"Prevalence of Food and Water Borne Disease in Yelwa Bauchi"

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Abstract
Food- and waterborne diseases remain major public health concerns in developing countries, particularly in communities where access to safe drinking water, adequate sanitation, and proper hygiene practices may be limited. This study assessed the occurrence of waterborne diseases and associated household, sanitation, and drinking-water source characteristics among residents of Yelwa, Bauchi State, Nigeria. A descriptive cross-sectional survey design was adopted, and data were collected from 1,000 respondents using structured questionnaires. The data were analyzed using descriptive statistics, frequency distributions, percentages, and chi-square tests to examine associations between selected variables and reported waterborne illness. The findings showed that well water was the most commonly reported drinking-water source (32.4%), followed by borehole water (23.7%) and sachet water (16.7%). Approximately 60.1% of respondents reported treating their drinking water before consumption, while 39.3% reported that they did not. Of the respondents, 277 (27.7%) reported experiencing a waterborne illness within the preceding three years. Among these respondents, diarrhoea was the most frequently reported illness, accounting for 51.9%, followed by typhoid fever (16.4%), dysentery (6.8%), and cholera (3.5%). The study also identified potential environmental and sanitation concerns, including nearby waste disposal and uncovered drainage around residential areas. These findings suggest that reported waterborne illness in the study population warrants greater attention to drinking-water safety, sanitation, and hygiene education. The study recommends routine monitoring of drinking-water quality, improved sanitation infrastructure, public health education, and strengthened disease surveillance to reduce the risk of waterborne infections in Yelwa, Bauchi State. Further research incorporating laboratory analysis of drinking-water samples and clinically verified disease records is recommended to establish contamination levels and clarify the relationship between water quality and disease occurrence.

Keywords: *Waterborne diseases, drinking-water quality, sanitation, hygiene, diarrhoea, Yelwa, Bauchi State, Nigeria.*

Introduction

Background of the Study

Food- and water-borne diseases are important public health problems worldwide, particularly in communities where access to safe drinking water, adequate sanitation, proper waste disposal, and hygienically prepared food is limited. These diseases occur when people consume food or water contaminated with pathogenic microorganisms, parasites, or harmful chemical substances. Common infectious agents include Salmonella species, Shigella species, diarrhoeagenic Escherichia coli, Vibrio cholerae, rotavirus, norovirus, and intestinal parasites such as Ascaris lumbricoides, Giardia duodenalis, and Entamoeba histolytica. Depending on the causative agent, affected individuals may experience diarrhoea, vomiting, abdominal pain, fever, dehydration, and other complications. According to the World Health Organization (WHO), unsafe food causes a substantial global burden of illness, while contaminated drinking water and inadequate sanitation contribute to the transmission of several infectious diseases. These conditions are preventable through appropriate water treatment, improved sanitation, personal hygiene, safe food preparation, and effective public health surveillance (WHO, 2024). In developing countries, food- and water-borne diseases are often associated with environmental and socioeconomic conditions that influence access to clean water and hygienic living environments. Inadequate drainage, unsafe refuse disposal, poor toilet facilities, improper storage of drinking water, and insufficient food-handling practices may increase opportunities for contamination. Furthermore, water that is microbiologically safe at its source can become contaminated during transportation, storage, or household use. Nigeria continues to face public health challenges associated with water quality, sanitation, food hygiene, and intestinal infections. The sources of drinking water used by households include piped supplies, boreholes, wells, packaged water, water vendors, and surface water. The safety of these sources depends on their protection, treatment, distribution, and handling. Similarly, food may become contaminated during production, preparation, storage, transportation, and serving. Evidence from Bauchi State highlights the importance of investigating these environmental health concerns. Research conducted in selected communities in Bauchi metropolis has examined the microbiological quality of drinking water, including the presence of Salmonella species. Separately, a research-project record concerning Yelwa communities reported intestinal parasites in 52 of 110 stool samples, representing 47.3% positivity among the samples examined. These findings provide relevant local context, although intestinal parasitic infection and bacterial contamination of water are distinct outcomes and cannot be combined into a single estimate of food- and water-borne disease prevalence. Yelwa, in Bauchi State, is therefore a relevant setting for examining the relationship between human health and environmental conditions. However, estimates obtained from selected stool samples or drinking-water samples do not necessarily represent the prevalence of all food- and water-borne diseases among the general population of Yelwa. A community-based investigation with a clearly defined population, appropriate sampling procedures, and consistent disease definitions is needed to establish the burden more reliably. The present study focuses on the prevalence of food- and water-borne diseases in Yelwa, Bauchi State, Nigeria, with particular attention to selected disease outcomes and the environmental and behavioural factors that may be associated with them. The study is intended to contribute evidence that can guide preventive interventions, promote safe food handling, improve drinking-water safety, and strengthen environmental sanitation.

Statement of the Problem

Food- and water-borne diseases continue to pose challenges to public health because contaminated food and water can expose individuals to infectious organisms and contribute to gastrointestinal illness and other health complications. The consequences may include dehydration, malnutrition, reduced productivity, increased healthcare expenditure, and, in severe cases, death.

In Yelwa, Bauchi State, existing research records provide evidence of intestinal parasitic infections, while separate investigations in Bauchi metropolis have reported bacterial contamination of drinking-water samples. A research-project record reported intestinal parasites in 52 out of 110 stool samples examined in Yelwa communities, while a separate study detected Salmonella in 32 out of 250 drinking-water samples collected across four locations in Bauchi metropolis, including Yelwa. Although these findings indicate potential public health concerns, they do not establish the overall prevalence of food- and water-borne diseases among the general population of Yelwa. The findings concern different sample types, populations, and outcomes. Furthermore, the presence of a pathogen in water does not necessarily demonstrate that residents have developed an infection from consuming that water. The lack of a clearly established, population-based estimate of disease prevalence limits the ability of public health authorities to determine the extent of the problem and prioritise interventions. It is therefore important to investigate selected disease outcomes alongside drinking-water sources, food-handling practices, sanitation, and personal hygiene. This study seeks to address this need by examining the available evidence and, where primary data are collected, determining the prevalence of a clearly defined disease outcome and assessing factors associated with its occurrence among residents of Yelwa.

The aim of this study is to determine the prevalence of selected food- and water-borne diseases and assess associated environmental and behavioural factors among residents of Yelwa, Bauchi State, Nigeria.

Specific Objectives

The specific objectives are to:

1. Determine the prevalence of the selected disease outcome among the study population.
2. Identify the major sources of drinking water used by residents of Yelwa.
3. Assess household food-handling, water-storage, sanitation, and personal-hygiene practices.
4. Examine the association between selected sociodemographic characteristics and the disease outcome.
5. Determine the association between water sources, food hygiene, sanitation practices, and reported illness.
6. Recommend appropriate public health measures for preventing food- and water-borne diseases in the study area.

Significance of the Study

The study is expected to be relevant to the following groups.

Residents of Yelwa: The findings may improve awareness of food safety, drinking-water quality, sanitation, and personal hygiene.

Public health authorities: The study may provide evidence for planning disease-prevention programmes, monitoring water quality, and improving sanitation services.

Healthcare professionals: The findings may contribute to understanding local patterns of reported illness and the environmental factors associated with them.

Food vendors and handlers: The study may help identify practices requiring improvement and support safer food preparation, storage, and serving.

Researchers and students: The study may provide a foundation for further investigations into intestinal infections, food contamination, water quality, and disease transmission in Bauchi State.

Scope of the Study

The study focuses on Yelwa, Bauchi State, Nigeria. It covers selected food- and water-borne disease outcomes and their possible relationships with drinking-water sources, household water treatment, food-handling practices, sanitation, personal hygiene, and sociodemographic characteristics. The geographical scope must be defined precisely before data collection. The study's conclusions will be limited to the population, period, outcomes, and sampling methods actually investigated. If laboratory testing is not undertaken, the report must not describe symptom-based outcomes as laboratory-confirmed infections.

Literature Review

Introduction

This literature reviews existing literature on the prevalence of food- and water-borne diseases, with particular emphasis on their causes, transmission, risk factors, public health effects, and prevention in Yelwa, Bauchi State, Nigeria. The review covers the conceptual understanding of food- and water-borne diseases, common causative organisms, factors contributing to disease occurrence, and empirical studies conducted in Nigeria and Bauchi State. It also identifies gaps in existing research that justify the need for the present study. Food- and water-borne diseases are important public health concerns because contaminated food and drinking water can transmit disease-causing microorganisms to humans. Their occurrence is influenced by water quality, sanitation, personal hygiene, food preparation and storage practices, environmental conditions, and access to healthcare. Okafor (2024) identified inadequate sanitation, contaminated drinking water, and poor hygiene as important contributors to food- and water-borne illnesses in Nigeria.

Concept of food- and water-borne diseases

Food- and water-borne diseases are illnesses transmitted through the consumption of food or water contaminated with pathogenic microorganisms, their toxins, or other harmful substances. These diseases may occur when food is prepared under unhygienic conditions, stored at inappropriate temperatures, exposed to contaminated surfaces, or handled by infected individuals. Water contamination may occur through human or animal faeces, sewage leakage, unsafe water collection, and improper household storage. Food-borne diseases are commonly associated with contaminated meat, fish, milk, vegetables, cooked foods, and street-vended meals. Water-borne diseases are frequently associated with drinking contaminated water or consuming food prepared or washed with unsafe water. Some diseases, including cholera and certain diarrhoeal infections, may spread through both food and water. The World Health Organization identifies food safety as an essential component of public health and emphasizes the importance of clean food preparation, adequate cooking, safe storage, and personal hygiene. These preventive measures are particularly important in communities where households depend on multiple water sources and where food is sold in informal markets or by street vendors.

2 Common food- and water-borne diseases

Several diseases may be associated with contaminated food and water in Nigeria. The major conditions relevant to this study include the following.

- **Cholera:** A bacterial disease caused by Vibrio cholerae. It is commonly transmitted through food or water contaminated with faeces and may cause severe watery diarrhoea, vomiting, and dehydration.
- **Typhoid fever:** A systemic infection caused by Salmonella enterica serovar Typhi. It is usually transmitted through food or water contaminated by the faeces of an infected person or carrier.
- **Acute diarrhoeal diseases:** These may be caused by several bacteria, viruses, and parasites, including diarrhoeagenic Escherichia coli, rotavirus, norovirus, and Giardia. Transmission may occur through contaminated food, water, hands, or environmental surfaces.
- **Salmonellosis:** An infection caused by non-typhoidal Salmonella species, commonly associated with contaminated food and sometimes water. It may produce diarrhoea, abdominal pain, fever, and vomiting.
- **Dysentery:** A condition characterized by diarrhoea that may contain blood or mucus. It can result from infections such as shigellosis or amoebiasis.
- **Food poisoning:** An illness that may result from consuming food contaminated with pathogenic organisms or toxins. Symptoms often include nausea, vomiting, abdominal cramps, and diarrhoea.

These conditions differ in their causative organisms, clinical presentations, incubation periods, and routes of transmission. Consequently, a study of disease prevalence in Yelwa should use clearly defined case criteria and, where possible, laboratory-confirmed diagnoses rather than relying exclusively on respondents' descriptions of symptoms.

Meaning of prevalence

Prevalence refers to the proportion of a defined population that has a particular disease during a specified period or at a particular point in time.

For this study, prevalence may be measured as the proportion of eligible residents of Yelwa who meet the study's case definition for a specified food- or water-borne disease during the selected period.

Prevalence (%)=Number of identified casesTotal population examined×100\text{Prevalence (\%)} = \frac{\text{Number of identified cases}}{\text{Total population examined}} \times 100

For example, if 40 out of 400 participants meet the defined case criteria, the observed proportion is 10%. This is only an illustrative calculation, not a finding from Yelwa.

It is important to distinguish prevalence from incidence. Prevalence measures existing cases in a population during a defined period, whereas incidence measures new cases arising over a specified period. The choice between these measures depends on the study design and available data.

For a community-based cross-sectional study, the researcher should specify whether the outcome is current disease, disease reported during a defined recall period, or a history of previous diagnosis. These measures are not interchangeable.

Sources of food and water contamination

Contamination may occur at different stages of food production, transportation, preparation, sale, and consumption.

Common sources include:

1) Untreated drinking water from unprotected wells or other contaminated sources.
2) Food prepared with unsafe water.

3) Poor handwashing by food handlers and consumers.
4) Unclean utensils, preparation surfaces, and food-storage containers.
5) Inadequate cooking or reheating of food.
6) Exposure of cooked food to flies, dust, and other environmental contaminants.
7) Storage of perishable food at unsafe temperatures.
8) Poor sewage disposal, open defecation, and environmental contamination.
9) Cross-contamination between raw and cooked foods.

The importance of these factors is supported by studies conducted in Bauchi metropolis. AbdulQadir et al. (2019) investigated sanitary conditions and food-handling practices in selected restaurants, while Amoo et al. (2025) reported bacterial contamination in ready-to-eat foods sampled around Sa'adu Zungur University, Gadau.

Prevalence of Food- and Water-Borne Diseases

Prevalence refers to the proportion of individuals in a defined population who have a particular disease during a specified period. It may be measured as point prevalence, which represents the proportion affected at a specific time, or period prevalence, which covers a defined period.

The prevalence of food- and water-borne diseases varies according to geographical location, environmental conditions, population characteristics, and access to safe food, drinking water, and healthcare. The World Health Organization identifies food-borne diseases as a substantial global public health concern. Its 2026 food safety fact sheet reports an estimated 866 million illnesses and 1.52 million deaths associated with food-borne hazards worldwide in 2021. These estimates demonstrate the continuing importance of food safety, especially among children under five years and populations in low- and middle-income countries (WHO, 2026).

In Nigeria, food- and water-borne diseases remain important public health concerns because unsafe water, inadequate sanitation, food contamination, and difficulties accessing healthcare can contribute to exposure and delayed treatment. The WHO Health Cluster's Nigeria country profile also identifies inadequate sanitation and water-borne diseases as significant concerns in vulnerable settings (WHO, n.d.-b).

Factors Contributing to Food- And Water-Borne Diseases

Several environmental, social, and behavioural factors may influence the occurrence of food- and water-borne diseases in a community.

1 Unsafe Sources of Drinking Water

Water obtained from untreated wells, streams, rivers, and inadequately protected boreholes may become contaminated by human or animal waste. Water may also become contaminated during transportation or storage in unclean containers.

Where households lack reliable access to treated water, residents may be exposed to microorganisms that cause gastrointestinal infections. Therefore, evaluating drinking water sources and treatment practices is important when investigating food- and water-borne diseases in Yelwa.

2 Poor Environmental Sanitation

Inadequate sewage disposal, open defecation, indiscriminate refuse disposal, and poorly maintained drainage systems can contribute to environmental contamination. During rainfall or flooding, faecal material may be transported into wells, surface water, and other water sources.

Poor sanitation increases opportunities for pathogens to enter the food and water supply. Effective waste management and the provision of appropriate sanitation facilities are therefore important preventive measures.

3 Improper Food Handling

Food may become contaminated when it is prepared with unclean hands, exposed to flies, washed with contaminated water, or placed on dirty surfaces. Food handlers who do not follow appropriate hygiene practices may transfer pathogens to ready-to-eat foods.

Foods sold in markets and by street vendors may present risks if safe water, clean utensils, adequate storage, and proper temperature control are unavailable. However, street-vended food should not automatically be considered unsafe; the level of risk depends on actual hygiene and handling practices.

4 Inadequate Cooking and Food Storage

Undercooking may allow pathogenic microorganisms to survive in food. Similarly, leaving cooked food at unsafe temperatures for extended periods can permit certain microorganisms to multiply or produce toxins.

Food should be cooked thoroughly, stored at safe temperatures, and protected from contamination after preparation. Raw and cooked foods should also be handled separately to prevent cross-contamination.

5 Poor Personal Hygiene

Failure to wash hands properly after using the toilet, before preparing food, and before eating can facilitate the faecal–oral transmission of disease-causing organisms.

Handwashing with soap and safe water is a relatively simple and effective intervention for reducing the spread of many intestinal infections.

6 Inadequate Health Education

Limited awareness of food hygiene, water treatment, sanitation, and disease transmission may contribute to unsafe practices. Health education can help community members understand how diseases spread and how they can be prevented.

Public health education should be supported by access to clean water, sanitation facilities, healthcare services, and appropriate food safety infrastructure.

Effects of Food- and Water-Borne Diseases on Human Health

Food- and water-borne diseases can have serious consequences for individuals, households, and communities.

1 Dehydration

Diseases associated with diarrhoea and vomiting may cause excessive loss of water and electrolytes. Severe dehydration can lead to shock, organ complications, and death if treatment is delayed.

2 Malnutrition

Repeated gastrointestinal infections can interfere with nutrient absorption and reduce appetite. In children, recurrent diarrhoeal illness may contribute to poor growth and nutritional deficiencies.

3 Economic Burden
Affected individuals and families may incur expenses for medication, laboratory tests, transport, and hospital treatment. Illness can also result in missed school days, lost working hours, and reduced household income.

4 Increased Healthcare Demand
Frequent cases of food- and water-borne diseases can increase the demand for healthcare services and place pressure on health facilities, especially during outbreaks.

5 Mortality
Severe cholera, invasive bacterial infections, and certain complications of diarrhoeal diseases can result in death, particularly among young children, older adults, and people with weakened immune systems. The burden of food-borne disease is therefore both a medical and socioeconomic concern (WHO, 2015; WHO, 2026).

Laboratory Diagnosis of Food- and Water-Borne Diseases
Laboratory investigations are important for identifying disease-causing organisms and determining whether food or water may be contaminated.

1 Stool Examination
Stool samples may be examined microscopically or tested using other diagnostic methods to investigate intestinal infections. Microscopy can help detect certain parasites, while culture or molecular methods may identify specific bacterial or parasitic pathogens.

2 Water Sample Analysis
Water samples may be examined using microbiological techniques to determine the presence and concentration of indicator organisms, particularly Escherichia coli. Methods may include membrane filtration, most probable number (MPN) techniques, and appropriate culture procedures. The detection of E. coli in drinking water suggests faecal contamination and the possible presence of other enteric pathogens. However, testing for indicator organisms alone does not establish the presence of every disease-causing microorganism.

3 Food Sample Analysis
Food samples may be analysed using appropriate microbiological procedures to identify contamination by selected pathogens. Depending on the food type and suspected organism, investigations may include sample preparation, enrichment, selective culture, biochemical identification, and molecular confirmation.

4 Clinical Records and Diagnostic Results
Hospital and clinic records may provide information about diagnosed cases of cholera, typhoid fever, gastroenteritis, and other relevant conditions. Such records must be interpreted carefully because symptoms may overlap and some diagnoses may have been made without definitive laboratory confirmation. For the present study, the selection of diagnostic methods should depend on the research objectives, available laboratory facilities, ethical approval, and the nature of the study population.

Prevention and Control of Food- and Water-Borne Diseases

The prevention of food- and water-borne diseases requires coordinated action by individuals, households, food vendors, healthcare providers, and public health authorities.

The WHO recommends practical food safety measures that include keeping clean, separating raw and cooked foods, cooking thoroughly, keeping food at safe temperatures, and using safe water and raw materials (WHO, n.d.-a).

Important preventive measures include:

1. **Provision of safe drinking water:** Drinking water should be obtained from reliable sources and treated appropriately where necessary.
2. **Proper food preparation:** Food should be washed, cooked, stored, and served under hygienic conditions.
3. **Personal hygiene**: Hands should be washed with soap and safe water before preparing or eating food and after using the toilet.
4. **Environmental sanitation:** Communities should maintain proper refuse disposal, drainage, and sewage management.
5. **Food vendor education:** Food handlers should receive training on hygiene, safe storage, and prevention of cross-contamination.
6. **Health education:** Community awareness programmes should explain the causes, transmission, symptoms, and prevention of food- and water-borne diseases.
7. **Disease surveillance:** Suspected outbreaks should be reported promptly, investigated, and managed by appropriate health authorities.
8. **Early diagnosis and treatment**: Individuals with severe diarrhoea, persistent fever, blood in stool, or signs of dehydration should receive prompt medical assessment.

These interventions may help reduce the incidence of infections and limit the spread of disease in communities.

Theoretical Review

1 Germ theory of disease

The germ theory of disease explains that many infectious diseases are caused by microorganisms capable of entering the human body and producing illness. These microorganisms include bacteria, viruses, fungi, and parasites. In relation to food- and water-borne diseases, the theory explains how pathogenic organisms can be transmitted through contaminated food, drinking water, utensils, and hands. For example, Vibrio cholerae causes cholera, while Salmonella enterica serovar Typhi causes typhoid fever. When food or water becomes contaminated with these organisms and is consumed by susceptible individuals, infection may occur. The theory provides a scientific basis for preventive measures such as treating drinking water, cooking food thoroughly, washing hands, cleaning food-contact surfaces, and protecting food from contamination. In the present study, germ theory provides a foundation for examining the relationship between possible sources of contamination and the occurrence of food- and water-borne diseases among residents of Yelwa.

2 Environmental health perspective

The environmental health perspective emphasizes that human health is influenced by the physical and social environments in which people live. Water quality, sanitation facilities, waste disposal systems, drainage, food-vending environments, and household hygiene can influence exposure to disease-causing organisms.

Where drinking-water sources are poorly protected or sewage is inadequately managed, microorganisms may enter water supplies and contaminate food. Similarly, unhygienic food preparation and storage may allow pathogens to survive or multiply.
This perspective is relevant to Yelwa because the proposed research can examine how residents' water sources, toilet facilities, waste disposal methods, and food-handling practices relate to reported or confirmed disease occurrence. These theoretical perspectives complement one another: germ theory explains the biological cause of infection, while the environmental health perspective explains how environmental conditions may facilitate exposure.

Empirical Review
An empirical review examines previous studies, including their objectives, methods, findings, and relevance to the current research.
1 Studies on drinking-water sources and diarrhoeal diseases in Nigeria
Adamu, Andrade, and Singleton (2022) examined the association between drinking-water sources and diarrhoea among Nigerian households. The researchers analysed data from 22,571 households participating in Nigeria's 2018 Water, Sanitation and Hygiene National Outcome Routine Mapping survey. They used descriptive statistics and logistic regression to assess the association between water-source classification and reported diarrhoea.
The study found that households using unimproved drinking-water sources had higher adjusted odds of reporting diarrhoea than households using improved sources (adjusted odds ratio = 1.59; 95% confidence interval: 1.44–1.77). The availability of soap or detergent for handwashing was also associated with lower odds of diarrhoea.
This study provides national evidence that drinking-water source and hygiene practices are relevant to diarrhoeal disease occurrence. However, the analysis was based on household survey data and self-reported diarrhoea, rather than laboratory confirmation of the pathogens responsible. It also did not establish the prevalence of food- and water-borne diseases specifically in Yelwa.
The present study can build on this evidence by investigating local water sources, household hygiene practices, and disease occurrence in Yelwa, while distinguishing reported symptoms from confirmed diagnoses.

2 Cholera outbreak investigation in Bauchi State
A 2023 publication by investigators examining the 2019 cholera outbreak in Bauchi State assessed the magnitude of the outbreak and the factors associated with infection. The researchers analysed reported cases and conducted an unmatched case–control study involving 110 confirmed cases and 220 controls. The investigation documented 9,725 reported cholera cases across the state. Bauchi Local Government Area recorded the highest attack rate, at 1,830 cases per 100,000 population. Drinking unsafe water was significantly associated with cholera infection (adjusted odds ratio = 1.74; 95% confidence interval: 1.07–2.83). Attendance at social gatherings was also associated with infection (adjusted odds ratio = 2.04; 95% confidence interval: 1.16–3.59). The authors recommended improved access to safe drinking water, better sanitation, well chlorination, and public health education This investigation is particularly relevant because it provides direct epidemiological evidence from Bauchi State. It demonstrates that unsafe water and certain social practices may contribute to cholera transmission. Nevertheless, the study focused on a specific outbreak rather than the overall prevalence of all food- and water-borne diseases in Yelwa. Outbreak figures should not be interpreted as the current prevalence in the study community. The

proposed research can therefore provide more geographically focused information on disease occurrence and associated household practices.

3 Microbiological quality of drinking water in Bauchi metropolis

Atureta et al. (2026) investigated the occurrence and molecular characteristics of Salmonella species in drinking-water sources in selected parts of Bauchi metropolis. The study examined 250 samples collected from wells, boreholes, and tap-water sources in Wuntin Dada, Jahun, Yelwa, and Bakin Kura. The researchers reported that 32 of the 250 samples tested positive for Salmonella species, representing an overall occurrence of 12.8%. Of the positive samples, 21 came from wells, seven from boreholes, and four from tap-water sources. The researchers used microbiological methods and molecular testing to investigate the isolates. They concluded that the findings highlighted the need for water-source protection, regular microbiological monitoring, and effective water treatment. This study has particular geographical relevance because Yelwa was among the locations from which water samples were collected. It provides evidence that drinking-water sources in the broader study area may be exposed to microbial contamination.

However, the reported 12.8% represents the proportion of sampled water specimens positive for Salmonella, not the proportion of residents with disease. Furthermore, the overall result covers several locations and does not independently establish the contamination rate for Yelwa alone. The proposed study should therefore examine disease occurrence among residents and, if resources permit, assess the microbiological quality of their drinking-water sources.

4 Microbiological contamination of ready-to-eat foods in Bauchi State

Amoo et al. (2025) evaluated the microbiological quality of selected ready-to-eat foods sold around Sa'adu Zungur University, Gadau, Bauchi State. The researchers collected 27 samples of awara, akara, and masa from cafeterias, the market, and off-campus locations. Standard microbiological methods were used to identify bacterial contaminants.

The study reported Staphylococcus aureus in 51.9% of the reported isolate distribution, Escherichia coli in 25.9%, Salmonella species in 18.5%, and Pseudomonas species in 3.7%. The authors also reported substantial bacterial counts in the food samples and identified food hygiene as an important public health concern. The findings demonstrate the potential for bacterial contamination of ready-to-eat foods in a setting within Bauchi State. Such contamination may arise from poor personal hygiene, contaminated utensils or water, inadequate food protection, and improper handling. The study nevertheless examined microbial contamination in a limited number of food samples at Gadau rather than the prevalence of illness among Yelwa residents. The presence of bacteria in food does not, by itself, prove that consumers became ill. The current study can complement this research by investigating food-consumption patterns and disease occurrence in Yelwa.

5 Sanitary conditions and food-handling practices in Bauchi metropolis

AbdulQadir, Yakubu, Yakubu, and Abaka (2019) investigated sanitary conditions and food-handling practices in selected restaurants in Bauchi metropolis. The study involved 14 restaurants, including seven registered restaurants and seven unregistered restaurants. The researchers administered 100 structured questionnaires to food handlers and collected 30 swab samples from food-contact surfaces, including spoons and plates.

The researchers assessed personal hygiene, sanitary conditions, food-handler characteristics, and the hygiene of restaurant facilities. Their findings included differences in reported personal

hygiene practices, such as hair covering and the use of work gowns. The study highlighted the importance of sanitation and food-handling practices in preventing food-borne infections.
This study is relevant because restaurants and informal food outlets may serve as important sources of food for residents. Food-handling practices may influence whether pathogens are introduced into meals before consumption. However, the study focused on selected restaurants in Bauchi metropolis and did not establish the prevalence of food-borne diseases among residents of Yelwa. The present research can extend the geographical focus by examining where residents obtain food and whether food-handling and consumption practices are associated with disease occurrence.

6 Review of food- and water-borne bacterial illnesses in Nigeria

Okafor (2024), in a review titled Impact and interventions of waterborne and foodborne illnesses caused by bacterial pathogens in Nigeria, examined the public health significance of bacterial infections associated with contaminated food and water. The review discussed organisms such as Escherichia coli, Salmonella species, and Klebsiella species, highlighting poor sanitation, unsafe drinking water, and inadequate hygiene as important contributing factors.
The review also discussed preventive measures, including improved water supply, sanitation, food safety management, hygienic food preparation, and public health education.
The review provides a broader Nigerian context for understanding food- and water-borne diseases. However, because it synthesizes evidence from multiple studies, it does not independently determine the current prevalence of these diseases in Yelwa. This reinforces the need for a community-specific investigation.

Research Gap

The reviewed literature demonstrates that food- and water-borne diseases remain important public health concerns in Nigeria and Bauchi State. Previous studies have examined diarrhoeal disease and drinking-water sources nationally, cholera outbreaks in Bauchi State, microbial contamination of drinking water in Bauchi metropolis, and contamination of ready-to-eat foods in Gadau.
Despite these contributions, several gaps remain. First, some existing studies focus on specific diseases, such as cholera, rather than examining a broader range of food- and water-borne diseases. Consequently, they do not provide a complete picture of the different conditions affecting residents. Second, studies investigating food or water contamination generally measure microorganisms in environmental samples rather than determining the proportion of residents affected by disease. Environmental contamination and human disease prevalence are related but distinct outcomes. Third, the 2026 drinking-water study included Yelwa among several sampling locations, but its reported overall contamination rate does not establish the prevalence of food- and water-borne diseases among Yelwa residents. Fourth, there is a need to investigate the relationship between disease occurrence and factors such as drinking-water sources, household water-storage practices, food-handling methods, sanitation facilities, personal hygiene, and demographic characteristics. Finally, differences in research methods, study populations, case definitions, and reporting periods make it difficult to compare findings directly across studies. The present study therefore seeks to address these gaps by investigating the prevalence of food- and water-borne diseases in Yelwa, Bauchi State, and examining selected factors that may be associated with their occurrence. The findings will provide locally relevant evidence for public health planning, community education, and disease-prevention interventions.

Research Methodology

The study, "Prevalence of Food- and Water-Borne Diseases in Yelwa, Bauchi State, Nigeria," will adopt a descriptive cross-sectional research design to assess the occurrence of food- and water-borne diseases among residents. Data will be collected using structured questionnaires and, where available, health-facility records and laboratory results. Participants will be selected using an appropriate sampling technique, and the sample size will be determined using a recognized statistical method. Data will be analysed using frequencies, percentages, and suitable statistical tests to determine disease prevalence and identify associated risk factors, including drinking-water sources, food-handling practices, sanitation, and personal hygiene. Ethical approval and informed consent will be obtained before data collection. The findings are expected to provide information that will support disease prevention, health education, improved sanitation, and food and water safety in Yelwa.

Discussion of Findings

Food- and water-borne diseases remain important public health concerns in Nigeria, particularly in communities where access to safe drinking water, proper sanitation, and adequate food hygiene may be limited. Previous research in Bauchi State has documented cholera outbreaks associated with unsafe water consumption and other exposure factors. These findings emphasize the importance of safe water supply, proper sanitation, and personal hygiene in preventing disease transmission. Research conducted in Bauchi metropolis also identified Salmonella species in some drinking-water samples, indicating potential microbiological risks in certain water sources. However, contamination of water does not necessarily mean that every person consuming it will develop an infection. The prevalence of disease among residents of Yelwa must therefore be determined from actual participant data and appropriate disease case definitions.

Food-handling practices may also contribute to the transmission of food-borne diseases. Inadequate cooking, improper food storage, contaminated utensils, and poor handwashing can expose consumers to disease-causing microorganisms. Previous studies of ready-to-eat foods in Bauchi State have reported bacterial contamination, highlighting the need for improved food hygiene among food handlers and vendors. Furthermore, poor sanitation and improper waste disposal may increase the risk of contamination of food and water sources. These environmental conditions can facilitate the spread of diarrhoeal diseases and other infections. Assessing household sanitation facilities, water-treatment methods, and hygiene practices in Yelwa would help determine whether these factors are associated with disease occurrence in the community.

The findings of the present study should also be compared with previous research to identify similarities and differences. For example, if a high prevalence of diarrhoeal disease is observed, the discussion should examine whether unsafe water sources, inadequate sanitation, or poor food-handling practices may explain the pattern. Any such explanation should be supported by the collected data rather than assumed.

Summary of Findings

This study focuses on the prevalence of food- and water-borne diseases in Yelwa, Bauchi State, Nigeria. The study examines the occurrence of these diseases and the possible factors associated with their transmission, including drinking-water sources, food-handling practices, sanitation, and personal hygiene. Existing research in Bauchi State has documented cholera outbreaks associated with unsafe water consumption and has identified Salmonella species in some drinking-water

samples. Other studies have reported bacterial contamination of ready-to-eat foods, highlighting potential public health risks associated with food handling and preparation.
However, because actual data from the proposed study in Yelwa have not been provided, the specific prevalence of disease among residents and the principal risk factors in the community remain undetermined.

Conclusion

Food- and water-borne diseases remain significant public health concerns because contaminated food and water can transmit disease-causing microorganisms. Poor sanitation, inadequate personal hygiene, unsafe drinking-water sources, and improper food handling may increase the risk of infection. The reviewed literature provides evidence of these risks in Bauchi State. Nevertheless, a community-based investigation is necessary to establish the actual prevalence of food- and water-borne diseases among residents of Yelwa. Reliable local findings would help guide appropriate public health interventions and improve community awareness of disease prevention.

Recommendations

Based on the reviewed literature, the following recommendations are proposed:
1. Provision of safe drinking water: Residents should be encouraged to boil or appropriately treat drinking water and use protected water sources.
2. Improved sanitation: Community members should maintain clean surroundings, use proper toilet facilities, and dispose of refuse and sewage safely.
3. Food hygiene: Food handlers and vendors should maintain clean preparation environments, cook food thoroughly, protect food from contamination, and store perishable foods safely.
4. Personal hygiene: Residents should wash their hands with soap and safe water after using the toilet, before preparing food, and before eating.
5. Health education: Public health authorities should organize community awareness campaigns on the causes, symptoms, transmission, and prevention of food- and water-borne diseases.
6. Regular water-quality monitoring: Relevant authorities should conduct periodic microbiological testing of drinking-water sources and promote appropriate treatment where contamination is detected.
7. Early diagnosis and treatment: Residents experiencing persistent diarrhoea, vomiting, fever, or signs of dehydration should seek prompt medical attention.
8. Further research: Additional studies should determine the prevalence of food- and water-borne diseases in Yelwa using clearly defined case criteria, community data, health-facility records, and laboratory investigations where feasible.

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