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# Factors Affecting Cholera Infection Prevention Practices Among Food Vendords in Osogbo Metropolis, Osun State, Nigeria.

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***Abstract-*** ***Cholera is a dangerous diarrhoeal disease that can be lethal, particularly in places with inadequate sanitation and little access to medical care. Outbreaks of foodborne cholera have the potential to overwhelm healthcare systems and impact huge populations due to their fast spread. Prevention and control of cholera can be accomplished by the provision of safe drinking water, improving sanitation, food hygiene, personal cleanliness, and clinical case management. Eighty percent of cases of cholera are mild and asymptomatic, with an incubation period varying from two hours to five days. The route of transmission is the fecal-oral route; cholera outbreaks are mainly caused by internal displacement caused by natural and man-made calamities. An estimated 28,000 to 150,000 people die from cholera each year, and there are 3 to 5 million cases worldwide. Serogroups, O1 and O139 of Vibrio cholerae are linked to pandemic and epidemic cholera in humans. The second main way that cholera is spread is through contaminated food in homes or markets. In Nigeria, cholera was first notified in December 1970, which led to an epidemic of 22,931 cases and 2,945 deaths with intermittent outbreaks occurring since then and CFR of 3.3%. A multistage sampling procedure was adopted after which a two groups simple randomized experimental design was used for this study; it was carried out in two Local Government Areas using three stages, namely, pre-intervention, intervention, and post-intervention stages. The study population comprised of about three hundred food vendors from which a sample size of one hundred and sixteen (116) were drawn. The questionnaire were administered using interviewed administered questionnaire approach, data were analyzed using the IBM Statistical Package for Services Solutions (SPSS) version 22. Most of the respondents 35 (30.2%) fall within age range 41 – 50 years of age. Majority 106 (91.4%) were females, most 98 (84.5%) of the respondents were Yoruba. Most 55 (47.4%) of the respondents has senior secondary certificate. Most 41 (33.3%) of the respondents have been vending for between 5-10years. Majority 112 (96.6%) of the respondents were aware of the cholera infection and the major sources of their information's were radio 81(72.3%) at (χ 2 = 10.036, P = 0.002) and television 68 (60.7%) at (χ 2 = 5.390, P = 0.014). Forty five 45 (80.4%) of the respondents believed that drinking contaminated water and 40 (71.4%) believed that consuming contaminated food were routes of cholera infection transmission. Majority 81 (72.2%) at (χ 2= 7.862, p= 0.020) of the respondents practiced though food cooking when cholera is suspected, most 86 (76.8) at (χ 2= 16.643, p= 0.001) of the respondents will wash vegetables very well when cholera is suspected. 81 (72.3 %) at (χ 2 = 1.137, p= 0.566) said that when they suspect cholera they wash their hands with soap and .water which was statistically not significant. Forty four (75.9%) of the respondents in the control and 36 (62.1%) of the respondents in the study group were of the opinion that ORS helps in the prevention of cholera infection.***

***Index Terms-*** ***Cholera, factors, prevention practices, food vendors, Osogbo metropolis***

## I. INTRODUCTION

The prevention and control of cholera can be accomplished by the provision of safe drinking water, improving sanitation, food hygiene, personal cleanliness, and clinical case management. To stop cholera from spreading during outbreaks, an oral cholera vaccine has been developed and implemented (Olu et al., 2023). Eighty percent of cases of cholera are mild and asymptomatic, with an incubation period varying from two hours to five days. The spread of cholera can be stopped by early discovery, confirmation, and proper action (Fagbamila et al., 2023). The route of transmission is the fecal-oral route; cholera outbreaks are mainly caused by internal displacement caused by natural and man-made calamities, which results in unstable living conditions (Dan-Nwafor et al., 2019).

An estimated 28,000 to 150,000 people die from cholera each year, and there are 3 to 5 million cases worldwide. However, emerging nations with high human poverty indices in the tropics and subtropics are more likely to contract the illness. In South and Central America, Africa, and portions of Asia and the Middle East, cholera is endemic. Recurrent cholera epidemics with high case-fatality rates and a significant disease burden have occurred throughout Africa (Dan-Nwafor et al., 2019). Cholera is prevalent in Nigeria, according to historical statistics, with significant outbreaks occurring since 1970, including significant ones in 1991, 1999, 2010, 2018, and 2024 (Eneh et al., 2024). Vibrio cholerae the causative organism is a facultative anaerobic, comma-shaped, motile, non-spore-forming Gram-negative rod that is a member of the Vibrionaceae family. The bacteria was isolated from both fresh and saltwater due to its capacity to withstand elevated concentrations of sodium chloride (Willey et al. 2014). Bivalves, protozoa, water birds, animals with chitin exoskeletons, aquatic plants, and abiotic substrates like sediments have all been linked to V. cholerae in water bodies. (Salako et al., 2021). Vibrio cholerae is divided into over 200 distinct serogroups based on the structure of the O antigen in lipopolysaccharide. Two of these serogroups, O1 and O139, are linked to pandemic and epidemic cholera in humans.

Cholera was responsible for ninety-five thousand (95,000) fatalities, and 2.9 million cases are estimated to occur each year in 69 endemic nations globally. In 69 endemic nations, cholera poses a threat to one billion and three hundred thousand people, and each year, around 7.50 deaths per 100,000 people are in danger of dying from the disease (Nasr et al., 2024). The case fatality ratio (CFR) in Africa has persistently surpassed the recommended 1% by the WHO, averaging 2.2% annually and affecting an average of 23 different countries (Amisu et al., 2024).

The WHO African region recorded, on average, 28 cholera outbreaks per year since 2000, with an average of 113,632 cases per year and 2,633 deaths every year. A total of 2,727172 cases and 63182 deaths were recorded from 2000 to 2023, an average case fatality rate (CFR) of 2.3%. (Koua et al., 2025). About 1.7 million cases of cholera are reported each year, putting an estimated 550 million people in sub-Saharan Africa (SSA) in danger. (Zerbo et al., 2020). In Nigeria, cholera was first notified in December 1970, which led to an epidemic of 22,931 cases and 2,945 deaths with intermittent outbreaks occurring since then (Asaolu and Abiona, 2024). By September 29, 2024, 36 states in Nigeria had reported 10,837 suspected cases, with 359 deaths (CFR 3.3%) and under five years old were most impacted by suspected cases. As of September 2024, Osun State had reported 49 cholera cases, with no deaths reported and a CFR of 0% (N. C. D. C 2024).

The second main way that cholera is spread is through contaminated food in homes or markets, which is why this study on food vendors was conducted. This includes unclean fruits and vegetables, leftover rice, and street vendors' meals and drinks. Throughout the developing world, street vendors sell food and drinks that are a staple of urban life. These items are frequently prepared in unsanitary ways and then kept at room temperature for hours, allowing bacteria to multiply quickly. Selling homemade frozen drinks and using dangerous ice to freeze drinks were two more issues with food and drinks from street sellers. V. cholerae O1 grows very well in leftover rice. Different from other foodborne processes, cholera can spread through seafood, which is a third main route (Coast, 1995).

Cholera is a dangerous diarrhoeal disease that can be lethal, particularly in places with inadequate sanitation and little access to medical care. Outbreaks of foodborne cholera have the potential to overwhelm healthcare systems and impact huge populations due to their fast spread. To prevent extensive outbreaks and lessen the disease's burden, research on cholera among food vendors is crucial for detecting and reducing risks. The study assessed the factors that affects cholera infection prevention among the food vendors in Osogbo metropolis. In essence, studies on cholera among food vendors in Nigeria are vital for protecting public health, preventing outbreaks, and promoting safer food practices within the community. (Nneoma, 2024).

## II. METHODOLOGY

The study was conducted in Osogbo metropolis which is headquarter of Osun State South-Western Nigeria. Osogbo metropolis is made up of three local Government areas; Osogbo Local Government Area (located in the Oke-Baale area of the city), the Olorunda Local Government Area (located in the Igbonna area of the city), and portions of the Egbedore Local Government Area. The study employed an experimental study design (Two groups simple randomized experimental design was used for this study); it was carried out in three stages, namely, pre-intervention, intervention, and post-intervention stages among Food vendors in Osogbo metropolis between the ages of 21-60 years. They were identified through their various LGA Waste Environmental and sanitation (WES) department, a department in charge of food inspection and environmental sanitation and multi-stage sampling method was used for this study due to the large size of the study area.

Stage 1: Two out of the 3 LGAs that makes up Osogbo metropolis were selected using a simple random sampling method by balloting.

Stage 2: One of the LGAs were selected from two of the LGAs selected in stage 1, using a simple random sampling method by balloting as the study LGA, while the second LGA was the control LGA.

Equal allocation of samples were carried out, half of the sample size was allocated to the study group while remaining half was allocated to the control group.

Stage 3: Two-thirds of the wards were selected from the list of the wards in the study LGA and Control LGA using a simple random sampling method by balloting.

Stage 4: Two streets were selected from the list of the wards selected in stage 3 above for both study and control groups using simple random sampling by balloting.

Stage 5: Ten food vendor shops/outlets were selected using simple random sampling by balloting from the list of food vendors shops/outlet on each streets selected in stage 4.

Stage 6: Eligible respondents were selected using simple random sampling by balloting from the list of food vendors in the food vendors shops/outlet selected in stage 5 above.

The sample size was calculated using the Leslie-Kish formula and estimated sample size was one hundred and sixteen (116). Ethical clearance certificates were obtained from both the Adeleke University ethical review committee with the number (AUERC/2025/33PH/28) and the Osun State Ministry of Health (OSHREC/PRS/569T/1154). Individual consents to participate in the study were obtained before the study was carried out.

Research assistants were recruited from Osun State University Teaching Hospital, Osogbo, among the residents' doctors in the department of community medicine. It also included the nurses, CHEW, medical students, and nursing students from the same institution. The training took place in the department of community medicine and lasted three days between the hours of 10am and 1pm. The training includes an overview of the topic, aim, and specific objectives of the study, and ethics of research. Using a sample of the questionnaire, a detailed explanation of each question was made, and confidentiality and privacy of the study was emphasized. An understanding of the survey procedure, methodology, and coordination of the project, logistics, and standardization of the process was emphasized during the training. Training methods includes lectures, group discussion, simulation, and role play. After the pre-test of the questionnaire, a one-day refresher training was done to consider the changes that were made to the questionnaire.

The study questionnaire was an interviewer-administered and research assistant helped in data collections. Socio-demographic characteristics was assessed based on the questionnaire. The variables were expressed in proportions and percentages, and the study and control respondents were compared using chi-square. Continuous variables were expressed as means. Associations with cholera prevention was assessed for statistical significance. Completed questionnaires were sorted, the data was clean, and thereafter carefully entered into a

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computer using Epidata software. The information obtained were analyzed using the IBM Statistical Package for Service Solutions (SPSS) version 22, analysis includes both univariate and bivariate.

## III. RESULTS

One hundred and sixteen participants were enrolled from two Local Government Areas of Osogbo metropolis. Data were collected from the two LGAs at pre-intervention phase. Health education intervention was conducted at the study LGA while the health education intervention at the control LGA was delayed until after post intervention data were collected. Post intervention data were collected from both study and control LGA 24 weeks after health education intervention on the study LGA only.

1. Respondents Socio-demographic characteristics

Most of the respondents 35 (30.2%) fall within age range 41 – 50 years of age. Majority 106 (91.4%) were females, most 98 (84.5%) of the respondents were Yoruba, while majority 73 (62.9%) of the respondents practice Christianity as a religion. Some 55 (47.4%) of the respondents has senior secondary certificate. Some 41 (33.3%) of the respondents have been vending for between 5-10years.

Table 1: Frequency distribution and Chi square values of the Socio-demographic characteristics of respondents

| Variable | Control Group | | Study Group | | Total | | Statistics |
|---|---|---|---|---|---|---|---|
| | Freq (n=58) | % | Freq (n=58) | % | Freq | % | |
| Age group | | | | | | | |
| 21-30 years | 12 | 20.7 | 14 | 24.1 | 26 | 22.4 | $\chi^2$ =1.261 |
| 31-40 years | 15 | 25.9 | 16 | 27.6 | 31 | 26.7 | *p* =0.868 |
| 41-50 years | 18 | 31.0 | 17 | 29.3 | 35 | 30.2 | |
| 51-60 years | 13 | 23.4 | 11 | 18.9 | 24 | 20.6 | |
| Gender | | | | | | | |
| Male | 5 | 8.6 | 5 | 8.6 | 10 | 8.6 | $\chi^2$ =<0.001 |
| Female | 53 | 91.4 | 53 | 91.4 | 106 | 91.4 | *p* =1.000 |
| Ethnicity | | | | | | | |
| Yoruba | 49 | 84.5 | 49 | 84.5 | 98 | 84.5 | $\chi^2$ =5.545 |
| Igbo | 7 | 12.1 | 7 | 12.1 | 14 | 12.1 | *p* =0.136 |
| Others | 0 | 0.0 | 2 | 3.4 | 2 | 1.7 | |
| Benue | 2 | 3.4 | 0 | 0.0 | 2 | 1.7 | |
| Religion | | | | | | | |
| Christianity | 41 | 70.7 | 32 | 55.2 | 73 | 62.9 | $\chi^2$ =2.993 |
| Islam | 17 | 29.3 | 26 | 44.8 | 43 | 37.1 | *p* =0.084 |
| Highest level of Education | | | | | | | |
| No formal education | 7 | 12.1 | 8 | 13.8 | 15 | 12.9 | $\chi^2$ =8.569 |
| Primary | 13 | 22.4 | 11 | 19.0 | 24 | 20.7 | *p* =0.101 |
| Junior Second | 4 | 6.9 | 9 | 15.5 | 13 | 11.2 | |
| Senior Second, | 26 | 44.8 | 29 | 50.0 | 55 | 47.4 | |
| Tertiary | 8 | 13.8 | 1 | 1.7 | 9 | 7.8 | |
| Duration vending business | | | | | | | |
| Less than 5 | 12 | 20.7 | 15 | 25.9 | 27 | 23.3 | X 2=1.220 |
| 5-10 | 22 | 37.9 | 19 | 32.8 | 41 | 35.3 | *p* =0.875 |
| 10-15 | 8 | 13.8 | 8 | 13.8 | 16 | 13.8 | |
| 15-20 | 5 | 8.6 | 3 | 5.2 | 8 | 6.9 | |
| More than 20 | 11 | 19.0 | 13 | 22.4 | 24 | 20.7 | |

2. Practice of respondents at baseline towards cholera infection

Majority 91 (81.3%) at ($\chi2 = 13.34$, p= 0.001) of the respondents covers there food from flies as a way to protect them from cholera, 98 (87.5%) at ($\chi2 = 5.224$, p= 0.022) of respondents wash their hands before handling food in protecting themselves from cholera infection. Majority 88 (78.6%) at ($\chi2 = 7.79$, p= 0.010) of the respondents said the prevent cholera by appropriate toilet usage.

Thirty eight (67.9%) of the respondents in the control group and 35 (62.5%) of the respondents in the study group preserved their food in the refrigerator, also 29 (51.8%) of the respondents in the control group and 18 (32.1%) of the respondents in the study group disposes their refuse by open dumping. Forty two (75.0%) of the respondents in the control and 38 (67.9%) of the respondents in the study group said they will go to the hospital if the suspect cholera infection.

Forty-five (80.4%) of the respondents in the control and 36 (64.35%) of the respondents in the study group will store water in clean container when they suspect cholera. Furthermore, 31 (55.4%) of the respondents in the control group and 25 (44.6%) of the respondents in the study group will stop eating in the public places when they suspect cholera.

Table 2. Respondents' baseline practices towards cholera infection prevention

| Variable | Control | | Study Group | | Total | | Statistics |
|---|---|---|---|---|---|---|---|
| | Freq (n=58) | % | Freq (n=58) | % | Freq | % | |
| Food preservation | | | | | | | |
| Fridge | 38 | 67.9 | 35 | 62.5 | 73 | 65.2 | $\chi^2$ =3.155 |
| Salting | 10 | 17.9 | 12 | 21.4 | 22 | 19.6 | *p*=0.532 |
| Sundry | 7 | 12.5 | 6 | 10.7 | 13 | 11.6 | |
| Canning | 0 | 0.0 | 2 | 3.6 | 2 | 1.8 | |
| Bottling | 1 | 1.8 | 1 | 1.8 | 2 | 1.8 | |
| Methods of waste disposal | | | | | | | |
| Wastebin | 22 | 39.3 | 33 | 58.9 | 55 | 49.1 | $\chi^2$ =4.774 |
| Open dump | 29 | 51.8 | 18 | 32.1 | 47 | 42.0 | *p*=0.092 |
| Burning | 5 | 8.9 | 5 | 8.9 | 10 | 8.9 | |
| Flies protection | | | | | | | |
| Cover the food | 39 | 69.6 | 52 | 92.9 | 91 | 81.3 | $\chi^2$ =13.340 |
| Window net | 5 | 8.9 | 3 | 5.4 | 8 | 7.1 | *p*=0.001 |
| Insecticulator | 12 | 21.4 | 1 | 1.8 | 13 | 11.6 | |
| Hands washing when handling food | | | | | | | |
| Yes | 53 | 94.6 | 45 | 80.4 | 98 | 87.5 | $\chi^2$ =5.224 |
| No | 3 | 5.4 | 11 | 19.6 | 14 | 12.5 | *p*=0.022 |
| Action taken when cholera infection is suspected | | | | | | | |
| Go to hospital | | | | | | | |
| Yes | 42 | 75.0 | 38 | 67.9 | 80 | 71.4 | $\chi^2$ =0.704 |
| No | 11 | 19.6 | 14 | 25.0 | 25 | 22.3 | *p* =0.703 |
| Don't know | 3 | 5.4 | 4 | 7.1 | 7 | 6.3 | |
| Prayer | | | | | | | |
| Yes | 20 | 35.7 | 19 | 33.9 | 39 | 34.8 | $\chi^2$ =0.785 |
| No | 31 | 55.4 | 29 | 51.8 | 60 | 53.6 | *p*=0.675 |
| Don't know | 5 | 8.9 | 8 | 14.3 | 13 | 11.6 | |
| Seek traditional medicine | | | | | | | |
| Yes | 8 | 14.3 | 14 | 25.0 | 22 | 19.6 | $\chi^2$ =2.136 |
| No | 39 | 69.6 | 33 | 58.9 | 72 | 64.3 | *p*=0.344 |
| Don't know | 9 | 16.1 | 9 | 16.1 | 18 | 16.1 | |
| Consume OTC | | | | | | | |
| Yes | 10 | 17.9 | 21 | 37.5 | 31 | 27.7 | $\chi^2$ =5.824 |
| No | 37 | 66.1 | 26 | 46.4 | 63 | 56.3 | *p*=0.054 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Don't know | 9 | 16.1 | 9 | 16.1 | 18 | 16.1 | |
| Use of toilets properly | | | | | | | |
| Yes | 50 | 89.3 | 38 | 67.9 | 88 | 78.6 | $\chi^2$=9.79 |
| No | 2 | 3.6 | 12 | 21.4 | 14 | 12.5 | *p*=0.010 |
| Don't know | 4 | 7.1 | 6 | 10.7 | 10 | 8.9 | |
| Always wash your hands with soap and water | | | | | | | |
| Yes | 41 | 73.2 | 37 | 66.1 | 78 | 69.6 | $\chi^2$=1.538 |
| No | 11 | 19.6 | 11 | 19.6 | 22 | 19.6 | *p*=0.463 |
| Don't know | 4 | 7.1 | 8 | 14.3 | 12 | 10.7 | |
| Drink chlorinated water or boiling water only | | | | | | | |
| Yes | 32 | 57.1 | 26 | 46.4 | 58 | 51.8 | $\chi^2$ =1.291 |
| No | 13 | 23.2 | 16 | 28.6 | 29 | 25.9 | *p*=0.524 |
| Don't know | 11 | 19.6 | 14 | 25.0 | 25 | 22.3 | |
| Appropriate disposal of refuse | | | | | | | |
| Yes | 39 | 69.6 | 34 | 60.7 | 73 | 65.2 | $\chi^2$ =1.386 |
| No | 11 | 19.6 | 12 | 21.4 | 23 | 20.5 | *p*=0.500 |
| Don't know | 6 | 10.7 | 10 | 17.9 | 16 | 14.3 | |
| Store water in clean and airtight bottles | | | | | | | |
| Yes | 45 | 80.4 | 36 | 64.3 | 81 | 72.3 | $\chi^2$ =4.168 |
| No | 6 | 10.7 | 8 | 14.3 | 14 | 12.5 | *p*=0.124 |
| Don't know | 5 | 8.9 | 12 | 21.4 | 17 | 15.2 | |
| Stop eating foods from public places | | | | | | | |
| Yes | 31 | 55.4 | 25 | 44.6 | 56 | 50.0 | $\chi^2$ =1.330 |
| No | 13 | 23.2 | 17 | 30.4 | 30 | 26.8 | *p*=0.514 |
| Don't know | 12 | 21.4 | 14 | 25.0 | 26 | 23.2 | |

Factors that can help to prevent cholera infection among respondents

Majority 91 (81.3%) at ($\chi$ 2 = 9.175, p = 0.010) at of the respondents believed that cholera can be prevented with soap, 69 (61.6%) at ($\chi$ 2= 17.741, p = 0.001) believed Oral rehydration solution can prevent cholera infection. Seventy seven (68.8%) at ($\chi$ 2 = 12.136, p= 0.002) of the respondents believed that oral information can help in cholera infection. Fifty one 91.1% of the respondents in the control group and 40 (71.4%) of the respondents in the study group were of the opinion that soap can prevent cholera infection and 44 (78.6%) of respondents in the control group and 25 (44.6%) of the respondents in the study group were of the opinion that ORS is one of the factors that help to prevent cholera infection. Forty five (80.4%) of the respondents in the control group and 32 (57.1%) of the respondents in the study

group were of the opinion that Health education can help to prevent cholera infection.

Table 3: Factors that can help to prevent cholera infection among respondents

| Variable | Control | | Study Group | | Total | | Statistics |
|---|---|---|---|---|---|---|---|
| | Freq (n=58) | % | Freq (n=58) | % | Freq | % | |
| Items that helps in cholera prevention | | | | | | | |
| Yes | 41 | 73.2 | 34 | 60.7 | 75 | 67.0 | $\chi^2$ =10.951 |
| No | 4 | 7.1 | 17 | 30.4 | 21 | 18.8 | *p*=0.004 |
| Don't know | 11 | 19.6 | 5 | 8.9 | 16 | 14.3 | |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Soap | | | | | | | |
| Yes | 51 | 91.1 | 40 | 71.4 | 91 | 81.3 | $\chi^2$ =9.175 |
| No | 5 | 8.9 | 13 | 23.2 | 18 | 16.1 | *p*=0.010 |
| Don't know | 0 | 0.0 | 3 | 5.4 | 3 | 2.7 | |
| Oral rehydration solution | | | | | | | |
| Yes | 44 | 78.6 | 25 | 44.6 | 69 | 61.6 | $\chi^2$ =17.741 |
| No | 2 | 3.6 | 17 | 30.4 | 19 | 17.0 | *p*<0.001 |
| Don't know | 10 | 17.9 | 14 | 25.0 | 24 | 21.4 | |
| Aqua tablets | | | | | | | |
| Yes | 49 | 87.5 | 17 | 30.4 | 66 | 58.9 | $\chi^2$ =37.818 |
| No | 3 | 5.4 | 19 | 33.9 | 22 | 19.6 | *p*<0.001 |
| Don't know | 4 | 7.1 | 20 | 35.7 | 24 | 21.4 | |
| Health education | | | | | | | |
| Yes | 45 | 80.4 | 32 | 57.1 | 77 | 68.8 | $\chi^2$ =12.136 |
| No | 2 | 3.6 | 15 | 26.8 | 17 | 15.2 | *p*=0.002 |
| Don't know | 9 | 16.1 | 9 | 16.1 | 18 | 16.1 | |
| Print material (brochures, pamphlets, posters) | | | | | | | |
| Yes | 40 | 71.4 | 25 | 44.6 | 65 | 58.0 | $\chi^2$ =11.663 |
| No | 4 | 7.1 | 17 | 30.4 | 21 | 18.8 | *p*=0.003 |
| Don't know | 12 | 21.4 | 14 | 25.0 | 26 | 23.2 | |
| Others | | | | | | | |
| Yes | 1 | 1.8 | 0 | 0.0 | 1 | 0.9 | $\chi^2$ =4.419 |
| No | 6 | 10.7 | 13 | 23.2 | 19 | 17.0 | *p*=0.110 |
| Don't know | 49 | 87.5 | 43 | 76.8 | 92 | 82.1 | |

Summarized Cholera Prevention Practices among respondents

Moat 75 (64.66%) of the respondents have good practice towards cholera prevention practices. Forty (53.3%) of the respondents in the control group have good practice while 35 (46.7%) of the respondents in the study group have good practice towards cholera prevention.

Table 4: Respondents summarized cholera prevention practices

| Variable | Control | | Study Group | | Total | | Statistics |
|---|---|---|---|---|---|---|---|
| | Freq (n=58) | % | Freq (n=58) | % | | % | |
| Good practice | 40 | | 53,3 | 35 | 46.7 | 75 | 100 |
| Poor practice | 18 | | 43.9 | 23 | 56.1 | 41 | 100 |

Association between socio-demographic characteristics and summarized practices among respondents

The relationship between age and practice was not statistically significant at ($\chi2$ = 1.724, p= 0.632), also the relationship between gender and practice was not statistically significant at ($\chi2$= 0.883, p = 0.347). Relationship between ethnicity and practice was not statistically significant at ($\chi2$= 3.248, p= 0.197). The relationship between religion and practices of cholera prevention were not significant ($\chi2$ = 0.028, p= 0.867). The relationship between level of education and practices of cholera infection was not statistically significant

Table 5: Association between socio-demographic characteristics and practices among respondents

| Variable | Good practice | | Poor practice | | Total | | Statistics |
|---|---|---|---|---|---|---|---|
| | Freq (n=35) | % | Freq (n=23) | % | Freq | % | |
| Age group | | | | | | | |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 21-30 years | 10 | 28.6 | 4 | 17.4 | 14 | 24.1 | $\chi^2$ =1.724 |
| 31-40 years | 8 | 22.9 | 8 | 34.8 | 16 | 27.6 | *p*=0.632 |
| 41-50 years | 11 | 31.4 | 6 | 26.1 | 6 | 29.3 | |
| 51-60 years | 6 | 17.1 | 5 | 21.7 | 5 | 19.0 | |
| Gender | | | | | | | |
| Male | 4 | 11.4 | 1 | 4.3 | 5 | 8.6 | $\chi^2$ =0.883 |
| Female | 31 | 88.6 | 22 | 95.7 | 53 | 91.4 | *p*=0.347 |
| Ethnicity | | | | | | | |
| Yoruba | 31 | 88.6 | 18 | 78.3 | 49 | 84.5 | $\chi^2$ =3.248 |
| Igbo | 4 | 11.4 | 3 | 13.0 | 7 | 12.1 | *p*=0.197 |
| Others | 0 | 0.0 | 2 | 8.7 | 2 | 3.4 | |
| Religion | | | | | | | |
| Christianity | 19 | 54.3 | 13 | 56.5 | 32 | 55.2 | $\chi^2$ =0.028 |
| Islam | 16 | 45.7 | 10 | 43.5 | 26 | 44.8 | *p*=0.867 |
| Highest level of Education | | | | | | | |
| No formal education | 5 | 14.3 | 3 | 13.0 | 8 | 13.8 | $\chi^2$ =3.791 |
| Primary | 7 | 20.0 | 4 | 17.4 | 11 | 19.0 | *p*=0.435 |
| Junior Secondary School | 3 | 8.6 | 6 | 26.1 | 9 | 15.5 | |
| Senior Secondary School | 19 | 54.3 | 10 | 43.5 | 29 | 50.0 | |
| Tertiary | 1 | 2.9 | 0 | 0.0 | 1 | 1.7 | |

Practices on steps to take when cholera infection is suspected among respondents

Majority 81 (72.2%) at ($\chi$ 2= 7.862, p= 0.020) of the respondents practiced though food cooking when cholera is suspected, most 86 (76.8) at ($\chi$ 2= 16.643, p= 0.001) of the respondents will wash vegetables very well when cholera is suspected. 81 (72.3 %) at ($\chi$ 2 = 1.137, p= 0.566) said that when they suspect cholera they wash their hands with soap and .water which was statistically not significant.

Forty three (76.85%) of the respondents in the study group and 38 (67.95%) of the respondents in the study group will wash their hands with soap and water when the suspect cholera infection. Forty six (82.1%) of the respondents in the control and 35 (62.5%) of the respondents in the study group will cook food thoroughly when they suspect cholera infection. Moreover, 49 (87.5%) of the respondents in the control and 32 (57.1%) of the respondents in the study group will clean cooking utensils as a step when they suspect cholera infection. Forty five (82.1%) of the respondents in the control and 16 (28.6%) of the respondents in the study group will take cholera vaccine when cholera is suspected.

Table 6: Practices on steps to take when cholera infection is suspected among respondents

| Variable | Control | | Study Group | | Total | | Statistics |
|---|---|---|---|---|---|---|---|
| | Freq (n=58) | % | Freq (n=58) | % | Freq | % | |
| Wash your hands with soap and water before handling food | | | | | | | |
| Yes | 43 | 76.8 | 38 | 67.9 | 81 | 72.3 | $\chi^2$ =1.137 |
| No | 9 | 16.1 | 12 | 21.4 | 21 | 18.8 | *p*=0.566 |
| don't know | 4 | 7.1 | 6 | 10.7 | 10 | 8.9 | |
| Cook food thoroughly | | | | | | | |
| Yes | 46 | 82.1 | 35 | 62.5 | 81 | 72.2 | $\chi^2$ =7.862 |
| No | 4 | 7.1 | 15 | 26.8 | 19 | 17.0 | *p*=0.020 |
| Don't know | 6 | 10.7 | 6 | 10.7 | 12 | 10.7 | |
| Wash vegetables | | | | | | | |
| Yes | 51 | 91.1 | 35 | 62.5 | 86 | 76.8 | $\chi^2$ =15.643 |
| No | 0 | 0.0 | 11 | 19.6 | 11 | 9.8 | *p*<0.001 |
| Don't know | 5 | 8.9 | 10 | 17.9 | 15 | 13.4 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Appropriate refuse disposal | | | | | | | |
| Yes | 47 | 83.9 | 30 | 53.6 | 77 | 68.8 | $\chi^2$ =16.477 |
| No | 1 | 1.8 | 15 | 26.8 | 16 | 14.3 | $p$<0.001 |
| Don't know | 8 | 14.3 | 11 | 19.6 | 19 | 17.0 | |
| Appropriate sewage disposal | | | | | | | |
| Yes | 53 | 94.6 | 31 | 55.4 | 84 | 75.0 | $\chi^2$ =23.136 |
| No | 1 | 1.8 | 12 | 21.4 | 13 | 11.6 | $p$<0.001 |
| Don't know | 2 | 3.6 | 13 | 23.2 | 15 | 13.4 | |
| | | | | | | | |
| Disposal of human waste | | | | | | | |
| Yes | 50 | 89.3 | 28 | 50.0 | 78 | 69.6 | $\chi^2$ = 20.640 |
| No | 2 | 3.6 | 13 | 23.2 | 15 | 13.4 | $p$ <0.001 |
| Don't know | 4 | 7.1 | 15 | 26.8 | 19 | 17.0 | |
| Boil water before drinking | | | | | | | |
| Yes | 47 | 83.9 | 28 | 50.0 | 75 | 67.0 | $\chi^2$ =19.900 |
| No | 0 | 0.0 | 14 | 25.0 | 14 | 12.5 | $P$ <0.001 |
| Don't know | 9 | 16.1 | 14 | 25.0 | 23 | 20.5 | |
| Clean cooking utensils | | | | | | | |
| Yes | 49 | 87.5 | 32 | 57.1 | 81 | 72.3 | $\chi^2$ =13.885 |
| No | 2 | 3.6 | 13 | 23.2 | 15 | 13.4 | $p$ =0.001 |
| Don't know | 5 | 8.9 | 11 | 19.6 | 16 | 14.3 | |
| Treat water with chlorine products | | | | | | | |
| Yes | 46 | 82.1 | 25 | 44.6 | 71 | 63.4 | $\chi^2$ =17.459 |
| No | 4 | 7.1 | 17 | 30.4 | 21 | 18.8 | $p$ <0.001 |
| Don't know | 6 | 10.7 | 14 | 25.0 | 20 | 17.9 | |
| Keep food away from flies | | | | | | | |
| Yes | 50 | 89.3 | 32 | 57.1 | 82 | 73.2 | $\chi^2$ =19.551 |
| No | 0 | 0.0 | 15 | 26.8 | 15 | 13.4 | $p$ <0.001 |
| Don't know | 6 | 10.7 | 9 | 16.1 | 15 | 13.4 | |
| Cholera vaccine | | | | | | | |
| Yes | 46 | 82.1 | 16 | 28.6 | 62 | 55.4 | $\chi^2$ =32.989 |
| No | 3 | 5.4 | 18 | 32.1 | 21 | 18.8 | $p$ <0.001 |
| Don't know | 7 | 12.5 | 22 | 39.3 | 29 | 25.9 | |
| Others | | | | | | | |
| Yes | 2 | 3.6 | 3 | 5.4 | 5 | 4.5 | $\chi^2$ =1.457 |
| No | 9 | 16.1 | 5 | 8.9 | 14 | 12.5 | $p$ =0.483 |
| Don't know | 45 | 80.4 | 48 | 85.7 | 93 | 83.0 | |

Factors that affects cholera infection prevention among respondents

Forty (69.0%) of the respondents in the control and 47 (81.0%) of the respondents in the study group were of opinion that chlorine solution in water will help in prevention of cholera infection also 50 (88.2%) of the respondents in the control and 51 (87.9%) of the respondents in the study group were of opinion that soap detergents helps in cholera infection prevention.

Forty four (75.9%) of the respondents in the control and 36 (62.1%) of the respondents in the study group were of the opinion that ORS helps in the prevention of cholera infection and 45 (77.6%) of the respondents in the control group and 36 (62.1%) of the respondents in the study group were of opinion that drugs for treatment helps to prevent cholera infection.

Table 7: Factors that affects cholera infection prevention among respondents

| Variable | Control | Study Group | Total | Statistics |
|---|---|---|---|---|

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| | Freq (n=58) | % | Freq (n=58) | % | Freq | % | |
|---|---|---|---|---|---|---|---|
| Factors that affects cholera infection | | | | | | | |
| Chlorine solution | | | | | | | |
| Yes | 40 | 69.0 | 47 | 81.0 | 87 | 75.0 | $\chi^2$ =2.890 |
| No | 7 | 12.1 | 6 | 10.3 | 13 | 11.2 | *p*=0.236 |
| Don't know | 11 | 19.0 | 5 | 8.6 | 16 | 13.8 | |
| Soap | | | | | | | |
| Yes | 50 | 86.2 | 51 | 87.9 | 101 | 87.1 | $\chi^2$ =1828 |
| No | 7 | 12.1 | 4 | 6.9 | 11 | 9.5 | *p*=0.401 |
| Don't know | 1 | 1.7 | 3 | 5.2 | 4 | 3.4 | |
| Oral rehydration solution | | | | | | | |
| Yes | 44 | 75.9 | 36 | 62.1 | 80 | 69.0 | $\chi^2$ =2.670 |
| No | 5 | 8.6 | 9 | 15.5 | 14 | 12.1 | *p*=0.263 |
| Don't know | 9 | 15.5 | 13 | 22.4 | 22 | 19.0 | |
| Use of tablets | | | | | | | |
| Yes | 45 | 77.6 | 36 | 62.1 | 81 | 69.8 | $\chi^2$ =4.267 |
| No | 7 | 12.1 | 8 | 13.8 | 15 | 12.9 | *p*=0.118 |
| Don't know | 6 | 10.3 | 14 | 24.1 | 20 | 17.2 | |
| Oral information | | | | | | | |
| Yes | 44 | 75.9 | 40 | 69.0 | 84 | 72.4 | $\chi^2$ =0.925 |
| No | 5 | 8.6 | 8 | 13.8 | 13 | 11.2 | *p*=0.626 |
| Don't know | 9 | 15.5 | 10 | 17.2 | 19 | 16.4 | |
| Print material (brochures, pamphlets, posters) | | | | | | | |
| Yes | 40 | 69.0 | 32 | 55.2 | 72 | 62.1 | $\chi^2$ =3.798 |
| No | 7 | 12.1 | 15 | 25.9 | 22 | 19.0 | *p*=0.150 |
| Don't know | 11 | 19.0 | 11 | 19.0 | 22 | 19.0 | |
| Others | | | | | | | |
| Yes | 1 | 1.7 | 13 | 22.4 | 14 | 12.1 | $\chi^2$ =15.156 |
| No | 6 | 10.3 | 11 | 19.0 | 17 | 14.7 | *p*=0.001 |
| Don't know | 51 | 87.9 | 34 | 58.6 | 85 | 73.3 | |

Relationship between Socio-demographic characteristics and summarized practices among the control group

Thirteen (54.2%) of the respondents were in age group 41-50 years and have good association with the practice if cholera infection at ($\chi$2= 10.809, p= 0.013). Twenty one of the respondents were female 87.5% have good practice toward cholera infection at ($\chi$2= 87.5%, p = 0.013). Seventeen (70.8%) of Yoruba have good practice towards cholera infection at ($\chi$2 = 6.324, p = 0.042). Eleven 45.8% of the respondents completed secondary school and have good practice towards cholera infection at ($\chi$2 = 6.344, p = 0.175).

Table 8: Relationship between socio-demographic characteristics and summarized practices among the control group

| Variable | Good practice | | Poor practice | | Total | | Statistics |
|---|---|---|---|---|---|---|---|
| | Freq (n=24) | % | Freq (n=34) | % | Freq | % | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Age group | | | | | | | |
| 21-30 years | 4 | 16.7 | 8 | 23.5 | 12 | 20.7 | $\chi^2$=10.809 |
| 31-40 years | 3 | 12.5 | 12 | 35.3 | 15 | 25.9 | *p*=0.013 |
| 41-50 years | 13 | 54.2 | 5 | 14.7 | 5 | 31.0 | |
| 51-60 years | 4 | 16.7 | 9 | 26.5 | 9 | 22.4 | |
| Gender | | | | | | | |
| Male | 3 | 12.5 | 2 | 5.9 | 5 | 8.6 | $\chi^2$=0.782 |
| Female | 21 | 87.5 | 32 | 94.1 | 53 | 91.4 | *p*=0.376 |
| Ethnicity | | | | | | | |
| Yoruba | 17 | 70.8 | 32 | 94.1 | 49 | 84.5 | $\chi^2$ =6.342 |
| Igbo | 5 | 20.8 | 2 | 5.9 | 7 | 12.1 | *p*=0.042 |
| Others | 2 | 8.3 | 0 | 0.0 | 2 | 3.4 | |
| Religion | | | | | | | |
| Christianity | 18 | 75.0 | 23 | 67.6 | 41 | 70.7 | $\chi^2$ =0.367 |
| Islam | 6 | 25.0 | 11 | 32.4 | 17 | 29.3 | *p*=0.545 |
| Highest level of Education | | | | | | | |
| No formal education | 1 | 4.2 | 6 | 17.6 | 7 | 12.1 | $\chi^2$=6.344 |
| Primary | 5 | 20.8 | 8 | 23.5 | 13 | 22.4 | *p* =0.175 |
| Junior Secondary School | 1 | 4.2 | 3 | 8.8 | 4 | 6.9 | |
| Senior Secondary School | 11 | 45.8 | 15 | 44.1 | 26 | 44.8 | |
| Tertiary | 6 | 25.0 | 2 | 5.9 | 8 | 13.8 | |

Relationship between socio-demographic characteristics and summarized practices of respondents among the study group

Most 14 (32.6%) of the respondents with good practice were between the age 31-40years of age and they were not significant with practice at ($\chi$2 = 2.880, p= 0.411) also forty (93.0%) of the respondents were female and were not statistically significant at ($\chi$2 = 0.570, p= 0.450). Thirty seven (86.0%) were Yoruba with good practices towards cholera infection and was not statistically significant at ($\chi$2= 1.800, p= 0.407). Most 21 48.8% completed secondary school have good practices towards cholera infection and was not statistically significant at ($\chi$2 = 3.948, p= 0.413). Most 22 (51.2%) were Christianity and have good practice on cholera infection prevention and were not statistically significant at ($\chi$2 = 1.0814, p= 0.299).

Table 9: Relationship between socio-demographic characteristics and summarized practices of respondents among the study group

| Variable | Good practice | | Poor practice | | Total | | Statistics |
|---|---|---|---|---|---|---|---|
| | Freq (n=43) | % | Freq (n=15) | % | Freq | % | |
| Age group | | | | | | | |
| 21-30 years | 9 | 20.9 | 5 | 33.3 | 14 | 24.1 | $\chi^2$=2.880 |
| 31-40 years | 14 | 32.6 | 2 | 13.3 | 16 | 13.3 | *p*=0.411 |
| 41-50 years | 13 | 30.2 | 4 | 26.7 | 17 | 29.3 | |
| 51-60 years | 7 | 16.3 | 4 | 26.7 | 11 | 19.0 | |
| Gender | | | | | | | |
| Male | 3 | 7.0 | 2 | 13.3 | 5 | 8.6 | $\chi^2$=0.570 |
| Female | 40 | 93.0 | 13 | 86.7 | 53 | 91.4 | *p*=0.450 |
| Ethnicity | | | | | | | |
| Yoruba | 37 | 86.0 | 12 | 80.0 | 49 | 84.5 | $\chi^2$ =1.800 |
| Igbo | 4 | 9.3 | 3 | 20.0 | 7 | 12.1 | *p*=0.407 |
| Others | 2 | 4.7 | 0 | 0.0 | 2 | 3.4 | |
| Religion | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Christianity | 22 | 51.2 | 10 | 66.7 | 32 | 55.2 | $\chi^2$ =1.081 |
| Islam | 21 | 48.8 | 5 | 33.3 | 26 | 44.8 | *p*=0.299 |
| Levels of Education | | | | | | | |
| No formal education | 6 | 14.0 | 2 | 13.3 | 8 | 13.8 | $\chi^2$ =3.948 |
| Primary | 8 | 18.6 | 3 | 20.0 | 11 | 19.0 | *p*=0.413 |
| Junior Secondary School | 8 | 18.6 | 1 | 6.7 | 9 | 15.5 | |
| Senior Secondary School | 21 | 48.8 | 8 | 53.3 | 29 | 50.0 | |
| Tertiary | 0 | 0.0 | 1 | 6.7 | 1 | 1.7 | |

## IV. DISCUSIONS

Factors that influence cholera prevention strategies in the study group

There is no statistical relationship between the age of the respondents and the cholera prevention strategies, as most were between the ages of 41 and 50 years. In a study by Olaniyi and Ayomaya et al. (2014) on knowledge and practice of food hygiene among food vendors in Ihiagwa, Owerri West Local Government Area, Imo State, less than half of the food vendors were between the ages of 30 and 39 years. There were disparities in the findings which could be due to the differences in the region where the study was carried out. It implies that food vending is embraced at an early age in Owerri.

In a study by Adebayo et al. (2023) on food hygiene practices among food vendors in the Odeda Local Government Area, Ogun State, Nigeria. The mean age was 36.68 ± 9.09 years. Although less than half of the food vendors demonstrated good environmental hygiene practices, the majority of food vendors demonstrated good personal food handling practices. These findings were similar to the study outcome. It could be due to the location of the study, which belongs to the same southwestern region of Nigeria, where there were similarities in culture, religious belief and educational pattern.

There is no significant statistical relationship between the gender of the respondents and the cholera prevention strategies (P = 0.450), and the majority of the respondents were female. In a similar study by Malaeb et al. (2022) on the general public's knowledge, attitude, and practices regarding cholera in Lebanon, the majority of food vendor respondents were female. The study findings were slightly higher than what was reported from Lebanon. This could be due to differences in the continents where the study was carried out. In Nigeria, most especially among the Yoruba, food vending is seen majorly as women's work. The implication is that males are not embracing food vending as a career in Nigeria.

From the study there was no statistical relationship between the ethnicity of the respondents and the cholera prevention strategies (P = 0.407), and the majority of the respondents were Yoruba. In another study by Adebayo et al. (2023), it was reported that the majority of the respondents were Yoruba. This could be due to the fact that both studies were carried out in the southwestern region of Nigeria. The similarities could be due to the same cultural values, religious beliefs and perceptions. The implication is the Yoruba are taking up food vending as a career, and it will reduce unemployment among the Yoruba.

There is no statistical relationship between the religion of the respondents and the cholera prevention strategies (P = 0.299), and most of the respondents were Christian. In a similar study by Adebayo et al. (2023), most of the respondents were Christians; there were similarities because the study was carried out in the same region. It implies that there were slightly more Christians in the food vending business than people of other religious beliefs.

There is no statistical relationship between the education of the respondents and the cholera prevention strategies (P = 0.413), and half of the respondents have senior secondary school education. It was reported by Emmanuel et al. (2019) in their analogous investigation on the sanitary and hygienic standards of street food sellers in Addis Ababa, Ethiopia, that most of the food vendors have elementary school education or have had no formal education. This finding was at variance with the study findings, where half of the respondents have a senior secondary school certificate. The differences

in the findings could be due to the facts that western education is more embraced in Nigeria and primary and junior secondary school are compulsory in Nigeria. It implies that cholera can easily be curtailed in Nigeria because of the higher level of education.

Factors that influence cholera prevention practices strategies in the control group

The ages of the respondents were statistically significant at P = 0.013, which means there is a relationship between age and cholera prevention strategies. Some of the respondents were between the ages of 41 and 50 years. In a similar study by Olaniyi and Ayomaya et al. (2014) on knowledge and practice of food hygiene among food vendors in Ihiagwa, Owerri West Local Government Area, Imo State, less than half of the food vendors were between the ages of 30 and 39 years. The age is slightly lower than the study findings, which could be due to the difference in the area of location in terms of culture and education status. It implies that most people in Owerri start food vending jobs at a younger age.

Also, there was no relationship between gender and cholera prevention strategies among the control group, which was not statistically significant at (P = 0.376), and the majority of the respondents were female. In a report by Emmanuel O.I. et al. (2019), female respondents were the majority in a study on knowledge and practice of food hygiene among food vendors in Ihiagwa, Owerri West Local Government Area, Imo State. The findings from the study were higher than the literature review; this could be due to cultural beliefs among the Yoruba that food vending is female work. It implies that males do not take food vendor as a job.

Ethnicity was statistically significant at P = 0.042, which means there was a relationship between gender and cholera prevention strategies. And the majority were Yoruba. In a study by Adebayo et al. (2023), it was reported that the majority of respondents were Yoruba. The similarities in the findings could be due to the fact that the study was carried out in the same southwestern Nigeria. Both Ogun State and Osun State were similar in culture and tribe. Religion was statistically not significant at P = 0.545, which means there was no statistical relationship between religion and cholera prevention strategies. The majority of the respondents in the control group were Christian. In a similar study, it was reported by Adebayo et al. that more than half of respondents were Christians in their study on Food Hygiene Practices among Food Vendors in Odeda Local Government Area, Ogun State, Nigeria. The differences noted may be due to a predominant religion in the area of study. It implies that more Christians are into the food vending business.

Education was statistically not significant at (P = 0.175), which means there is no relationship between education and cholera prevention strategies, and some had senior secondary school certificates. In a study conducted by Adebayo et al. (2023), it was reported that food vendors lacked formal education, whereas the majority had some kind of education. These findings were similar to the findings from the study where the majority of respondents among the control group have some form of education. The similarities could be due to the same region where the study was carried out. It implies most of the respondents were literate. In case of any outbreak or epidemic of cholera, it will be easy to prevent and curtail.

## V. CONCLUSION

Assess to rightful and adequate information's was identified as a major factor in Cholera prevention, water provision and adequate food preparation and storage was also identified has a major factors in Cholera prevention practices. Major preventing practices identified were treating water with chlorine solution and tablets, hand washing before handling food, cooking food thoroughly, washing fruits and vegetables before consumption, preventing food from flies and appropriate refuse and sewage disposal.

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