Assessing Food Hygine Practice among Vendors in Selected Public Primary Schools in Bauchi Metropolis

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Abstract
The study aimed at assessing food hygiene practices among vendors in selected public primary schools in Bauchi metropolis. Descriptive survey research design was adopted in this study. Three objectives with three correspondent's research questions were used. The population of the study comprises of all 1,433 food vendors in public primary schools in Bauchi metropolis, with the sample size of 70 respondents. The data for the study were collected from the sample respondents using structured questionnaire. The data collected were analyzed using descriptive statistics of frequency and percentage. The result of the data analyses revealed that the food vendors exhibit good hygiene practices such as keeping kitchen clean, using clean water etc. The study also found out that the food vendors reported that raw food should be stored prior to preparation, cooked food should be kept separate from raw food among others. Based on these findings, the study recommends that even though the respondents reported that there is existence of good hygiene practices, there is need for school management to monitor the hygiene practices by the food vendors in their respective schools as this will assist in adhering to the practices there by improving the health of the pupils and the staff.

Keywords*:* Food hygiene**,** Food handling practices, Food safety, Food-borne diseases, Contaminated food, Ready-to-eat food, Food vendors, Street food

Introduction

Food is an essential part of life. The world today sees food as an essential instrument for health promotion and disease prevention (Etim, Okoi, Inah & Ekpo, 2018). Poorly prepared and recontamination of ready-to-eat food may be the cause of outbreaks of food borne disease. Food-borne Illness or Food Poisoning is any illness associated with eating food contaminated by disease-causing bacteria, viruses, or parasites; natural toxins in plants and animals, such as mushrooms and shellfish; or harmful chemical agents such as insecticides and heavy metals. The symptoms of contaminated or unhygienic food develop within a period of several hours to two days

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after eating contaminated food and usually include nausea, abdominal and stomach cramps, vomiting, and diarrhea (Henry, *et al*., 2017). Food safety issues are of major importance to world health.

Globally, the sole aim and concern of better food handling and food hygiene practices of food vendors are to ensure that the food served to consumers is safe for consumption and to safeguard the health of the people. This is to say that food vendors play a critical food safety role in the 'farm to plate' continuum that is necessary for the prevention and control of food borne diseases and therefore, any lack of its understanding by the food vendors poses a serious challenge to food safety (Afolaranmi, *et al*., 2015). To buttress this, it is worth knowing that, it is in view of the above statement the world health theme for 2015 was "Food Safety" and the slogan was "Farm to Plate, make Food Safe" (World Health Organization, 2015). This highlights the importance the World Health Organization places on the need to globally address, in a coordinated manner, the potential threats posed by unsafe food which is a consequence of the breakdown of food hygiene with the subsequent risk of the emergence of food borne illnesses along the pathway of the entire food supply chain, of which food vendors are critical components.

As many as 76 million people suffer from food-borne illness in the United States each year, with about 5,000 of these cases proving fatal. Food Borne Diseases exist in two major categories; *intoxications* and *infections* (Microsoft Encarta, 2018). Food borne diseases can also be categorized as Known foodborne pathogens or 31 pathogens known to cause foodborne illness. Unspecified agents with insufficient data to estimate agent-specific burden; known agents not yet identified as causing foodborne illness; microbes, chemicals, or other substances known to be in food whose ability to cause illness is unproven; and agents not yet identified. Norovirus, Salmonella, nontyphoidal, Clostridium perfringens, Campylobacter Spp, Staphylococcus aureus are the most common pathogens contributing to domestically acquired foodborne illnesses.

The term "Food" refers to the broad range of edible materials that comprise the essential body nutrients required for life and growth. Cooked ready-to-eat food is the food given to primary school children that is ready for immediate consumption at points of sale. The Food and Agricultural Organization (FAO) defined this kind of food as ready-to-eat foods and beverages prepared and/or sold by vendors and hawkers especially in public schools and other similar public places (FAO & WHO, 2015). Basically, food is edible substance we eat that has all the required mineral resources to increase our body nutrient for good health and growth.

Food handling and hygiene is very essential in that, with rapidly increasing number of food vendors especially in public places such as schools, market and street in urban areas and their access to a rapidly growing consumer base, there is a need for increased vigilance and control of the food vendor's practices through the enforcement of regulations, proper hygienic practices and food safety control measures by local authorities that are empowered to perform their functions without constraints, with the aim of preventing and controlling the potential risks and spread of disease. In the interest of public health, the management of food vendors, both mobile and stationary, should involve the development of coordinated, effective, integrated and preventive strategies that emphasize vendors' registration, formal training on hygienic practices, initial medical and periodic medical certification and regular personal and environmental hygiene checks (Iwu, *et al*., 2017).

However, with the booming street food industry in the developing world there is an urgent need to ensure food vendors adhere to hygienic practices to protect public health. Street foods are very well patronized in many developing countries since they are affordable, easily accessible and also serve as an important source of income (Akabanda, *et al*., 2017). Study has shown that the ready to eat

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foods sold to children in public school at large do not meet proper hygienic standards and can therefore lead to morbidity and mortality due to food borne illnesses, and concomitant effects on trade and development (WHO, 2016). The process for taken safe and hygiene practices of food to ensure that the food served to consumers is safe for consumption and to safeguard the health of the people is known as food handling (Husain, *et al*., 2016). Food handler are anyone who works in a food and drink establishments and who handles food, or contact with any equipment or utensils that are likely to be in contact with food, such as cutlery, plates, bowls, or chopping boards (Ayehu, *et al*., 2014).

Food-borne illnesses are a growing public health concern worldwide and results from food contaminated by pathogenic microorganisms, mycotoxins or chemical hazards (FAO & WHO, 2015). This concern is heightened by the fact that, worldwide, there seems to be a change in life-style and food consumption patterns as frequency of eating out is increasing and commitment to food preparation at home is decreasing. The number of reported outbreaks of food-borne illnesses has been high, both in developed and developing countries (Osaili, *et al*., 2013). However, the problem is exacerbated in developing countries due to economic reasons, poverty, the lack of adequate health care facilities, and the dearth of data regarding food-borne diseases. The safety of streset or vended foods is therefore one of the most pressing health and safety issues facing most developing countries since it leads to both public health and social consequences such as; poverty, the lack of adequate health care facilities, and the dearth of data regarding food-borne diseases (FAO & WHO, 2015).

In Africa most especially Nigeria, mobile and stationery food vendors operate day and night in car parks, factories, markets and schools to mention but a few, where there are numerous customers. Food vendors (FVs) are categorized into two groups mobile vendors; who journeys from place to place with prepared and packaged food intended for sale on their heads, carts, bicycles, motorcycles or tricycles and; (Oludare, *et al*., 2014) stationary vendors; who have fixed stalls where food is prepared, stored and served to consumers. Due to increases in patronage, the food vending sector of the economy has expanded in low and middle-income state and provides access to a diversity of inexpensive food for variety of customers. A food vendor therefore, is any person who handles food, regardless of whether he/she prepares or serves it (Oludare, *et al*., 2014).

In many African countries including Nigeria street food vendors have formed an integral part of the food supply chain, particularly following the advent of urbanization (Okojie & Isah, 2014). The street food industry has contributed immensely to human and economic development as studies conducted in some of the African countries like Nigeria, Morocco, and Kenya have shown that major street food vendors usually earn above the countries' minimum wage (Ifenkwe, 2012; Oyeneho & Hedberg, 2013; Wogu, *et al*., 2011). The socioeconomic role of the street food sector in terms of its potential for employment creation, yielding income particularly for women, and provision of food at affordable cost to lower income groups in the cities has been documented. In Nigeria, urban city dwellers spend as much as half of their food expenditure on street foods (WHO, 2017).

Several factors are known to favor food borne disease or food poisoning during food handling processes. These factors include poor personal and environmental hygiene, poor storage of food and drinks, improper preparation and cooking, and carrier state with unclean hand. Based on these risk factors, the World Health Organization (WHO) developed preventive steps to enhance food safety. These steps are known as the "Golden rules for safe food preparation (WHO, 2017). The rules include thorough cooking of food; thorough re-heating of stored food; avoiding contact between raw foods; and cooked food; anti-protection of food from insects, rodents and other animals. Despites this "Golden rules,"

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food borne diseases continue to be a serious public health problem in Nigeria, and often affected are school children. Also, the number of women in the work force is on the increase and school children are away from home, resulting in more meals being eaten outside the home.

In Nigeria public food vending is a thriving business, especially in the northern part of the country, and it is one of the most common business practices to pupils in school to take during the break time, as it generates income in many of the low-income business holders (Monney, *et al*., 2014). Many lack the knowledge of knowing that vended foods may be a source of many foodborne pathogens and illnesses if not regulated or properly handled. For example, in Nigeria, there is no uniformity on the regulations for informal trading, which includes public school's food vending (Muhonja & Kimathi, 2014). Knowledge of safe food handling and hygiene is vital for street food vending as it may reduce foodborne infections. However, knowledge alone may not always lead to desired food hygiene practices, as other factors such as water sources, socio-demographics and cultural practices play a role as well (Gong *et al*., 2016). However, demographics such as gender and age would be considered.

According to Okojie and Isah, (2014) there has been an inadequate supervision and monitoring by food safety officers, and the enforcement of food hygiene regulation has been weak. Poor sanitary conditions like open gutters, flies, improper waste disposal, and overcrowding are still persistent dangers to food hygiene (Onyeneho & Hedberg, 2013). Even vendors who exhibit knowledge about food hygiene still find it difficult associating dirty hands with the transmission of diarrheal pathogens. Just to say the least, the sources of food contamination are but few of the roots and sources of contamination that are known in the limelight. Very little is usually known and explored about how street food vendors themselves perceive food safety and how to practice it.

Food handler are anyone who works in a food and drink establishments and who handles food, or contact with any equipment or utensils that are likely to be in contact with food, such as cutlery, plates, bowls, or chopping boards (Ayehu *et al*., 2014). In industrialized countries, infected food handlers are an important source of food borne disease. Ingestion of infected food can result in mild to severe illness, hospitalization or even death. Diseases with short incubation periods are more likely to be detected and attributed to poor food handling and food borne. The implication here is that school children who are the few that survived the high infant and childhood mortality and who are known high risk group for intestinal parasitic infections are further exposed to hazards of purchasing food from vendors who may harbour dangerous pathogens or have the potentials of spreading infection to a large number of pupils.

In Bauchi, data from the Microbiological Department of Bauchi State Specialist Hospital reported a near epidemic recurrence of E. coli infection, which is traceable to the consumption of contaminated food (Mustapha & Miroslava, 2019). This is probably due to poor sanitation and a lack of food hygiene practices in the state. Adeneye, *et al*., (2016) studied patients affected by food-borne diseases in Bauchi state and reported that 54.8% of them dispose their waste in the bush and only 4.1% use public disposal bins; the 56.2% are using well water as their source of water; the 84.9% do not care about food hygiene; and 39.4% do not know the causes of infectious diseases in food, particularly cholera. Anecdotal evidence says that most of the time, the money collected from food vendors for space allocation is not going to the treasury of the institution but into the pockets of some individuals (e.g. chief security officer, director planning/technical etc.) and, in nearly all cases, the food vendors do not have permission from BASEPA (Bauchi State Environmental Protection Agency) mandated for food safety.

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This problem has increased in Bauchi in recent years as a larger number of uneducated and unskilled people are interested in working as street and workplace food vendors. The minimum skill needed for most food handling businesses, together with the small financial investment needed and the comparative ease with which one can start vending, make it a pleasing prospect for people striving to find employment, particularly low developing state like Bauchi in Nigeria (Sani & Siow, 2014). Similarly, Oranusi *et al*., (2007) reported poor storage practices, poor personal hygiene, and the lack of knowledge of food sellers' providers in Bauchi public primary schools. The lack of knowledge may lead to unintentional behaviour that may endanger food safety, so education of the decision makers is thus cited as a requirement for food safety compliant behaviour.

Another problem is the high number of food street vendors selling food on the premises of the primary institutions of learning in Bauchi. In public primary schools of learning in Bauchi state which the study will be carried out, there were many street food sellers who provide uninspected food to the school during the schools' breakfast. They have a very large number of small-scale food providers, if compared to the usually small number of large-scale food providers at the higher institutions of learning in developed countries. The vendors are usually not inspected and there is very limited knowledge about who the small-scale food vendors are and what their level of food handling knowledge is. The research here intends to carry out this study to assess food hygiene practices among vendors in selected public primary schools in Bauchi metropolis. Findings from this study will provide useful information for policy formulation and strategic interventions.

Diseases especially those caused by our daily intakes and activities such as food and hygiene continue to be a threat to human health and life with much emphasis being placed on curative care instead of preventive care through simple precautions of hygiene in our daily activities. Unfortunately, it is obvious and globally acclaimed that unhygienic food and other forms of contamination of our daily consumables have led to the death of millions of people throughout the world, especially in Africa where lack of education, poverty, poor public health policies, lack of qualified personnel, poor financing health system among other reasons have left Africa and for that matter Nigeria at the mercy of every outbreak from unhygienic food.

Globally speaking, it is accepted and noticed that contaminated food and water causes serious health hazards to human and even animal life. It is therefore not surprising that diseases such as cholera, diarrhea, typhoid, hepatitis, among others exist and are of great concern to public health professionals especially in West Africa including Nigeria and Bauchi State in particular where access to quality education on hygiene is merely a dream, especially for food vendors. It was observed that, unclean, insufficiently or inadequately cleaned cooking equipment have been identified as a source of bacterial contamination in processed food. The containers, pumps or tanks used for holding or transporting unprocessed raw materials, have occasionally been used for processed products without any cleaning and disinfection by the food vendors. Transfer of microorganisms by personnel particularly from hands, is of vital importance. During handling and preparation, bacteria are transferred from contaminated hands of food workers to food and subsequently to other surfaces. This is worrisome.

In Nigeria it is not uncommon to notice that most health centers are filled with patients of various ages suffering from different food related diseases. To date, only limited research has explored the effect of primary school food safety and hygiene standard on consumer purchase intention. Limited study has tested the effect of food vendors on food contamination and their level of knowledge on food hygiene as well as its safety. On top of that, theoretical model in understanding how food safety is compromised by both vendors and purchasers in the context of eating out was

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not reported in literature. Hence, this research is an empirical endeavor to build a framework that provides a theoretical based knowledge in assessing the influence of food hygienic among vendors in selected public primary schools in Bauchi methods.

The purpose of the study is to assess food hygiene practices among vendors in selected public primary schools in Bauchi metropolis. Specifically, the study sort;

i. To assess the level of hygiene practices by vendors when handling food (from preparation to serving stage) in primary schools.
ii. To assess the methods used for storage of food among vendors in selected public primary schools based on age.
iii. To identify food hygiene practices among vendors based on gender.

Methodology

The study adopted a quantitative research design, which relied on primary data obtained from food vendors in public primary schools across Bauchi metropolis. The quantitative approach was chosen because it enables the researcher to transform observed phenomena into measurable variables, facilitating systematic analysis and evidence-based decision-making (Creswell & Plano, 2011). The research focused on collecting numerical data to describe food hygiene practices, assess relationships among variables, and identify possible interventions for improving food safety among vendors. The study setting was Bauchi State, located in the north-eastern region of Nigeria, covering an area of 49,119 km² with a population of about six million people. The area is ethnically diverse, with major tribes including the Hausa, Fulani, Gerawa, Kirfawa, and Jarawa, and most of the population engaged in crop and livestock production.

The target population comprised all food vendors operating in selected public primary schools within Bauchi metropolis, estimated at 1,430 according to the Bauchi State Ministry of Education (2023). From this population, a sample size of 70 food vendors (approximately 4.8%) was selected using a clustered sampling technique, ensuring representation across different school locations. This sample size allowed for a 95% confidence level with a ±4.89% margin of error, aligning with statistical reliability standards (Duquia et al., 2007). The data collection instrument was a self-structured questionnaire divided into three sections: demographic data, knowledge and practices of food hygiene, and food storage and processing methods. Questionnaires were administered personally by the researcher to enhance understanding and participation, particularly given the low literacy level among respondents.

Data collected were verified, coded, and analyzed using Microsoft Excel (2010), with results presented in tables and charts based on frequency and percentage distributions. Ethical considerations were rigorously maintained throughout the study. The researcher ensured originality of content, avoided plagiarism, and credited all sources used. Confidentiality was upheld as information gathered from participants was kept secure and used solely for academic purposes. Permission to conduct the study was obtained from the Bauchi State Ministry of Education and the headmasters of the participating schools, ensuring adherence to institutional and ethical research protocols.

Result

In this chapter, data collected from the respondents using questionnaire was presented and analyzed. The results of the analysis were presented in tables and charts according to the research questions guiding the study.

Table 4.1: Respondents Opinion on Hygiene practices

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STATEMENT	A	D
The need to keep kitchen area clean	66 (94.28)	04 (5.71)
Use of clean water in cleaning utensils	63 (90.00)	07 (10.00)
The need to sweep selling premise daily	69 (98.57)	01 (1.42)
Washing of food items before cooking	70 (100)	00 (0.00)
Washed hands properly after sneezing or blowing nose.	67 (95.71)	03 (4.28)
The need to wear apron and cap regularly.	66 (94.28)	04 (5.71)
Displaying food with cover	64 (91.42)	06 (8.57)
Keeping food free from rodent	69 (98.57)	01 (1.42)
Not allowing people to urinate around the selling premises	67 (95.71)	03 (4.28)
Covering open wounds with neat dressing	68 (97.14)	02 (2.85)
MEAN % OF RESPONDENTS ON OPINIONS	(95.57%)	(4.43%)

Fig. 4.1: Responses on Hygiene Practices

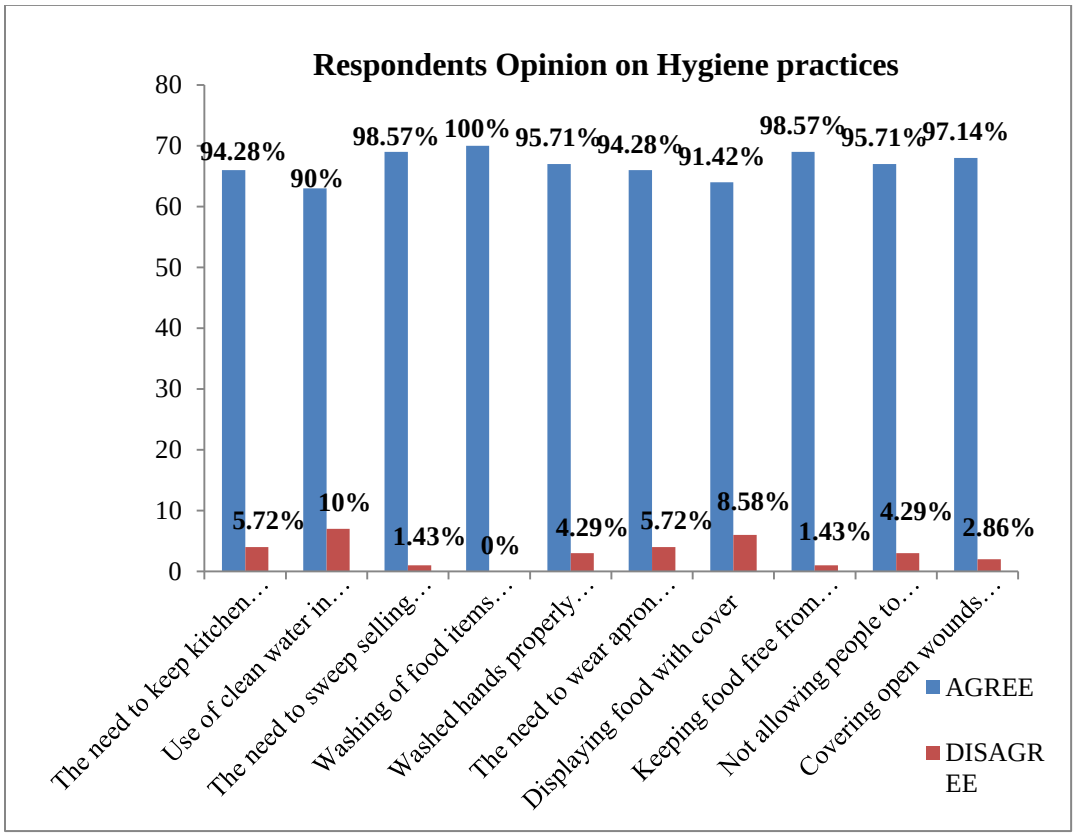

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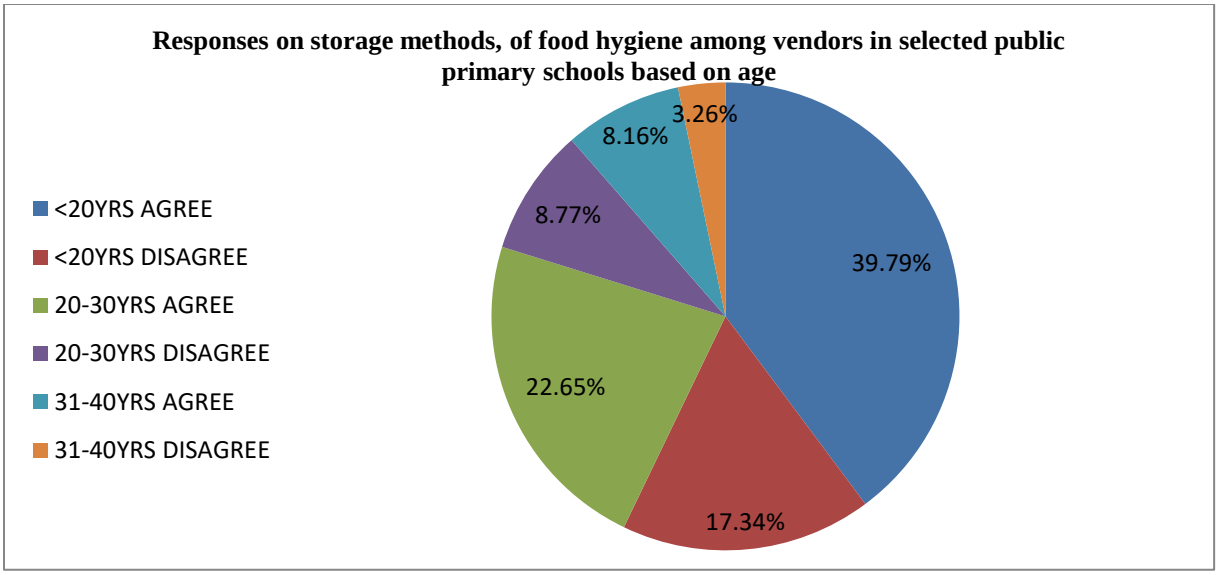
Table 4.1: Presents the respondent's opinion on food hygiene practices employed by vendors when handling food (from preparation to serving) stage in primary schools. From Table 4.1, it can be observed that 95.57% of the respondents agreed with the research statements on hygiene practices adopted by vendors during food preparation and serving stage in primary schools while 4.43% of the respondents disagreed with the research statements.

Table 4.2: Responses on storage methods, of food hygiene among vendors in selected public primary schools based on age

STATEMENT	Below 20 years		20 – 30years		31 – 40years		Above 41 years	
	A	D	A	D	A	D	A	D
Raw food should be stored prior to preparation	25 (35.71)	15 (21.42)	10 (14.28)	12 (17.14)	05 (7.14)	03 (4.28)	-	-
Chemicals should be used in storing food	10 (14.28)	30 (42.85)	07 (10)	15 (21.42)	03 (4.28)	05 (7.14)	-	-
Proper storage is to maintain clean refrigerator and freezer	38 (54.28)	02 (2.85)	20 (28.57)	02 (2.85)	08 (11.42)	00 (0.0)	-	-
Cooked food should be kept separate from raw food	38 (54.28)	02 (2.85)	20 (28.57)	02 (2.85)	08 (11.42)	00 (0.0)	-	-
Food should be stored in kitchen before reselling	29 (41.42)	11 (15.71)	20 (28.57)	02 (2.85)	08 (11.42)	00 (0.0)	-	-
Having enough store for food items	29 (41.42)	11 (15.71)	19 (27.14)	03 (4.28)	06 (8.57)	02 (2.85)	-	-
Storage of leftover cooked food for re-sale	26 (37.14)	14 (20)	15 (21.42)	07 (10)	02 (2.85)	06 (8.57)	-	-
Mean % of Respondents Based on Gender	(39.79%)	(17.34%)	(22.65%)	(8.77%)	(8.16%)	(3.26%)		

Source: Field survey (May 2023)

Fig.4.2: Responses on storage methods, of food hygiene among vendors in selected public primary schools based on age



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4.2: Presents the responses of respondents on the storage methods, of food hygiene among vendors in selected public primary schools based on age. Majority of the responses 39.79% from the respondents who agreed with researcher's statement on storage methods were below 20 years; while 22.65% of the respondents who were between the age bracket of 20 – 30 years agreed with researcher's statement and 8.16% of the respondents who were between the age brackets of 31 – 40 years agreed. This implies that the storage methods differ across the age group.

Table 4.3: Responses on Food hygiene practice among vendors based on gender

Statement	Male		Female	
	A	D	A	D
The need to keep kitchen area clean	23 (32.85%)	00 (0%)	43 (61.42%)	04 (5.71%)
Use of clean water in cleaning utensils	23 (32.85%)	00 (0%)	40 (57.14%)	07 (10%)
The need to sweep selling premise daily	22 (31.42%)	01 (1.42%)	47 (67.14%)	00 (0%)
Washing of food items before cooking	23 (32.85%)	00 (0%)	47 (67.14%)	00 (0%)
Washed hands properly after sneezing or blowing nose.	21 (30.00%)	02 (2.85%)	46 (65.71%)	01 (1.42%)
The need to wear apron and cap regularly.	21 (30.00%)	02 (2.85%)	45 (64.28%)	02 (2.85%)
Displaying food with cover	19 (27.14%)	04 (5.71%)	45 (64.28%)	02 (2.85%)
Keeping food free from rodent	23 (32.85%)	00 (0%)	46 (65.71%)	01 (1.42%)
Not allowing people to urinate around the selling premises	22 (31.42%)	01 (1.42%)	45 (64.28%)	02 (2.85%)
Covering open wounds with neat dressing	23 (32.85%)	00 (0%)	44 (62.85%)	03 (4.28%)
Mean % of Respondents Based on Gender	(31.42%)	(1.42%)	(64%)	(3.14%)

Fig.4.3: Responses on Food hygiene practice among vendors based on gender

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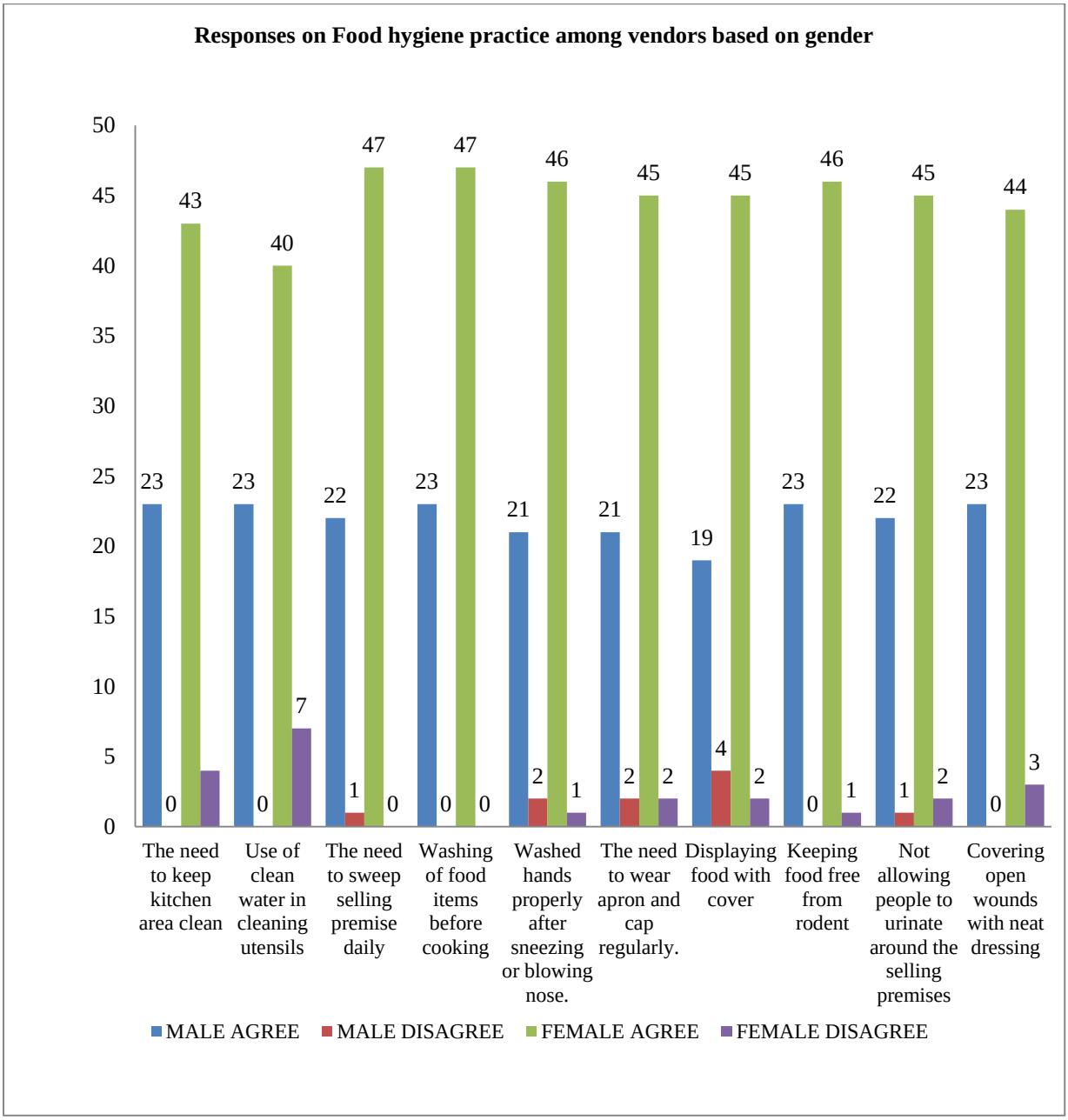

Table 4.3: Presents responses of respondents on food hygiene practice among vendors based on gender. It can be observed that 31.42% of the respondents who were male agreed with researcher's statement on food hygiene practice among vendors; 1.42% of the male respondents disagreed; 64% of the female respondents agreed with the researchers' statement on food hygiene practice and 3.14% of the female respondents disagreed. This implies that the food hygiene practices differ based on gender.

Discussion

The discussions of on the finding were based on objectives;

Objective 1: To assess the level of hygiene practices by vendors when handling food (from preparation to serving stage) in primary schools.

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The analyses of the responses of respondents following the raised questions are being presented in table 4.1. The research question one which is on hygiene practices adopted by vendors during food preparation and serving stage in primary schools. The study revealed that keep kitchen clean, use of clean water in cleaning utensil, sweeping of selling premises, washing of food items before cooking, washing hand properly after sneezing or blowing nose, wearing apron and cap, displaying food with cover, keeping food free from rodent, not allowing people to urinate around the selling premises and covering open wounds with neat dressing are the hygiene practices adopted by vendors during food preparation and serving stage in primary schools. These findings agreed with previous study by Iwu, et al., (2017).

Objective 2: To assess the methods used for storage of food among vendors in selected public primary schools based on age.

The analysis on based on this research questions revealed that the storage method differs across the age of respondents. Majority of the respondents who were below 20 years agreed that raw food should be stored prior to preparation; proper storage is to maintain clean refrigerator and freezer; cooked food should be kept separate from raw food; food should be stored in kitchen before reselling; having enough store for food items and storage of leftover cooked food for re-sale. However, majority respondents in the entire age category disagreed that chemicals should be used in storing food. This finding is consistent with previous study by Gordon-Davis (2011) and WHO (2013).

Objective 3: To identify food hygiene practices among vendors based on gender.

The analysis of responses of respondents based on this research questions revealed that majority of the respondents in both gender (male and female) agreed that keeping kitchen clean, use of clean water, sweeping selling premises, washing of food items, washing of hands after sneezing, wearing of apron and cap, covering of food when serving and keeping food away from rodents, not allowing people to urinate in the surrounding and covering wounds with neat dressing were the hygiene practices among the food vendors. However, the practices were higher in female as compared to female. This finding is in line with previous findings by Nwana (1994) who established that most of the food vendors maintained high standard of hygiene.

Conclusion

The study aimed at assessing food hygiene practices among vendors in selected public primary schools in Bauchi metropolis. The result of the data analyses revealed that the food vendors exhibit good hygiene practices such as keeping kitchen clean, using clean water etc. The study also found out that the food vendors reported that raw food should be stored prior to preparation, cooked food should be kept separate from raw food among others. Based on these findings, the study recommends that even though the respondents reported that there is existence of good hygiene practices, there is need for school management to monitor the hygiene practices by the food vendors in their respective schools as this will assist in adhering to the practices there by improving the health of the pupils and the staff.

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