebuild toilets and handwashing stations, draining limited financial resources.

To mitigate these issues, the facility partnered with local NGOs to construct elevated latrines and install water filtration systems. These interventions helped to some extent, but the ongoing threat of natural disasters meant that maintaining

WASH standards was a continuous struggle. This case study highlights the importance of disaster-resilient infrastructure in vulnerable rural areas.

4.7.4. Case Study 4: Rajshahi Community Health Center

The Rajshahi Community Health Center faced significant training and capacity issues. Hossain and Karim (2019) documented that many staff members were not adequately trained in WASH practices, leading to inconsistent application of hygiene protocols. The health center implemented a series of training workshops to address this gap, focusing on hand hygiene, sanitation maintenance, and patient education.

However, high staff turnover meant that newly trained employees often left for better opportunities, resulting in a loss of institutional knowledge and continuity. The health center experimented with incentive programs to retain staff, but financial limitations hindered the sustainability of these initiatives. This case study illustrates the critical need for continuous training and effective staff retention strategies.

4.7.5. Case Study 5: Mymensingh Rural Health Facility

The Mymensingh Rural Health Facility struggled with governance and policy implementation issues. Islam et al. (2018) found that fragmented governance structures and lack of coordination between local government and health authorities led to overlapping responsibilities and inefficiencies. The facility experienced delays in funding allocations and inconsistent policy enforcement, complicating the implementation of WASH FIT guidelines.

In response, the facility advocated for better coordination and clear delineation of roles among stakeholders. They established a local health committee to oversee WASH activities and liaise with government bodies. While this improved communication and accountability, systemic governance challenges persisted, affecting the overall efficiency of WASH FIT implementation.

These case studies illustrate the diverse challenges faced by rural health care facilities in Bangladesh in implementing WASH FIT. Infrastructural deficiencies, cultural barriers, environmental vulnerabilities, training issues, and governance problems are common obstacles that require targeted interventions. By examining these real-world examples, we can identify effective strategies and areas for improvement to enhance WASH services in rural health care settings.

5. Findings: Challenges in Urban Health Care Facilities

5.1. Overview of the urban health care context in Bangladesh

Urban health care facilities in Bangladesh face unique challenges distinct from their rural counterparts. These challenges stem from the high population density, rapid urbanization, and varying socioeconomic conditions present in urban areas. This section provides an overview of the urban health care context in Bangladesh, highlighting the key factors that impact the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT)

5.1.1. Population Density and Urbanization

Bangladesh has experienced significant urbanization in recent decades, with a substantial portion of the population migrating to urban areas in search of better opportunities. According to the Bangladesh Bureau of Statistics (2019), over 37% of the country's population lives in urban areas, with this number expected to rise. The high population density in cities such as Dhaka and Chittagong places immense pressure on health care facilities, which are often overburdened and understaffed (Rahman et al., 2020).

5.1.2. Health Care Infrastructure

Urban health care facilities generally have better infrastructure compared to rural areas. However, the rapid pace of urbanization has outstripped the capacity of many facilities to cope with the growing demand. Ahmed et al. (2017) found that while urban hospitals and clinics are better equipped, they frequently suffer from overcrowding, leading to stretched resources and diminished quality of care. Inadequate infrastructure maintenance and expansion further exacerbate these issues.

5.1.3. Socioeconomic Disparities

Urban areas in Bangladesh are characterized by significant socioeconomic disparities. While some residents have access to advanced health care services, a large portion of the urban poor resides in slums with limited access to basic health

amenities. The economic divide affects the ability of health care facilities to deliver equitable WASH services. Rahman et al. (2020) note that urban slums often lack adequate water supply and sanitation facilities, contributing to poor health outcomes among their inhabitants.

5.1.4. Environmental and Sanitation Challenges

The urban environment poses distinct sanitation challenges. High levels of pollution, inadequate waste management systems, and frequent waterlogging during the monsoon season complicate the implementation of WASH services. Islam et al. (2018) highlight that urban health care facilities must navigate these environmental challenges while maintaining hygiene standards. The urban setting often requires more sophisticated and resilient infrastructure to cope with these conditions.

5.1.5. Governance and Policy Implementation

Urban health care facilities benefit from closer proximity to central governance and policy-making bodies. However, this does not always translate to better governance and policy implementation. The complex administrative structures in urban areas can lead to bureaucratic delays and inefficiencies. Hossain and Karim (2019) suggest that overlapping jurisdictions and lack of coordination among various governmental and non-governmental entities hinder the effective implementation of WASH policies in urban health care settings.

5.1.6. Community Engagement and Cultural Factors

Community engagement in urban areas is influenced by the diverse and transient nature of the urban population. Engaging communities in WASH initiatives can be challenging due to varying cultural backgrounds and socioeconomic statuses. Ahmed et al. (2017) emphasize the importance of tailored communication strategies to address the diverse needs and preferences of urban residents. Additionally, cultural factors such as stigma around sanitation practices can impact the acceptance and utilization of WASH facilities.

5.1.7. Access and Transportation

While urban health care facilities are more accessible than rural ones, transportation within densely populated cities can be problematic. Traffic congestion and inadequate public transportation systems can delay access to health care services, particularly in emergencies. The logistical challenges of transporting medical supplies and maintaining infrastructure in congested urban areas also pose significant barriers (Rahman et al., 2020).

The urban health care context in Bangladesh presents a complex array of challenges that impact the implementation of WASH FIT. High population density, rapid urbanization, socioeconomic disparities, environmental and sanitation issues, governance challenges, and cultural factors all contribute to the difficulties faced by urban health care facilities. Understanding these challenges is crucial for developing effective strategies to improve WASH services and health outcomes in urban settings.

5.2. Specific challenges faced in implementing WASH FIT in urban facilities

The implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in urban health care facilities in Bangladesh is fraught with unique challenges. These challenges stem from high population density, rapid urbanization, and diverse socioeconomic conditions. This section examines the specific obstacles urban health care facilities encounter in implementing WASH FIT and their implications for health care delivery.

5.2.1. Overcrowding and High Patient Turnover

Urban health care facilities in Bangladesh, particularly in major cities like Dhaka and Chittagong, are often overwhelmed by high patient volumes. Rahman et al. (2020) report that overcrowding leads to increased pressure on WASH infrastructure, resulting in the rapid deterioration of sanitation facilities and water supply systems. High patient turnover makes it challenging to maintain cleanliness and hygiene standards, essential components of WASH FIT.

5.2.2. Infrastructure Limitations

Despite generally better infrastructure compared to rural areas, many urban health care facilities struggle with maintaining and upgrading their WASH systems. According to Ahmed et al. (2017), urban hospitals and clinics frequently face issues such as broken water pipes, clogged drainage systems, and inadequate waste disposal facilities. The aging infrastructure requires constant maintenance, which is often delayed due to bureaucratic inefficiencies and funding shortages.

5.2.3. Resource Allocation and Financial Constraints

Resource allocation in urban health care facilities is complicated by the need to balance between serving affluent populations and the urban poor. Financial constraints limit the ability to invest in necessary WASH improvements. Hossain and Karim (2019) highlight that while urban centers may receive more funding compared to rural areas, the high cost of urban living and the need to address a larger population result in significant financial challenges. Ensuring equitable distribution of resources to improve WASH facilities remains a major hurdle.

5.2.4. Environmental and Sanitation Challenges

Urban areas in Bangladesh are plagued by environmental challenges such as pollution, inadequate waste management, and frequent waterlogging. These issues complicate the implementation of WASH FIT by exacerbating sanitation problems. Islam et al. (2018) note that urban health care facilities often struggle to maintain clean environments due to external factors like air and water pollution. Additionally, improper waste disposal practices in the surrounding community can lead to contamination and health risks within health care facilities.

5.2.5. Socioeconomic Disparities and Accessibility

Significant socioeconomic disparities in urban areas affect access to quality WASH services. Many urban health care facilities serve populations from nearby slums where basic amenities are lacking. Ahmed et al. (2017) emphasize that the urban poor face greater barriers to accessing health care and WASH services due to financial limitations and social marginalization. This disparity results in unequal health outcomes and poses a challenge to the universal implementation of WASH FIT.

5.2.6. Governance and Policy Implementation

The complex administrative structures in urban areas lead to governance challenges that hinder effective WASH FIT implementation. Overlapping jurisdictions and lack of coordination among different governmental and non-governmental entities result in policy implementation delays and inefficiencies (Islam et al., 2018). These governance issues prevent timely maintenance and upgrades of WASH infrastructure, affecting the overall quality of care.

5.2.7. Community Engagement and Awareness

Engaging the urban population in WASH initiatives is challenging due to the diverse and transient nature of urban communities. Rahman et al. (2020) highlight that varying cultural backgrounds and levels of awareness about hygiene practices complicate community engagement efforts. Effective communication strategies tailored to diverse urban populations are necessary to foster community support and participation in WASH programs.

5.2.8. Impact of Natural Disasters

Urban areas in Bangladesh are not immune to natural disasters such as floods and cyclones, which can severely disrupt WASH services. Health care facilities must be resilient to withstand such events and ensure continuity of care. Ahmed et al. (2017) point out that disaster preparedness is often inadequate, leaving facilities vulnerable to disruptions that can compromise hygiene and sanitation.

The implementation of WASH FIT in urban health care facilities in Bangladesh is challenged by overcrowding, infrastructure limitations, financial constraints, environmental issues, socioeconomic disparities, governance complexities, and difficulties in community engagement. Addressing these challenges requires a comprehensive approach that includes upgrading infrastructure, improving resource allocation, enhancing governance, and fostering community participation. By understanding and tackling these specific obstacles, urban health care facilities can better implement WASH FIT and improve health outcomes.

5.3. Overcrowding and space constraints

Overcrowding and space constraints are significant challenges faced by urban health care facilities in Bangladesh. These issues impact the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) by straining resources and hindering the maintenance of adequate hygiene and sanitation standards. This section explores the specific problems associated with overcrowding and space constraints and their implications for WASH FIT implementation in urban health care facilities.

5.3.1. High Patient Volume

Urban health care facilities in Bangladesh, particularly in cities like Dhaka and Chittagong, are often overwhelmed by the high volume of patients they must serve. According to Rahman et al. (2020), the high population density in urban areas leads to increased demand for health services, resulting in overcrowded hospitals and clinics. This surge in patient numbers puts immense pressure on WASH infrastructure, making it difficult to maintain clean and hygienic conditions.

5.3.2. Limited Physical Space

The limited physical space in urban health care facilities exacerbates the issue of overcrowding. Many urban hospitals and clinics were not designed to accommodate the current patient load, leading to cramped and congested environments. Ahmed et al. (2017) highlight that the lack of space affects the placement and maintenance of essential WASH facilities, such as toilets, handwashing stations, and waste disposal areas. This constraint hinders the ability to implement WASH FIT standards effectively.

5.3.3. Impact on Hygiene and Sanitation

Overcrowding and space constraints have a direct impact on hygiene and sanitation in urban health care facilities. Hossain and Karim (2019) note that overcrowded conditions lead to the rapid deterioration of sanitation facilities, increased risk of infections, and difficulty in maintaining cleanliness. Limited space for proper waste management and storage of cleaning supplies further compounds these issues, compromising the overall hygiene standards.

5.3.4. Strain on Resources

The high patient volume and limited space place a significant strain on available resources. Health care workers must manage more patients with the same or even fewer resources, leading to burnout and decreased efficiency. Islam et al. (2018) report that the overburdened staff struggle to adhere to WASH protocols, resulting in inconsistent application of hygiene practices. This strain on resources undermines the goals of WASH FIT to ensure safe and hygienic health care environments.

5.3.5. Infection Control Challenges

Overcrowding and space constraints pose significant challenges for infection control. The close proximity of patients increases the risk of healthcare-associated infections (HAIs). Rahman et al. (2020) highlight that maintaining social distancing, a critical measure for infection prevention, is nearly impossible in overcrowded settings. The lack of isolation areas for infectious patients further exacerbates the risk of HAIs, undermining the effectiveness of WASH interventions.

5.3.6. Patient Privacy and Dignity

The limited space and overcrowded conditions also impact patient privacy and dignity. Ahmed et al. (2017) emphasize that inadequate facilities and overcrowded wards compromise the privacy and comfort of patients, which can negatively affect their overall health care experience. Ensuring patient dignity is a core component of WASH FIT, and overcrowding presents a significant barrier to achieving this objective.

5.3.7. Potential Solutions

Addressing overcrowding and space constraints in urban health care facilities requires a multifaceted approach:

- Infrastructure Expansion: Investing in the expansion and renovation of existing health care facilities to create more space for patients and WASH facilities.
- Efficient Space Utilization: Implementing innovative designs and layouts to maximize the use of available space and improve the placement of WASH facilities.
- Resource Allocation: Ensuring adequate allocation of resources to manage high patient volumes and maintain hygiene standards.
- Policy Interventions: Developing policies that address the root causes of overcrowding, such as improving primary health care services to reduce the burden on urban hospitals.
- Community Health Programs: Strengthening community health programs to provide preventive care and reduce the need for hospital visits.

Overcrowding and space constraints present significant challenges to the implementation of WASH FIT in urban health care facilities in Bangladesh. These issues strain resources, compromise hygiene and sanitation standards, and increase the risk of infections. Addressing these challenges through infrastructure expansion, efficient space utilization, resource

allocation, policy interventions, and community health programs is crucial for improving WASH services and health outcomes in urban settings.

5.4. Resource allocation issues

5.4.1. Introduction

Resource allocation is a critical factor influencing the implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in urban health care facilities in Bangladesh. Efficient allocation of financial, human, and material resources is essential to ensure that health care facilities can maintain adequate water, sanitation, and hygiene (WASH) standards. This section examines the specific resource allocation issues faced by urban health care facilities and their implications for WASH FIT implementation.

5.4.2. Financial Constraints

Urban health care facilities in Bangladesh often face significant financial constraints despite being in economically vibrant areas. Rahman et al. (2020) note that while urban centers might receive more overall funding compared to rural areas, the high cost of urban living, coupled with the need to cater to a large and diverse population, stretches financial resources thin. Limited budgets affect the ability to invest in and maintain WASH infrastructure, such as water supply systems, sanitation facilities, and waste management.

5.4.3. Inequitable Distribution of Funds

There is often an inequitable distribution of funds within urban health care systems, with larger, more prominent hospitals receiving a disproportionate share of resources. Smaller clinics and health centers, which serve significant portions of the urban poor, often receive less funding and struggle to maintain WASH standards. Islam et al. (2018) highlight that this imbalance exacerbates disparities in health outcomes and undermines efforts to provide equitable health care access.

5.4.4. Human Resource Challenges

Adequate staffing is crucial for effective WASH FIT implementation, but urban health care facilities frequently face human resource challenges. Hossain and Karim (2019) report that understaffing, high turnover rates, and insufficient training are common issues. The high demand for health services in urban areas leads to burnout among health care workers, further complicating efforts to maintain hygiene and sanitation standards.

5.4.5. Training and Capacity Building

Effective WASH FIT implementation requires continuous training and capacity building for health care staff. However, limited financial and human resources often mean that staff training is inadequate or inconsistent. Rahman et al. (2020) emphasize that without regular training, health care workers may lack the necessary skills and knowledge to adhere to WASH protocols, leading to inconsistent hygiene practices and increased risk of healthcare-associated infections.

5.4.6. Material Resource Shortages

Urban health care facilities often experience shortages of essential material resources needed for WASH maintenance, such as cleaning supplies, personal protective equipment (PPE), and sanitation materials. Ahmed et al. (2017) highlight that these shortages are particularly acute in smaller health centers and clinics, which may not have the purchasing power or logistical support to secure necessary supplies regularly.

5.4.7. Impact on WASH FIT Implementation

Resource allocation issues significantly impact the implementation of WASH FIT in urban health care facilities. Financial constraints limit the ability to upgrade and maintain infrastructure, inequitable distribution of funds exacerbates disparities, human resource challenges undermine consistent hygiene practices, and material shortages hinder the overall effectiveness of WASH interventions. These issues collectively impede the goal of WASH FIT to provide safe and hygienic health care environments.

5.4.8. Strategies to Address Resource Allocation Issues

Addressing resource allocation issues requires a multi-faceted approach:

- Increased Funding: Advocating for increased budget allocations specifically for WASH infrastructure and maintenance in urban health care facilities.
- Equitable Distribution: Ensuring a more equitable distribution of funds within the urban health care system to support smaller clinics and health centers adequately.
- Human Resource Management: Implementing strategies to reduce staff turnover, provide adequate training, and manage workload to prevent burnout.
- Efficient Procurement Systems: Developing efficient procurement systems to ensure a steady supply of essential WASH materials and equipment.
- Public-Private Partnerships: Leveraging partnerships between the government, private sector, and non-governmental organizations to enhance resource allocation and support for WASH initiatives.

Resource allocation issues present significant challenges to the implementation of WASH FIT in urban health care facilities in Bangladesh. Financial constraints, inequitable distribution of funds, human resource challenges, and material shortages all impact the ability to maintain adequate WASH standards. Addressing these issues through increased funding, equitable distribution, effective human resource management, efficient procurement systems, and public-private partnerships is crucial for improving WASH services and health outcomes in urban settings.

5.5. Diverse patient demographics

Urban health care facilities in Bangladesh serve a highly diverse population, which presents unique challenges in implementing the Water and Sanitation for Health Facility Improvement Tool (WASH FIT). The varied demographic characteristics, including socioeconomic status, cultural backgrounds, and health needs, impact the delivery of WASH services. This section explores the specific challenges related to diverse patient demographics and their implications for WASH FIT implementation in urban health care settings.

5.5.1. Socioeconomic Disparities

Urban areas in Bangladesh are characterized by significant socioeconomic disparities, with affluent neighborhoods situated alongside densely populated slums. According to Rahman et al. (2020), the economic divide affects access to health care and WASH services. Patients from lower socioeconomic backgrounds often lack access to adequate sanitation and clean water at home, increasing their reliance on health care facilities to meet these basic needs. This disparity places additional pressure on urban health care facilities to provide comprehensive WASH services to all patients.

5.5.2. Cultural and Linguistic Diversity

Urban centers attract individuals from various cultural and linguistic backgrounds. This diversity can complicate efforts to implement uniform WASH practices. Ahmed et al. (2017) highlight that cultural beliefs and practices around hygiene and sanitation vary widely, influencing how patients perceive and utilize WASH facilities. Language barriers can further hinder effective communication of WASH guidelines and protocols, making it challenging for health care providers to ensure compliance.

5.5.3. Varied Health Needs

The health needs of urban populations are diverse, ranging from chronic conditions to acute illnesses and preventive care. Islam et al. (2018) note that urban health care facilities must cater to a wide array of health issues, which can strain resources and complicate the implementation of standardized WASH practices. Patients with compromised immune systems, such as those undergoing chemotherapy or living with HIV, require stringent hygiene measures to prevent infections, adding another layer of complexity to WASH FIT implementation.

5.5.4. High Patient Turnover

Urban health care facilities often experience high patient turnover, with a constant influx of new patients. This dynamic environment can lead to challenges in maintaining consistent WASH practices. Rahman et al. (2020) report that the high turnover rate makes it difficult to enforce and monitor hygiene protocols continuously. Health care workers must adapt quickly to the needs of a rapidly changing patient population, which can impact the quality and consistency of WASH services.

5.5.5. Social Stigma and Health Behavior

Social stigma associated with certain health conditions and hygiene practices can impact the utilization of WASH facilities. For example, stigma around diseases such as tuberculosis or HIV may deter patients from seeking care or using

communal sanitation facilities, fearing discrimination or judgment from others (Ahmed et al., 2017). Addressing these stigmas through education and community engagement is crucial for ensuring that all patients feel safe and supported in using WASH services.

5.5.6. Implications for WASH FIT Implementation

The diverse patient demographics in urban health care facilities have several implications for WASH FIT implementation:

- Customized Communication Strategies: Health care facilities need to develop tailored communication strategies to address the cultural and linguistic diversity of their patients. This includes using multiple languages and culturally appropriate messages to promote WASH practices.
- Inclusive WASH Services: Facilities must ensure that WASH services are accessible and equitable for all patients, regardless of their socioeconomic status. This may involve targeted interventions for underserved populations, such as providing additional sanitation facilities in high-traffic areas.
- Training for Health Care Workers: Continuous training and capacity building for health care workers are essential to equip them with the skills and knowledge to manage diverse patient needs and maintain high WASH standards.
- Community Engagement: Engaging with the community to address social stigmas and promote positive health behaviors can enhance the overall effectiveness of WASH FIT implementation.

Diverse patient demographics present significant challenges to the implementation of WASH FIT in urban health care facilities in Bangladesh. Socioeconomic disparities, cultural and linguistic diversity, varied health needs, high patient turnover, and social stigma all impact the delivery of WASH services. Addressing these challenges through customized communication strategies, inclusive WASH services, training for health care workers, and community engagement is crucial for improving WASH standards and health outcomes in urban settings.

5.6. Coordination and management difficulties

Effective coordination and management are crucial for the successful implementation of the Water and Sanitation for Health Facility Improvement Tool (WASH FIT) in urban health care facilities. However, these facilities often face significant challenges related to coordination and management, which can hinder their ability to maintain high standards of water, sanitation, and hygiene (WASH). This section explores these difficulties and their impact on WASH FIT implementation in urban health care settings.

5.6.1. Complex Administrative Structures

Urban health care facilities in Bangladesh are typically governed by complex administrative structures involving multiple levels of government and various departments. Islam et al. (2018) highlight that overlapping jurisdictions and lack of clear delineation of responsibilities can lead to inefficiencies and delays in decision-making processes. This complexity makes it challenging to implement cohesive and streamlined WASH FIT programs.

5.6.2. Fragmented Governance

Fragmented governance is a common issue in urban health care facilities, where different entities may be responsible for various aspects of WASH services. For example, one department might oversee water supply, while another manages waste disposal. This fragmentation can result in a lack of coordination and accountability, making it difficult to maintain consistent WASH standards (Rahman et al., 2020). Effective WASH FIT implementation requires integrated management approaches that bridge these gaps.

5.6.3. Inadequate Leadership and Oversight

Strong leadership and oversight are essential for driving WASH FIT initiatives. However, many urban health care facilities suffer from inadequate leadership, with limited capacity to enforce WASH policies and monitor compliance. Ahmed et al. (2017) note that without strong oversight, there is a risk of inconsistent implementation of WASH practices, leading to variability in hygiene and sanitation standards across facilities.

5.6.4. Resource Allocation Challenges

Effective coordination and management of resources are critical for the success of WASH FIT. Urban health care facilities often face challenges in resource allocation due to budget constraints and competing priorities. Hossain and Karim (2019) report that financial resources are frequently diverted to address immediate health care needs, leaving

insufficient funds for WASH improvements. This misallocation hampers the ability to maintain infrastructure and supply necessary materials for WASH services.

5.6.5. Communication Barriers

Efficient communication within and between health care facilities and governing bodies is vital for effective WASH FIT implementation. However, communication barriers, including bureaucratic red tape and lack of transparency, can impede the flow of information and coordination efforts. Islam et al. (2018) emphasize that poor communication can lead to misunderstandings, delays, and inefficiencies, undermining the overall effectiveness of WASH programs.

5.6.6. Staff Training and Capacity Building

Urban health care facilities often struggle with staff training and capacity building, essential components for effective WASH FIT implementation. Rahman et al. (2020) highlight that continuous training programs are needed to equip health care workers with the skills to manage WASH services effectively. However, the lack of structured training programs and high staff turnover rates present significant challenges to maintaining a well-trained workforce.

5.6.7. Monitoring and Evaluation

Robust monitoring and evaluation mechanisms are crucial for assessing the effectiveness of WASH FIT implementation and making necessary adjustments. Many urban health care facilities lack comprehensive monitoring systems, which hinders their ability to track progress and identify areas needing improvement. Ahmed et al. (2017) suggest that without proper monitoring, it is difficult to ensure accountability and measure the impact of WASH interventions.

5.6.8. Potential Solutions

Addressing coordination and management difficulties in urban health care facilities requires a multi-faceted approach:

- Streamlined Governance Structures: Simplifying administrative structures and clearly delineating responsibilities to enhance coordination and reduce bureaucratic delays.
- Integrated Management Approaches: Promoting integrated management of WASH services across different departments and entities to ensure cohesive implementation.
- Leadership Development: Strengthening leadership and oversight capacities to drive WASH FIT initiatives and enforce compliance with standards.
- Efficient Resource Allocation: Implementing strategic resource allocation frameworks that prioritize WASH improvements alongside other health care needs.
- Improved Communication Channels: Enhancing communication mechanisms to facilitate efficient information flow and coordination between stakeholders.
- Continuous Training Programs: Establishing continuous training and capacity-building programs for health care workers to maintain a skilled workforce.
- Robust Monitoring Systems: Developing comprehensive monitoring and evaluation systems to track progress, ensure accountability, and measure the impact of WASH interventions.

Coordination and management difficulties present significant challenges to the implementation of WASH FIT in urban health care facilities in Bangladesh. Complex administrative structures, fragmented governance, inadequate leadership, resource allocation challenges, communication barriers, and insufficient training and monitoring mechanisms all impact the effectiveness of WASH services. Addressing these issues through streamlined governance, integrated management, leadership development, efficient resource allocation, improved communication, continuous training, and robust monitoring systems is crucial for enhancing WASH standards and health outcomes in urban settings.

5.7. Case studies or examples

Urban health care facilities in Bangladesh encounter numerous challenges in implementing the Water and Sanitation for Health Facility Improvement Tool (WASH FIT). This section presents specific case studies and examples that illustrate these challenges, providing real-world insights into the difficulties faced by urban health care settings.

5.7.1. Case Study 1: Dhaka Medical College Hospital

Dhaka Medical College Hospital (DMCH), one of the largest public hospitals in Bangladesh, serves a vast and diverse urban population. According to Rahman et al. (2020), DMCH faces significant challenges related to overcrowding and limited space. The hospital's infrastructure, originally designed for a smaller patient population, struggles to

accommodate the high volume of patients. This overcrowding strains the available WASH facilities, leading to rapid wear and tear and frequent maintenance issues.

Despite efforts to expand and upgrade facilities, the hospital continues to experience difficulties in maintaining hygiene and sanitation standards. For instance, the lack of sufficient toilets and handwashing stations exacerbates the spread of infections. The case of DMCH underscores the critical need for infrastructure investment and efficient space management to improve WASH conditions in high-volume urban health care facilities.

5.7.2. Case Study 2: Chittagong General Hospital

Chittagong General Hospital (CGH) provides health services to a large urban population, including many low-income residents. Hossain and Karim (2019) highlight that CGH faces financial constraints that impact its ability to maintain WASH standards. The hospital relies heavily on government funding, which is often insufficient to cover the costs of necessary upgrades and maintenance.

Moreover, CGH deals with resource allocation challenges, where limited financial resources are prioritized for immediate medical needs rather than long-term WASH improvements. This misallocation results in outdated and inadequate sanitation facilities, posing health risks to both patients and staff. The CGH example illustrates the need for balanced and strategic resource allocation to ensure sustainable WASH improvements.

5.7.3. Case Study 3: Sylhet MAG Osmani Medical College Hospital

Sylhet MAG Osmani Medical College Hospital (SOMCH) serves a diverse patient population, including many from surrounding rural areas. Islam et al. (2018) report that SOMCH faces significant coordination and management difficulties. The hospital operates under a complex administrative structure with multiple departments responsible for different aspects of WASH services, leading to fragmented governance and inefficiencies.

For example, the water supply and waste management systems are managed by separate entities, resulting in communication barriers and delays in addressing issues. This fragmentation hinders the hospital's ability to implement cohesive WASH FIT programs effectively. SOMCH's experience highlights the importance of integrated management approaches and clear delineation of responsibilities to improve WASH coordination.

5.7.4. Case Study 4: Rajshahi Medical College Hospital

Rajshahi Medical College Hospital (RMCH) contends with challenges related to training and capacity building. Ahmed et al. (2017) note that RMCH experiences high staff turnover, which affects the continuity and effectiveness of WASH training programs. Newly hired staff often lack adequate training in WASH protocols, leading to inconsistent hygiene practices and increased risk of healthcare-associated infections.

In response, RMCH has initiated continuous training workshops and capacity-building programs to equip health care workers with the necessary skills and knowledge. However, the high turnover rate and limited training resources remain significant barriers. The RMCH case demonstrates the need for sustained investment in staff training and retention strategies to enhance WASH FIT implementation.

5.7.5. Case Study 5: Khulna Medical College Hospital

Khulna Medical College Hospital (KMCH) faces environmental and sanitation challenges due to its location in a flood-prone area. According to Rahman et al. (2020), frequent flooding disrupts the hospital's water supply and sanitation systems, making it difficult to maintain WASH standards. The hospital's infrastructure is not adequately designed to withstand such environmental challenges, leading to repeated damage and costly repairs.

KMCH has attempted to address these issues by installing flood-resistant WASH facilities and implementing emergency response plans. However, the recurring nature of environmental disruptions poses ongoing challenges. The KMCH example highlights the need for disaster-resilient infrastructure and proactive planning to ensure WASH services in vulnerable urban areas.

These case studies illustrate the diverse challenges faced by urban health care facilities in Bangladesh in implementing WASH FIT. Overcrowding, financial constraints, coordination difficulties, training issues, and environmental challenges all impact the ability to maintain adequate WASH standards. Addressing these challenges requires targeted interventions, strategic resource allocation, integrated management, continuous training, and resilient infrastructure to improve health outcomes in urban settings.

6. Comparative Analysis

6.1. Comparison of challenges between rural and urban health care facilities

In the context of implementing Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh, it is crucial to understand the distinct challenges faced by rural and urban health care facilities. This section explores these challenges, highlighting key differences and similarities.

6.1.1. Rural Health Care Facility Challenges

Rural health care facilities in Bangladesh often grapple with inadequate infrastructure, limited access to clean water, and poor sanitation facilities. According to Rahman et al. (2018), many rural hospitals lack proper waste management systems, leading to environmental contamination and health risks. The scarcity of trained healthcare professionals exacerbates the situation, as rural areas often face a dearth of qualified doctors and nurses. Additionally, logistical challenges, such as inadequate transportation and communication networks, hinder the delivery of essential medical supplies and services (Chowdhury et al., 2017).

6.1.2. Urban Health Care Facility Challenges

Urban health care facilities, while generally better equipped than their rural counterparts, encounter their own set of challenges. Overcrowding is a significant issue, with high patient-to-bed ratios leading to strained resources and decreased quality of care (Khan & Islam, 2019). Urban hospitals also struggle with inadequate water and sanitation facilities, although the scale and nature of these challenges differ from rural settings. For instance, urban hospitals often face issues related to water supply interruptions and sanitation infrastructure maintenance (Hossain et al., 2020). The concentration of healthcare services in urban areas can lead to disparities in access, with marginalized communities often receiving suboptimal care.

6.1.3. Common Challenges

Both rural and urban health care facilities in Bangladesh share challenges related to inadequate funding, which affects their ability to implement comprehensive WASH FIT protocols. This lack of financial resources limits the availability of essential supplies, such as personal protective equipment and sanitation materials, crucial for maintaining hygiene standards (WHO, 2019). Moreover, the overall health infrastructure in Bangladesh, regardless of urban or rural settings, suffers from systemic issues such as corruption, inefficient management, and bureaucratic hurdles (Rahman, 2018).

Understanding the differences and similarities in challenges faced by rural and urban health care facilities is essential for developing targeted interventions to improve WASH services in Bangladesh. While rural areas struggle more with basic infrastructure and access issues, urban areas face challenges related to overcrowding and resource allocation. Addressing these challenges requires a multifaceted approach, considering the unique needs and contexts of each setting.

6.2. Common challenges and unique issues

Implementing the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh presents several common challenges across both rural and urban health care facilities. However, distinct unique issues also arise, shaped by the specific contexts of these settings.

6.2.1. Common Challenges

Both rural and urban health care facilities in Bangladesh face a range of common challenges, primarily related to infrastructural deficits, financial constraints, and governance issues. One of the most significant common challenges is the inadequate infrastructure, including the lack of reliable water supply systems and functional sanitation facilities. As reported by Rahman et al. (2019), many health care facilities across the country suffer from outdated or insufficient infrastructure, which hampers the provision of safe and effective health care services.

Financial constraints are another pervasive issue, limiting the capacity of health facilities to maintain essential WASH services. The limited funding impacts the procurement of necessary supplies, such as disinfectants and personal protective equipment, essential for maintaining hygiene standards (Islam & Sultana, 2020). Moreover, both rural and urban facilities often struggle with inefficient management and governance issues, including corruption and bureaucratic delays, which further complicate the implementation of WASH FIT (Khan & Haque, 2018).

6.2.2. Unique Issues in Rural Health Care Facilities

Rural health care facilities face unique challenges, primarily due to their geographic isolation and lack of access to resources. One of the most pressing issues is the shortage of trained healthcare professionals. Rural areas often lack the necessary human resources, which affects the quality and availability of health services (Chowdhury & Hossain, 2017). Additionally, rural facilities frequently struggle with inadequate transportation infrastructure, which hinders the timely delivery of medical supplies and the referral of patients to more specialized care centers.

Another unique challenge in rural areas is the limited access to safe water sources. Many rural facilities rely on unsafe water sources, increasing the risk of waterborne diseases among patients and staff (Hossain, 2020). The lack of proper waste management systems in these areas also poses significant health risks, as waste disposal methods are often inadequate, leading to environmental contamination.

6.2.3. Unique Issues in Urban Health Care Facilities

Urban health care facilities, while generally better resourced than rural ones, face distinct challenges primarily associated with high population density. Overcrowding is a significant issue in urban hospitals, leading to strained resources and reduced quality of care (Rahman & Islam, 2019). The high patient-to-bed ratio often results in longer waiting times and compromised infection control measures.

Furthermore, urban facilities frequently encounter challenges related to the maintenance of sanitation infrastructure. Urban health care settings can suffer from water supply interruptions and issues with sanitation facility maintenance, exacerbated by the high volume of users (Ahmed & Hasan, 2018). The complexity of urban environments also leads to greater variability in water and sanitation service delivery, posing a challenge for consistent WASH FIT implementation.

While both rural and urban health care facilities in Bangladesh share common challenges, such as infrastructural deficits and financial constraints, they also face unique issues shaped by their specific contexts. Addressing these challenges requires tailored approaches that consider the distinct needs of each setting, ensuring the successful implementation of WASH FIT and the improvement of health care services across the country.

6.3. Insights from the comparative analysis

The comparative analysis of rural and urban health care facilities in Bangladesh provides valuable insights into the implementation of the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT). By examining the distinct and shared challenges faced by these facilities, several key observations emerge that can inform policy and practice.

6.3.1. Differential Resource Allocation and Utilization

One significant insight is the differential allocation and utilization of resources between rural and urban health care facilities. Urban facilities generally have better access to financial and human resources, which allows for more comprehensive infrastructure and services (Khan & Hossain, 2020). In contrast, rural facilities often operate with limited resources, affecting their capacity to implement and maintain adequate WASH services. This discrepancy underscores the need for targeted investments to ensure equitable access to essential health services across different regions (Islam & Sarker, 2019).

6.3.2. Impact of Infrastructure and Logistics

Infrastructure quality and logistical capabilities vary significantly between rural and urban settings, impacting the effectiveness of WASH FIT implementation. Urban facilities, while often better equipped, face challenges related to the maintenance of infrastructure due to high patient volumes and wear and tear (Ahmed & Chowdhury, 2018). Conversely, rural facilities frequently struggle with fundamental infrastructure issues, such as unreliable water supply and inadequate sanitation facilities, which pose significant barriers to maintaining hygiene standards (Rahman et al., 2019).

6.3.3. Human Resource Distribution and Training

The distribution and training of healthcare professionals also differ notably between rural and urban areas. Urban centers tend to attract more qualified healthcare professionals, offering them better working conditions and career opportunities (Hossain & Rahman, 2020). In contrast, rural areas face a persistent shortage of trained staff, which hampers the consistent implementation of WASH practices. This disparity highlights the importance of developing strategies to incentivize skilled professionals to work in rural areas and to provide continuous training to all healthcare workers on WASH standards (Islam & Akter, 2019).

6.3.4. Governance and Policy Implications

Governance challenges, including bureaucratic inefficiencies and corruption, affect both rural and urban health care facilities but manifest differently. Urban facilities often encounter more complex administrative structures, which can slow decision-making processes and resource allocation (Khan & Rahman, 2018). Rural facilities, on the other hand, may experience more direct interference and resource mismanagement at the local level. These findings suggest that governance reforms should be context-specific, addressing the unique administrative challenges of each setting.

6.3.5. Opportunities for Cross-Sectoral Collaboration

The comparative analysis reveals opportunities for cross-sectoral collaboration to enhance WASH FIT implementation. Integrating efforts from public health, water resource management, and community engagement can lead to more holistic and sustainable solutions. For example, partnerships with local governments and NGOs can help address infrastructure gaps in rural areas, while collaborations with urban planning authorities can improve sanitation facilities in densely populated urban centers (Ahmed et al., 2019).

The insights gained from this comparative analysis emphasize the need for a nuanced approach to implementing WASH FIT in Bangladesh. While rural and urban health care facilities face distinct challenges, common issues such as resource constraints and governance inefficiencies require coordinated efforts. By addressing these challenges with tailored strategies, it is possible to improve WASH services and health outcomes across the country.

7. Opportunities and Potential Solutions

7.1. Potential opportunities for improving WASH FIT implementation in rural health care facilities

Implementing the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in rural areas of Bangladesh presents unique opportunities for enhancing health outcomes and facility performance. The specific challenges faced by rural health care facilities, such as inadequate infrastructure and limited access to resources, also offer potential pathways for targeted interventions and improvements.

7.1.1. Leveraging Community Engagement and Local Partnerships

One of the most significant opportunities lies in leveraging community engagement and fostering partnerships with local organizations. Rural communities in Bangladesh often have strong social cohesion and local governance structures that can be mobilized to support WASH initiatives. Engaging local leaders, community health workers, and NGOs can facilitate the dissemination of information and best practices related to WASH standards (Islam & Khan, 2020). These partnerships can also help in monitoring and sustaining WASH FIT interventions, ensuring long-term success and community buy-in.

7.1.2. Investing in Infrastructure Development

Targeted investments in infrastructure development are crucial for improving WASH FIT implementation in rural health care facilities. Given the frequent issues with water supply and sanitation facilities, prioritizing infrastructure upgrades can significantly enhance service quality. Investments could include drilling boreholes, installing rainwater harvesting systems, and constructing or upgrading sanitation facilities (Rahman et al., 2019). Such improvements not only enhance hygiene and infection control but also bolster the overall health system's resilience.

7.1.3. Capacity Building and Training for Healthcare Workers

Building the capacity of healthcare workers through training and continuous education is another critical opportunity. Rural health facilities often lack adequately trained staff, which can hinder the effective implementation of WASH practices. Providing targeted training programs on WASH FIT protocols, infection control, and safe water management can empower healthcare workers to maintain high hygiene standards (Ahmed & Sarker, 2018). Moreover, involving staff in the planning and decision-making processes can enhance their commitment and adherence to WASH practices.

7.1.4. Utilizing Technology and Innovation

Innovative technologies can play a pivotal role in addressing WASH challenges in rural health care facilities. Mobile health (mHealth) applications, for instance, can provide remote training and support to healthcare workers, while also enabling real-time monitoring of WASH indicators (Hossain & Rahman, 2020). Solar-powered water purification systems and low-cost sanitation technologies can offer sustainable solutions to common challenges like water scarcity and poor waste management.

7.1.5. Policy Support and Resource Mobilization

Strengthening policy support and mobilizing resources are essential for the sustained success of WASH FIT in rural areas. Policies that prioritize rural health infrastructure development and allocate specific budgets for WASH interventions can significantly impact their implementation (Islam & Akter, 2019). Additionally, mobilizing resources through public-private partnerships and international aid can provide the necessary financial support for comprehensive WASH improvements.

Improving WASH FIT implementation in rural health care facilities in Bangladesh requires a multifaceted approach that addresses the unique challenges and leverages specific opportunities present in these settings. By engaging communities, investing in infrastructure, building staff capacity, utilizing technology, and strengthening policy frameworks, it is possible to enhance WASH services and improve health outcomes in rural Bangladesh.

7.2. Government and NGO initiatives

The successful implementation of the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh's health care facilities, both rural and urban, can be significantly bolstered through coordinated initiatives by the government and non-governmental organizations (NGOs). These entities play a critical role in providing resources, technical expertise, and advocacy needed to overcome the challenges in WASH service delivery.

7.2.1. Government Initiatives

The government of Bangladesh has been actively involved in improving WASH facilities across the country, particularly through policies and programs aimed at enhancing public health infrastructure. The Ministry of Health and Family Welfare, in collaboration with the Department of Public Health Engineering, has launched several initiatives to improve water supply and sanitation in health care facilities (Chowdhury et al., 2020). One notable initiative is the National Strategy for Water Supply and Sanitation (NSWSS), which outlines guidelines for providing safe water and adequate sanitation services in both urban and rural health care settings (Government of Bangladesh, 2018).

Additionally, the government has been investing in infrastructure development projects, such as the construction of deep tube wells and the installation of improved sanitation facilities in health centers (Rahman & Ahmed, 2019). These efforts are often supported by national budget allocations and international aid, emphasizing the government's commitment to enhancing WASH standards in health care facilities.

7.2.2. NGO Initiatives

NGOs have been instrumental in complementing government efforts by providing technical support, funding, and advocacy for WASH improvements. Organizations such as BRAC, WaterAid, and UNICEF have implemented various projects aimed at improving WASH infrastructure and practices in health care facilities across Bangladesh (Hossain et al., 2019). For example, BRAC's WASH program has been actively involved in training health care workers on hygiene practices and facilitating community engagement to promote better WASH standards (BRAC, 2018).

WaterAid has focused on providing technical assistance for the design and implementation of sustainable water and sanitation solutions. Their projects often include the installation of water filtration systems, construction of hygienic latrines, and the provision of handwashing facilities (WaterAid, 2019). Moreover, UNICEF has been a key partner in advocating for child-friendly WASH facilities in health care settings, ensuring that these facilities meet the needs of mothers and children.

7.2.3. Collaborative Efforts and Public-Private Partnerships

The synergy between government bodies and NGOs has led to several successful public-private partnerships (PPPs) that enhance WASH services in health care facilities. These collaborations often involve the pooling of resources, sharing of technical expertise, and joint monitoring and evaluation of WASH projects (Khan & Islam, 2020). For instance, PPPs have facilitated the implementation of solar-powered water systems and the development of waste management protocols in health care centers.

The combined efforts of the government and NGOs have been pivotal in advancing WASH FIT implementation in Bangladesh. Through strategic initiatives, infrastructure investments, technical support, and advocacy, these entities continue to play a vital role in addressing the WASH challenges faced by health care facilities. Strengthening these

collaborations and scaling up successful interventions will be crucial for achieving comprehensive WASH improvements across the country.

7.3. Community involvement and awareness programs

Community involvement and awareness programs are crucial components for the successful implementation of the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh. Engaging the community not only enhances the acceptance and sustainability of WASH initiatives but also empowers individuals to take responsibility for maintaining hygiene standards.

7.3.1. Community Mobilization and Participation

One of the most effective strategies for improving WASH in health care facilities is through active community mobilization. By involving community members in the planning, implementation, and monitoring of WASH projects, there is an increased sense of ownership and accountability. This participatory approach can lead to better maintenance of facilities and adherence to hygiene practices (Ahmed et al., 2018). Community health committees, comprising local leaders, health workers, and representatives from various community groups, can play a pivotal role in this process by coordinating efforts and ensuring that community voices are heard.

7.3.2. Educational Campaigns and Workshops

Educational campaigns and workshops are vital tools for raising awareness about the importance of WASH practices. These programs can be designed to target various community segments, including families, schoolchildren, and healthcare workers, to educate them about the benefits of proper hygiene and sanitation (Khan & Akter, 2019). For instance, school-based programs can teach children about handwashing techniques and the importance of using safe water, which they can then share with their families. Similarly, workshops for healthcare workers can focus on best practices for infection control and the maintenance of sanitary conditions in health care facilities.

7.3.3. Behavior Change Communication (BCC)

Behavior Change Communication (BCC) strategies are essential for shifting community norms and practices related to WASH. BCC can include a mix of interpersonal communication, mass media, and community-based activities that convey messages promoting hygiene and sanitation. For example, drama performances, radio broadcasts, and community meetings can be used to disseminate information about the dangers of poor sanitation and the benefits of using WASH services (Hossain & Rahman, 2020). These strategies are particularly effective in rural areas where access to formal education and media may be limited.

7.3.4. Collaboration with Local Leaders and Influencers

Local leaders and influencers, such as religious figures, teachers, and traditional healers, can significantly influence community attitudes and behaviors. Collaborating with these individuals can help to legitimize WASH initiatives and encourage community members to adopt recommended practices (Islam & Sarker, 2018). For example, religious leaders can incorporate messages about cleanliness and hygiene into sermons, aligning WASH practices with cultural and religious values.

7.3.5. Community-Led Monitoring and Feedback Mechanisms

Establishing community-led monitoring and feedback mechanisms can help ensure the sustainability of WASH improvements. Communities can be involved in monitoring the condition of water and sanitation facilities, reporting issues, and suggesting improvements. This approach not only helps in the timely identification and resolution of problems but also fosters a sense of responsibility among community members (Rahman et al., 2019). Moreover, regular feedback from the community can provide valuable insights into the effectiveness of WASH interventions and help in refining strategies.

Community involvement and awareness programs are integral to the successful implementation and sustainability of WASH FIT in Bangladesh. By mobilizing the community, providing education, employing BCC strategies, collaborating with lcal leaders, and establishing monitoring systems, it is possible to foster a culture of hygiene and sanitation. These efforts can lead to improved health outcomes and a higher quality of care in both rural and urban health care facilities.

7.4. Technological innovations

Technological innovations offer promising solutions to address the challenges of implementing the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh. The integration of technology can enhance the efficiency, effectiveness, and sustainability of WASH services in both rural and urban health care facilities.

7.4.1. Water Purification Technologies

One of the critical challenges in many Bangladeshi health care facilities, particularly in rural areas, is access to safe drinking water. Technological innovations in water purification can play a crucial role in mitigating this issue. The deployment of low-cost, portable water purification systems, such as ceramic filters and solar disinfection units, can provide reliable access to clean water (Ahmed et al., 2018). Additionally, advanced technologies like reverse osmosis and UV purification systems can be implemented in larger facilities to ensure a consistent supply of safe water for medical use (Rahman & Islam, 2020).

7.4.2. Sanitation and Waste Management Solutions

Innovative solutions for sanitation and waste management are essential for maintaining hygiene standards in health care facilities. Technologies such as biodigesters and incinerators can effectively manage biomedical waste, reducing the risk of contamination and disease transmission (Hossain & Sarker, 2019). Moreover, automated handwashing stations equipped with sensors can encourage proper hand hygiene practices among healthcare workers and patients, minimizing the spread of infections (Islam & Akter, 2018).

7.4.3. Digital Health Tools and Telemedicine

The integration of digital health tools, such as mobile health (mHealth) applications, can significantly enhance WASH FIT implementation. These tools can provide training modules, reminders for hygiene practices, and real-time monitoring of WASH indicators (Khan & Ahmed, 2019). Telemedicine platforms can also play a vital role, especially in remote areas, by providing healthcare professionals with access to expert consultations and guidance on managing WASH-related issues. This can improve decision-making and the quality of care provided in rural facilities.

7.4.4. Data Collection and Monitoring Technologies

The use of digital data collection and monitoring technologies can streamline the tracking and evaluation of WASH FIT implementation. Mobile data collection platforms, such as Open Data Kit (ODK), allow for the efficient gathering of information on water quality, sanitation conditions, and hygiene practices (Ahmed & Rahman, 2018). Geographic Information Systems (GIS) can be utilized to map water and sanitation facilities, helping identify areas in need of urgent attention and resources. These technologies enable health care facilities and policymakers to make data-driven decisions and prioritize interventions.

7.4.5. Renewable Energy Solutions

Implementing renewable energy solutions, such as solar power, can address energy constraints in health care facilities, particularly in rural areas. Solar panels can provide a reliable and sustainable energy source for operating water pumps, sanitation equipment, and lighting systems, ensuring continuous access to essential WASH services (Rahman et al., 2019). This not only reduces the dependency on unreliable grid power but also promotes environmental sustainability.

Technological innovations offer significant opportunities for improving WASH FIT implementation in Bangladesh's health care facilities. By adopting advanced water purification methods, innovative sanitation and waste management solutions, digital health tools, data monitoring technologies, and renewable energy sources, it is possible to enhance the quality and sustainability of WASH services. These technologies can bridge the gap between rural and urban facilities, ensuring equitable access to safe and hygienic healthcare environments.

7.5. Potential opportunities for improving WASH FIT implementation in urban health care facilities

Urban health care facilities in Bangladesh face unique challenges and opportunities in implementing the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT). The concentration of resources and population density in urban areas presents specific advantages and obstacles, which can be leveraged and addressed to enhance WASH services.

7.5.1. Infrastructure Enhancement and Modernization

Urban health care facilities often have better infrastructure compared to rural areas, but they also face challenges such as aging infrastructure and high patient loads. One significant opportunity lies in the enhancement and modernization of existing facilities. Investment in upgrading water supply systems, installing efficient plumbing, and modernizing sanitation facilities can significantly improve the hygiene standards in urban hospitals (Islam & Hossain, 2019). Additionally, the implementation of advanced waste management systems, including incineration and recycling facilities, can help manage biomedical waste more effectively (Ahmed et al., 2018).

7.5.2. Utilization of Advanced Technologies

Urban health care facilities are well-positioned to adopt advanced technologies due to better access to technical expertise and resources. Opportunities include the integration of digital monitoring systems for water quality and sanitation conditions, which can provide real-time data and enable quick responses to issues (Khan & Akter, 2018). The adoption of electronic health records (EHR) systems can also streamline the management of hygiene-related data, facilitating better monitoring and reporting of WASH standards.

7.5.3. Strengthening Healthcare Workforce Capacity

Urban areas typically attract a more skilled healthcare workforce, offering opportunities for targeted training and capacity-building initiatives. Urban health care facilities can implement continuous professional development programs focusing on WASH best practices, infection control, and emergency response protocols (Rahman & Islam, 2020). This can help ensure that healthcare professionals are well-equipped to maintain high hygiene standards and respond effectively to health crises.

7.5.4. Public-Private Partnerships and Funding Opportunities

The presence of private sector entities and international organizations in urban areas provides a unique opportunity for public-private partnerships (PPPs) to enhance WASH services. These partnerships can mobilize additional resources, technical expertise, and innovative solutions for infrastructure improvements and service delivery (Ahmed & Sarker, 2019). For example, collaborations with private water and sanitation companies can facilitate the installation of state-of-the-art water purification systems and efficient waste management technologies.

7.5.5. Community Engagement and Education Campaigns

Urban health care facilities can leverage their location to engage with a broader community base, including local businesses, schools, and NGOs. Educational campaigns targeting urban populations can raise awareness about the importance of hygiene and sanitation, encouraging community members to support and adhere to WASH standards (Hossain & Rahman, 2019). Additionally, urban facilities can work with local media and social media platforms to disseminate information and promote positive hygiene behaviors.

7.5.6. Addressing Urban-Specific Challenges

Urban health care facilities face specific challenges such as overcrowding and diverse patient populations. Addressing these challenges involves optimizing space utilization and managing patient flow to prevent overcrowding and reduce the risk of infection (Khan & Hossain, 2019). Furthermore, urban facilities must cater to diverse populations, including migrants and marginalized groups, who may have different health and hygiene needs. Tailored interventions, such as providing multilingual information and culturally appropriate services, can help ensure that all patients receive adequate care and support.

Urban health care facilities in Bangladesh have unique opportunities to enhance WASH FIT implementation through infrastructure modernization, advanced technologies, skilled workforce development, public-private partnerships, and community engagement. Addressing urban-specific challenges, such as overcrowding and diversity, is crucial for creating a safe and hygienic healthcare environment. By leveraging these opportunities, urban facilities can set a benchmark for WASH standards and significantly improve health outcomes.

7.6. Policy reforms and funding

Effective implementation of the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh necessitates comprehensive policy reforms and adequate funding. Addressing these aspects can significantly enhance the quality and sustainability of WASH services in both rural and urban health care facilities.

7.6.1. Policy Reforms

To facilitate WASH FIT implementation, there is a critical need for policy reforms that prioritize water, sanitation, and hygiene in health care settings. The government of Bangladesh can develop and enforce stringent regulations and guidelines for WASH standards in health facilities. These policies should include clear specifications for infrastructure requirements, water quality, waste management, and infection control practices (Ahmed & Rahman, 2019). Additionally, the integration of WASH components into national health strategies and development plans can ensure that these issues receive the necessary attention and resources.

Strengthening regulatory frameworks is also essential for monitoring and compliance. Establishing an independent body to oversee the enforcement of WASH standards can enhance accountability and transparency. This body should have the authority to conduct regular inspections, assess compliance, and impose penalties for non-compliance (Khan & Hossain, 2018). Moreover, involving stakeholders from various sectors, including health, water, and environment, in policy formulation can ensure a holistic approach to WASH challenges.

7.6.2. Increased Funding and Resource Allocation

Securing adequate funding is a fundamental aspect of enhancing WASH services in health care facilities. The government can allocate specific budgetary provisions for WASH in health facilities, ensuring that sufficient resources are available for infrastructure development, maintenance, and training (Islam & Akter, 2019). This allocation should consider the unique needs of both rural and urban settings, addressing disparities in resource distribution and access to services.

International aid and funding from multilateral organizations, such as the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), can supplement national funding efforts. These organizations can provide financial support for large-scale infrastructure projects, capacity-building initiatives, and technical assistance (Hossain et al., 2020). Additionally, public-private partnerships (PPPs) can be an effective mechanism for mobilizing private sector investment in WASH infrastructure and services.

7.6.3. Innovative Financing Mechanisms

Exploring innovative financing mechanisms can further support WASH FIT implementation. For example, blended finance models, which combine public and private funding, can leverage additional resources for WASH projects (Rahman & Sarker, 2019). Microfinance and community-based financing initiatives can also play a role in funding small-scale WASH improvements, particularly in rural areas where traditional financing may be limited.

Performance-based financing, where funding is contingent on achieving specific WASH-related outcomes, can incentivize health care facilities to improve their services. This approach aligns financial incentives with the desired outcomes, ensuring that resources are used effectively and efficiently (Ahmed & Hossain, 2018).

7.6.4. Capacity Building for Financial Management

Building capacity in financial management is crucial for ensuring the efficient use of resources allocated to WASH initiatives. Health care facilities, particularly in rural areas, may require training in budgeting, financial planning, and reporting to effectively manage funds and implement WASH projects (Islam & Rahman, 2019). Developing standardized financial management protocols and tools can also enhance transparency and accountability.

Policy reforms and adequate funding are critical components of a comprehensive strategy for implementing WASH FIT in Bangladesh. By enacting stringent policies, ensuring sufficient resource allocation, exploring innovative financing mechanisms, and building financial management capacity, it is possible to enhance the quality and sustainability of WASH services in health care facilities. These efforts will contribute to improved health outcomes and a safer, more hygienic environment for patients and healthcare workers alike.

7.7. Collaboration with private sector

Collaboration with the private sector presents significant opportunities for enhancing the implementation of the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh. The involvement of private enterprises can bring in additional resources, expertise, and innovative solutions that are crucial for overcoming the challenges faced by health care facilities in both rural and urban areas.

7.7.1. Public-Private Partnerships (PPPs)

Public-private partnerships (PPPs) are a vital mechanism for leveraging private sector investment and expertise in the WASH sector. These partnerships can facilitate the development and maintenance of water and sanitation infrastructure in health care facilities. For instance, private companies can invest in building water treatment plants, installing modern sanitation systems, and providing waste management services (Ahmed & Rahman, 2020). The government can offer incentives such as tax breaks or subsidies to encourage private sector participation in these projects.

PPPs also allow for shared risk and responsibility, which can lead to more sustainable and efficient service delivery. By aligning the interests of public and private entities, PPPs can help ensure that WASH services are both affordable and high-quality (Hossain & Islam, 2019). For example, private firms specializing in water technology can collaborate with public health authorities to implement advanced water purification systems in hospitals, ensuring safe and reliable water supply.

7.7.2. Corporate Social Responsibility (CSR) Initiatives

Corporate Social Responsibility (CSR) initiatives provide another avenue for private sector engagement in improving WASH services. Many companies have CSR programs focused on health and community well-being, which can be harnessed to support WASH projects in health care facilities. Businesses can contribute financially or in-kind, such as by donating hygiene products, installing sanitation facilities, or funding awareness campaigns (Khan & Akter, 2018). These contributions not only benefit the community but also enhance the company's reputation and strengthen its relationship with the public.

7.7.3. Innovation and Technology Transfer

The private sector is often a source of innovation and cutting-edge technology. Collaborating with private companies can facilitate the transfer of these technologies to health care facilities, enhancing the implementation of WASH FIT. For instance, private firms can provide access to advanced water filtration systems, automated sanitation solutions, and digital monitoring tools (Ahmed & Sarker, 2019). These technologies can improve the efficiency and effectiveness of WASH services, making them more accessible and sustainable.

Moreover, private sector involvement can help scale successful pilot projects. Innovations developed and tested in smaller settings can be expanded to larger health care facilities or other regions, benefiting a broader population (Rahman & Sarker, 2019).

7.7.4. Capacity Building and Training

Private companies can also play a crucial role in capacity building and training for health care staff. This includes offering technical training on the operation and maintenance of advanced WASH equipment, as well as workshops on best practices in hygiene and infection control (Islam & Hossain, 2020). By investing in the training of healthcare professionals, the private sector can help ensure the sustainability and effectiveness of WASH FIT implementation.

7.7.5. Funding and Resource Mobilization

Private sector entities, including multinational corporations and local businesses, can provide funding for WASH initiatives through grants, sponsorships, and donations. This financial support can be critical for covering the costs of infrastructure upgrades, purchasing essential supplies, and conducting community outreach programs (Hossain et al., 2018). Additionally, private sector involvement can attract further investment from other stakeholders, including international donors and NGOs, creating a multiplier effect.

Collaboration with the private sector offers substantial opportunities to enhance WASH FIT implementation in Bangladesh's health care facilities. Through public-private partnerships, CSR initiatives, technology transfer, capacity building, and funding support, private companies can contribute significantly to improving water, sanitation, and hygiene standards. These collaborations not only benefit the health care system but also foster a healthier and more resilient community.

7.8. Training and capacity building

Training and capacity building are essential components for the effective implementation of the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh. By equipping healthcare professionals and facility staff with the necessary skills and knowledge, it is possible to enhance the quality and sustainability of WASH services in both rural and urban health care settings.

7.8.1. Healthcare Professional Training

A crucial opportunity for improving WASH FIT implementation lies in the targeted training of healthcare professionals. This training should encompass a range of topics, including infection prevention and control, proper hand hygiene practices, waste management, and the maintenance of water and sanitation infrastructure (Islam & Hossain, 2019). For instance, specialized workshops and seminars can be conducted to educate healthcare workers about the latest WASH protocols and technologies. Additionally, continuous professional development programs can ensure that healthcare staff stay updated with best practices and emerging trends in the field.

7.8.2. Capacity Building for Facility Management

Effective management of health care facilities is vital for maintaining high standards of WASH services. Capacity building for facility managers should focus on administrative skills, including budgeting, resource allocation, and procurement of WASH supplies (Ahmed & Sarker, 2018). Training programs can also cover topics such as risk assessment and emergency preparedness, enabling managers to respond efficiently to WASH-related challenges and crises. Furthermore, developing leadership skills among facility managers can foster a culture of accountability and continuous improvement within healthcare institutions.

7.8.3. Training in Maintenance and Technical Skills

Maintenance and technical staff play a critical role in the daily operations of healthcare facilities, particularly in maintaining water and sanitation infrastructure. Training programs should be designed to enhance their technical skills, including the installation, operation, and maintenance of water purification systems, plumbing, and waste disposal units (Khan & Rahman, 2020). Providing hands-on training and certification programs can ensure that technical staff are competent and confident in handling WASH infrastructure, thereby reducing downtime and ensuring consistent service delivery.

7.8.4. Community Health Worker Training

Community health workers (CHWs) serve as a vital link between health care facilities and the communities they serve. Training CHWs in WASH-related topics can enhance their ability to educate and engage community members on hygiene practices, the importance of safe water, and proper sanitation (Hossain et al., 2019). CHWs can also play a key role in monitoring and reporting WASH conditions in local health facilities, providing valuable feedback for continuous improvement.

7.8.5. Use of E-Learning and Digital Tools

The use of e-learning platforms and digital tools can significantly enhance training and capacity-building efforts. Online courses, webinars, and mobile applications can provide flexible and accessible learning opportunities for healthcare staff, particularly in remote areas where traditional training may be less feasible (Rahman & Islam, 2020). Digital tools can also facilitate the dissemination of training materials, self-assessment quizzes, and certification processes, making training more efficient and scalable.

7.8.6. Partnerships for Training and Capacity Building

Collaborations with international organizations, NGOs, and academic institutions can enrich training and capacity-building programs. These partnerships can provide access to global expertise, funding, and technical resources, helping to design and implement comprehensive training programs (Ahmed & Sarker, 2019). For example, partnerships with organizations like the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) can provide standardized training modules and materials, ensuring consistency and quality across training initiatives.

Training and capacity building are pivotal for the successful implementation of WASH FIT in Bangladesh. By investing in the training of healthcare professionals, facility managers, technical staff, and community health workers, and leveraging digital tools and partnerships, it is possible to build a skilled workforce capable of maintaining high standards of water, sanitation, and hygiene in healthcare facilities. These efforts will lead to improved health outcomes and a safer environment for both patients and healthcare providers.

8. Discussion

8.1. Interpretation of key findings

The implementation of the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh reveals distinct challenges and opportunities across rural and urban health care facilities. The key findings from this study provide critical insights into the state of WASH services, highlighting areas for improvement and potential strategies for enhancing health care quality and patient safety.

8.1.1. Differential Challenges in Rural and Urban Settings

The study underscores the differential challenges faced by rural and urban health care facilities. Rural facilities often struggle with inadequate infrastructure, limited access to clean water, and poor sanitation services. These issues are exacerbated by a lack of trained healthcare professionals and logistical difficulties, such as transportation barriers and supply chain disruptions (Rahman & Ahmed, 2019). In contrast, urban facilities, while generally better resourced, grapple with overcrowding, inadequate maintenance of existing infrastructure, and disparities in access to services among marginalized populations (Islam & Hossain, 2020). These findings indicate a need for context-specific interventions that address the unique challenges of each setting.

8.1.2. Impact of Policy and Governance

The study highlights the critical role of policy and governance in shaping the quality of WASH services. Inconsistent enforcement of regulations and insufficient government oversight were identified as significant barriers to effective WASH FIT implementation (Khan & Rahman, 2018). The lack of a robust regulatory framework and accountability mechanisms often leads to substandard conditions in health care facilities, especially in rural areas. The findings suggest that strengthening policy frameworks and enhancing regulatory oversight are essential for ensuring compliance with WASH standards and improving overall health outcomes.

8.1.3. Role of Technological Innovations

Technological innovations emerged as a crucial factor in addressing WASH challenges. The adoption of advanced water purification technologies, automated sanitation solutions, and digital monitoring tools can significantly enhance service delivery (Ahmed & Sarker, 2019). The study found that urban facilities are more likely to benefit from these technologies due to better access to technical expertise and financial resources. However, there is a pressing need to extend these innovations to rural areas, where they can address critical gaps in infrastructure and service quality.

8.1.4. Importance of Training and Capacity Building

Training and capacity building were identified as pivotal in ensuring the sustainability of WASH FIT initiatives. The study revealed that healthcare professionals, particularly in rural areas, often lack adequate training in WASH practices, leading to inconsistent implementation and maintenance of hygiene standards (Hossain & Islam, 2019). Continuous professional development and targeted training programs can empower healthcare workers to uphold WASH standards and respond effectively to health emergencies. The findings underscore the necessity of investing in capacity building to enhance the skills and knowledge of healthcare staff across all levels.

8.1.5. Community Involvement and Awareness

The study also emphasizes the importance of community involvement and awareness in improving WASH services. Engaging local communities in WASH initiatives can foster a sense of ownership and accountability, leading to more sustainable outcomes (Ahmed & Rahman, 2018). Educational campaigns and behavior change communication (BCC) strategies were found to be effective in promoting hygiene practices and enhancing community participation. The findings suggest that integrating community engagement into WASH FIT implementation can significantly improve adherence to hygiene standards and reduce the incidence of waterborne diseases.

8.1.6. Collaborative Efforts and Partnerships

Collaboration with the private sector, NGOs, and international organizations was identified as a key enabler of successful WASH FIT implementation. Public-private partnerships (PPPs) and corporate social responsibility (CSR) initiatives have provided additional resources and expertise, facilitating infrastructure improvements and service delivery (Khan & Akter, 2018). The study suggests that fostering these collaborations can help bridge resource gaps and accelerate the adoption of innovative solutions in both rural and urban health care settings.

The key findings from this study highlight the complex landscape of WASH challenges and opportunities in Bangladesh's health care facilities. Addressing these challenges requires a multifaceted approach that includes policy reforms, technological innovations, capacity building, community engagement, and collaborative partnerships. By interpreting these findings, stakeholders can develop targeted strategies to improve WASH services, ultimately enhancing health care quality and patient safety across the country.

8.2. Implications for policy and practice

The findings from the study on implementing the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh provide crucial insights that can inform both policy and practice. Addressing the identified challenges and leveraging the opportunities requires a coordinated and strategic approach involving government entities, health care providers, and private sector partners.

8.2.1. Policy Implications

- Strengthening Regulatory Frameworks: The study underscores the need for robust regulatory frameworks to ensure compliance with WASH standards across all health care facilities. The government should consider developing comprehensive WASH policies that set clear guidelines for water quality, sanitation infrastructure, and hygiene practices (Khan & Hossain, 2018). These policies should be supported by regular inspections and enforcement mechanisms to ensure adherence.
- Resource Allocation and Funding: Adequate funding is critical for the successful implementation of WASH FIT. Policymakers should prioritize resource allocation for WASH improvements in the national health budget, ensuring that both urban and rural facilities receive the necessary support (Rahman & Sarker, 2019). This includes funding for infrastructure upgrades, training programs, and maintenance services.
- Public-Private Partnerships: The findings highlight the potential of public-private partnerships (PPPs) in enhancing WASH services. Policymakers should facilitate these partnerships by providing a conducive regulatory environment and incentives for private sector involvement. This could include tax benefits, streamlined approval processes, and recognition programs for companies contributing to public health (Ahmed & Rahman, 2020).
- 4. Decentralized Decision-Making: Empowering local health authorities with decision-making power can lead to more context-specific and responsive WASH interventions. Decentralization allows for better allocation of resources based on local needs and enhances the accountability of health facility managers (Islam & Hossain, 2019). Policies should encourage local governance structures to actively participate in WASH planning and implementation.

8.2.2. Practice Implications

- Capacity Building and Training: The study indicates a critical need for continuous training and capacity building among healthcare workers. Health care facilities should implement regular training programs focused on WASH practices, infection control, and emergency preparedness (Hossain & Islam, 2019). Such initiatives can be supported by online platforms and digital tools to reach a broader audience, especially in rural areas.
- Implementation of Innovative Technologies: Urban facilities, with better access to resources, should lead the adoption of innovative technologies for water purification, sanitation, and waste management. These technologies can then be scaled to rural facilities through pilot projects and partnerships (Ahmed & Sarker, 2019). Practices should also include regular maintenance of these technologies to ensure their longevity and effectiveness.
- Community Engagement and Education: Engaging communities in WASH initiatives is essential for sustained improvements. Health care facilities should collaborate with local organizations, schools, and religious institutions to promote hygiene awareness and educate the public on WASH practices (Ahmed & Rahman, 2018). Community health workers can play a pivotal role in this process by acting as liaisons between health facilities and the community.
- Monitoring and Evaluation: Effective monitoring and evaluation systems are crucial for assessing the impact of WASH interventions. Health care facilities should implement standardized tools for tracking WASH-related outcomes, such as water quality, infection rates, and patient satisfaction (Rahman & Islam, 2020). Data collected from these systems can inform continuous improvement efforts and policy adjustments.
- Integration of WASH into Health Services: Integrating WASH practices into routine health services can enhance overall healthcare delivery. For example, ensuring hand hygiene compliance during medical procedures can reduce infection rates. Health care facilities should embed WASH standards into their standard operating procedures and ensure that all staff are familiar with and adhere to these protocols (Khan & Rahman, 2018).

The implications of this study for policy and practice are wide-ranging, emphasizing the need for a coordinated approach to improving WASH services in Bangladesh's health care facilities. By strengthening regulatory frameworks, enhancing resource allocation, fostering public-private partnerships, and focusing on training and community engagement, it is possible to achieve significant improvements in health outcomes. These efforts require a commitment from all stakeholders, including government agencies, healthcare providers, private sector partners, and the community.

8.3. Recommendations for health care providers and policymakers

Based on the findings of the study on implementing the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh, several recommendations can be made for healthcare providers and policymakers. These recommendations aim to address the challenges identified in both rural and urban health care facilities and to capitalize on the opportunities for improving WASH services.

8.3.1. Recommendations for Health Care Providers

- Enhancing Staff Training and Awareness: Health care providers should prioritize regular training and education for all staff on WASH practices, including infection control, hand hygiene, and proper waste disposal (Hossain & Islam, 2019). This training should be comprehensive and include both theoretical knowledge and practical skills, with periodic refresher courses to ensure ongoing competence.
- Implementing and Monitoring WASH Protocols: It is crucial for health care facilities to establish clear WASH protocols and ensure their consistent implementation. Providers should develop and enforce standard operating procedures (SOPs) that align with WASH FIT guidelines (Khan & Rahman, 2018). Regular monitoring and evaluation should be conducted to assess compliance and identify areas for improvement.
- Investing in Infrastructure and Technology: Health care facilities should invest in upgrading their water, sanitation, and hygiene infrastructure. This includes installing modern water purification systems, improving plumbing and drainage, and ensuring adequate waste management facilities (Ahmed & Sarker, 2019). Adoption of innovative technologies, such as automated handwashing stations and digital monitoring tools, should also be considered to enhance service quality.
- Engaging with the Community: Health care providers should actively engage with the surrounding community to promote awareness and understanding of WASH practices. This can be achieved through community outreach programs, educational workshops, and collaboration with local organizations (Ahmed & Rahman, 2018). Involving the community can help foster a culture of hygiene and support the sustainability of WASH initiatives.
- Establishing Effective Communication Channels: Providers should establish clear and effective communication channels within the facility and with external stakeholders. This includes creating mechanisms for staff to report WASH-related issues and concerns, as well as for patients and visitors to provide feedback (Rahman & Islam, 2020). Transparent communication can help address problems promptly and improve overall service delivery.

8.3.2. Recommendations for Policymakers

- Strengthening Regulatory Frameworks and Enforcement: Policymakers should develop and enforce comprehensive regulations that set minimum standards for WASH services in health care facilities. These regulations should cover water quality, sanitation infrastructure, waste management, and infection control practices (Khan & Hossain, 2018). Effective enforcement mechanisms, including regular inspections and penalties for non-compliance, are essential for ensuring adherence to these standards.
- Allocating Adequate Resources and Funding: Adequate funding is crucial for the implementation and maintenance of WASH infrastructure. Policymakers should allocate sufficient resources in the national and local budgets to support WASH improvements in health care facilities (Rahman & Sarker, 2019). Additionally, they should explore innovative financing mechanisms, such as public-private partnerships and international aid, to supplement domestic funding.
- Promoting Public-Private Partnerships (PPPs): Policymakers should encourage and facilitate public-private partnerships to leverage private sector expertise and resources. This includes creating an enabling environment through supportive policies and incentives, such as tax breaks and streamlined approval processes (Ahmed & Rahman, 2020). PPPs can play a vital role in infrastructure development, technology transfer, and capacity building.
- Supporting Capacity Building and Training: Policymakers should support the development and implementation of training programs for healthcare workers and facility managers. This includes funding for professional development initiatives and the establishment of training centers (Islam & Hossain, 2019). Policymakers can

also collaborate with academic institutions and international organizations to provide standardized training materials and certification programs.

- Fostering Community Involvement: Policymakers should promote community involvement in WASH initiatives by supporting community-based organizations and local health committees. This can include funding for community education programs and creating platforms for community feedback and participation in decision-making (Ahmed & Rahman, 2018). Engaging the community can enhance accountability and ensure that WASH interventions are culturally appropriate and accepted.

The recommendations provided for healthcare providers and policymakers are designed to address the multifaceted challenges identified in implementing WASH FIT in Bangladesh's health care facilities. By enhancing training, infrastructure, community engagement, and regulatory frameworks, it is possible to improve WASH services, leading to better health outcomes and a safer environment for patients and healthcare workers. These recommendations require coordinated efforts and commitment from all stakeholders to be effectively implemented and sustained.

8.4. Limitations of the study

While the study on implementing the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh provides valuable insights, several limitations must be acknowledged. These limitations impact the generalizability and applicability of the findings and should be considered when interpreting the results and formulating recommendations.

8.4.1. Scope and Sample Size

One of the primary limitations of this study is the scope and sample size. The study focused on a select number of health care facilities in specific regions of Bangladesh, which may not fully represent the diversity of WASH conditions across the entire country (Islam & Hossain, 2020). The sample size, though adequate for initial analysis, may not capture the full range of challenges and opportunities faced by all health care facilities, particularly those in remote or underserved areas.

8.4.2. Data Collection Methods

The study relied on a combination of qualitative and quantitative data collection methods, including interviews, surveys, and site observations. While these methods provide a comprehensive understanding of WASH issues, they are also subject to limitations such as response bias and interviewer influence (Rahman & Islam, 2019). For instance, social desirability bias may have led respondents to overstate the effectiveness of WASH practices or underreport challenges. Additionally, observational data may be influenced by the presence of researchers, potentially altering the behavior of facility staff and patients.

8.4.3. Temporal Limitations

The study was conducted over a specific period, which may not fully capture the dynamic nature of WASH challenges in health care facilities. Seasonal variations, such as monsoon rains, can significantly impact water availability and sanitation conditions, but these effects may not have been fully observed within the study's timeframe (Ahmed & Sarker, 2019). Additionally, the study may not account for recent improvements or deteriorations in WASH infrastructure and practices that occurred after data collection.

8.4.4. Contextual and Cultural Factors

The study's findings are influenced by the specific cultural and contextual factors of Bangladesh. Cultural attitudes towards hygiene, gender dynamics, and socioeconomic conditions can all affect the implementation and perception of WASH services (Khan & Rahman, 2018). These factors may limit the generalizability of the study's findings to other countries or regions with different cultural and socioeconomic contexts.

8.4.5. Limited Focus on Patient Outcomes

While the study emphasizes the conditions and practices related to WASH infrastructure and management, it provides limited direct analysis of patient outcomes. Understanding the direct impact of WASH interventions on patient health outcomes, such as infection rates or recovery times, would provide a more comprehensive assessment of the effectiveness of WASH FIT implementation (Hossain & Islam, 2019). The lack of detailed patient outcome data limits the ability to quantify the benefits of improved WASH services in health care facilities.

8.4.6. Resource and Logistic Constraints

Resource and logistic constraints also posed limitations. Limited funding and logistical challenges, such as transportation difficulties and access to remote facilities, may have restricted the study's ability to include a more diverse range of facilities and gather extensive data (Ahmed & Rahman, 2018). These constraints may have also affected the depth of the analysis, particularly in understanding the unique challenges faced by facilities in hard-to-reach areas.

Acknowledging these limitations is crucial for understanding the scope and applicability of the study's findings. Future research should aim to address these limitations by expanding the scope, increasing the sample size, and incorporating longitudinal data to capture changes over time. Additionally, a more detailed examination of patient outcomes and the role of contextual and cultural factors would provide a more comprehensive understanding of WASH FIT implementation in Bangladesh's health care facilities.

9. Conclusion

9.1. Summary of key findings

The study on the implementation of the Water, Sanitation, and Hygiene for Health Care Facilities Improvement Tool (WASH FIT) in Bangladesh has revealed several critical insights into the challenges and opportunities faced by health care facilities in both rural and urban settings. The key findings can be summarized as follows:

9.1.1. Infrastructure and Resource Disparities

The study identified significant disparities in WASH infrastructure and resources between rural and urban health care facilities. Rural facilities often suffer from inadequate water supply, poor sanitation infrastructure, and a lack of essential hygiene supplies. These deficiencies are compounded by limited access to trained healthcare professionals and logistical challenges, such as poor transportation networks and irregular supply chains (Rahman & Ahmed, 2019). In contrast, urban facilities, while generally better resourced, face issues related to overcrowding, maintenance of aging infrastructure, and variability in service delivery.

9.1.2. Impact of Policy and Governance

Policy and governance were found to play a pivotal role in shaping the quality of WASH services. The study highlighted the need for stronger regulatory frameworks and enforcement mechanisms to ensure compliance with WASH standards. Inconsistent implementation and lack of accountability were noted as barriers to effective WASH service delivery, particularly in rural areas. The findings suggest that enhancing policy coherence and governance structures is essential for achieving uniform WASH standards across all facilities.

9.1.3. Role of Technological Innovations

Technological innovations emerged as a key enabler of improved WASH services. The adoption of advanced water purification systems, automated sanitation technologies, and digital monitoring tools has the potential to significantly enhance service quality and reliability. However, the study noted that the adoption of these technologies is more prevalent in urban areas, highlighting a need for targeted initiatives to extend these benefits to rural health care facilities.

9.1.4. Importance of Training and Capacity Building

The study emphasized the critical importance of training and capacity building for healthcare staff. A lack of adequate training in WASH practices was identified as a major impediment to the effective implementation of WASH FIT. Continuous professional development and targeted training programs are necessary to equip healthcare workers with the skills and knowledge required to maintain high hygiene standards and manage WASH infrastructure.

9.1.5. Community Involvement and Education

Community involvement and education were found to be crucial for sustaining WASH improvements. Engaging communities through awareness programs and behavior change communication (BCC) strategies can foster a culture of hygiene and increase compliance with WASH practices. The study suggests that leveraging community health workers and local organizations can enhance outreach and ensure that WASH interventions are culturally sensitive and locally relevant.

9.1.6. Collaboration with the Private Sector

The study highlighted the potential of public-private partnerships (PPPs) and corporate social responsibility (CSR) initiatives in supporting WASH improvements. Collaborations with the private sector can provide additional resources, technical expertise, and innovative solutions, facilitating the development and maintenance of WASH infrastructure. These partnerships are particularly valuable in addressing resource constraints and scaling successful interventions.

The study's findings underscore the multifaceted nature of the challenges and opportunities associated with implementing WASH FIT in Bangladesh's health care facilities. Addressing these challenges requires a comprehensive approach that includes enhancing infrastructure, strengthening policy frameworks, promoting technological innovations, building capacity, engaging communities, and fostering partnerships with the private sector. By leveraging these opportunities, it is possible to improve WASH services, thereby enhancing the overall quality of healthcare and health outcomes in both rural and urban settings.

9.2. Contributions to the field

This research offers several key contributions that enhance our understanding and provide practical insights for policymakers, healthcare providers, and researchers.

9.2.1. Comprehensive Assessment of WASH Challenges

The study provides a comprehensive assessment of the WASH challenges faced by healthcare facilities in both rural and urban settings in Bangladesh. By identifying specific issues such as inadequate infrastructure, resource disparities, and governance gaps, the research contributes to a nuanced understanding of the unique needs and barriers in different contexts. This detailed examination helps fill a critical gap in the literature, where often rural and urban healthcare facilities are treated homogenously.

9.2.2. Policy and Governance Insights

The research offers valuable insights into the role of policy and governance in shaping WASH services in healthcare facilities. It highlights the importance of robust regulatory frameworks and effective enforcement mechanisms in ensuring compliance with WASH standards (Khan & Rahman, 2018). These findings provide a foundation for future policy development and reform, emphasizing the need for a cohesive and supportive policy environment to facilitate WASH improvements.

9.2.3. Emphasis on Technological Innovations

A significant contribution of the study is its exploration of the role of technological innovations in enhancing WASH services. The research underscores the potential of advanced water purification systems, digital monitoring tools, and automated sanitation technologies in improving the quality and reliability of WASH services (Ahmed & Sarker, 2019). This emphasis on technology provides a forward-looking perspective, encouraging the adoption of innovative solutions in the healthcare sector.

9.2.4. Focus on Training and Capacity Building

The study's focus on training and capacity building for healthcare workers and facility managers is a crucial contribution. It identifies specific training needs and gaps, offering practical recommendations for developing comprehensive training programs. By highlighting the importance of continuous professional development, the research contributes to the ongoing discourse on human resource development in healthcare.

9.2.5. Community Engagement and Education

Another significant contribution of this study is its exploration of community engagement and education strategies. By examining the role of community health workers, local organizations, and educational campaigns, the research underscores the importance of community involvement in sustaining WASH improvements. This focus on community engagement provides a holistic approach to WASH interventions, ensuring that they are culturally appropriate and widely accepted.

9.2.6. Practical Recommendations for Stakeholders

The study provides practical recommendations for a wide range of stakeholders, including policymakers, healthcare providers, and the private sector. These recommendations are grounded in the empirical findings of the research and

offer actionable steps for improving WASH services in healthcare facilities. By addressing the specific needs of rural and urban settings, the study offers tailored solutions that can be adapted to different contexts.

9.2.7. Contribution to Global WASH Discourse

While focused on Bangladesh, the findings and recommendations of this study have broader implications for the global WASH discourse, particularly in low- and middle-income countries. The challenges and opportunities identified in this research are relevant to other regions facing similar issues, providing a valuable reference for international organizations, donors, and researchers working to improve WASH services globally.

This study makes substantial contributions to the field of public health by providing a detailed assessment of WASH challenges and opportunities in healthcare facilities in Bangladesh. It offers critical insights into policy, technology, training, community engagement, and practical recommendations for stakeholders. These contributions not only advance the academic discourse but also provide a practical framework for improving WASH services in healthcare settings, ultimately enhancing health outcomes and patient safety.

9.3. Future research directions

The study "Implementing WASH FIT in Bangladesh: A Study on Rural and Urban Health Care Facility Challenges and Opportunities" has provided a foundational understanding of the current state of water, sanitation, and hygiene (WASH) in healthcare facilities across different settings. However, several areas warrant further investigation to deepen our understanding and improve WASH services in Bangladesh and similar contexts.

9.3.1. Longitudinal Studies on WASH Impact

Future research should include longitudinal studies to assess the long-term impact of WASH interventions on health outcomes in healthcare facilities. These studies can provide valuable data on trends in infection rates, patient recovery times, and overall health improvements following the implementation of WASH FIT. Longitudinal research would help identify the sustainability of WASH practices and the factors that contribute to their success or failure over time.

9.3.2. Comprehensive Assessment of Patient Outcomes

While this study primarily focused on infrastructure and management practices, future research should more directly assess patient outcomes related to WASH improvements. Investigating the correlation between improved WASH conditions and specific health outcomes, such as reductions in healthcare-associated infections (HAIs) and morbidity rates, would provide concrete evidence of the benefits of WASH interventions. Such studies should also consider the psychological and social impacts on patients and staff.

9.3.3. Exploration of Cost-Effectiveness and Economic Impact

Further research is needed to evaluate the cost-effectiveness of different WASH interventions in healthcare settings. Understanding the economic benefits of investing in WASH infrastructure and services, including cost savings from reduced infection rates and improved patient outcomes, can inform policy and funding decisions (Rahman & Ahmed, 2019). Comparative studies on the cost-effectiveness of various technologies and strategies can help prioritize investments.

9.3.4. Cultural and Contextual Influences on WASH Practices

Given the diversity of cultural and contextual factors in Bangladesh, future studies should explore how these elements influence the implementation and acceptance of WASH practices. Research could examine the role of cultural beliefs, social norms, and community engagement in shaping WASH behaviors and practices. This line of inquiry is crucial for designing culturally appropriate and effective interventions.

9.3.5. Technological Innovations and Their Adaptation

As technological advancements continue to emerge, there is a need for research into the adaptation and scalability of new WASH technologies in different healthcare settings. Future studies should evaluate the feasibility, effectiveness, and user acceptance of innovative solutions such as automated sanitation systems, mobile health (mHealth) applications, and smart monitoring tools. Understanding the challenges and enablers of technology adoption can guide the development and deployment of new tools.

9.3.6. Policy Implementation and Governance Structures

Further research should investigate the effectiveness of policy implementation and the governance structures that support WASH improvements. Studies could focus on the role of government agencies, NGOs, and private sector partners in facilitating WASH initiatives and the impact of policy reforms on service delivery. Analyzing governance models and regulatory frameworks can provide insights into best practices and potential areas for policy enhancement.

9.3.7. Gender and Equity Considerations in WASH Services

Future research should also address gender and equity considerations in WASH services. This includes exploring the differential impacts of WASH conditions on various demographic groups, such as women, children, and persons with disabilities. Studies should assess how these groups experience and interact with WASH services and identify strategies to ensure equitable access and benefits.

The identified future research directions highlight the need for a multidimensional and interdisciplinary approach to improving WASH services in healthcare facilities. By addressing these research gaps, stakeholders can develop more effective, equitable, and sustainable WASH interventions, ultimately contributing to better health outcomes and enhanced quality of care.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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