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Rivers State's Rural and Urban Parts: Preventing Bacterial Enteric Fever Diseases among Pregnant Women

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Abstract

The preventable disease known as "Bacterial Enteric Fever" is caused by Salmonella paratyphi A&B and Salmonella Typhi (S, Typhi) and is common in West Africa and other low-income regions of the world. This study examined the management and prevention of enteric fever in pregnant women in both rural and urban areas of Rivers State, Nigeria. Enteric fever must be prevented and treated, especially in vulnerable groups such as expecting mothers. Given this, a study was carried out to determine the preventative and control strategies used by pregnant mothers in the rural and urban districts of River State.460 pregnant women (230 from urban and 230 from rural areas) were selected for a cross-sectional study from 24 comprehensive primary health care institutions in Rivers State, Nigeria, using a cluster sample technique. A systematic questionnaire created by the researcher was used to collect the data. Prescriptive and chi square statistics were used for the date analysis, with a significance threshold of 5%. The study found that comparing urban and rural areas, 48.3% of pregnant women in urban areas and 59.4% of those in rural areas had bacterial enteric fever. Hand cleaning before eating (28.7% vs. 30.0%, p = 0…030) and excrement in rivers (36.5% vs. 0%, p= p=<0.1) were also below average. The likelihood that pregnant women between the ages of 32 and 42 will visit herbal doctors (p=0.049) and buy food from street sellers (p-0.021) is higher. Pregnant women with a secondary school diploma were more likely to visit the hospital when unwell (p=0.010). Food purchases from street vendors were more common among unemployed pregnant women (p=0.004). In conclusion, compared to pregnant women in urban regions, those in rural areas are less likely to take precautions against bacterial enteric fever. The implementation of a targeted education program on the prevention of bacterial enteric fever is advocated.

Keywords: Enteric Fever, Pregnant, Women, Health, Blood, Nigeria.

Introduction

In middle-class and lower-class nations around the world, bacterial intestinal illnesses have become a serious public health concern [1]. Typhoid and paratyphoid fevers are included in the category of bacterial enteric fever. Salmonella Typhi (S Typhi) infection causes typhoid fever, while Salmonella Paratyphi A and B cause paratyphoid fever. As to statistics, 76% of all enteric fevers worldwide are caused by S Typhi [2]. Enteric fever is most common in South America, Asia, and Africa [3]. Eating or drinking anything tainted with human excrement can frequently lead to infection with bacteria like Salmonella Typhi and Paratyphi, which can induce enteric fever [4]. In the tropics and subtropics of Africa, Asia, and South America, it is now an endemic illness [5]. An estimated 540 people per 100,000 are affected by it [6]. This translates to around 33.3 million people worldwide who suffer from the illness each year, and roughly 260,000 fatalities in areas where the illness is prevalent [7].Although blood culture is the gold standard for enteric fever diagnosis, clinical microbiology services are sometimes unavailable in some endemic locations, which delays diagnosis [8].In these kinds of places, the antibody titre in the serum is frequently determined using the less accurate Widal test because of this abnormality [9]. When additional logistical impediments like transportation challenges, hospital wait times, and healthcare provider diagnoses are added, vulnerable populations—including expectant mothers—are further disadvantaged.

Age, illness status, poor hygiene, unsanitary settings, and a lack of clean water are some of the demographic and environmental factors that affect the incidence (yearly new cases) of bacterial enteric fever [10]. A number of publications have also mentioned that bacterial enteric fever

incidence in pregnant women has been reported to be greater than desirable in endemic areas. Pregnant women in rural areas may have an incidence as high as 83%, according to estimates, and as high as 62% in recorded cases [11]. According to some experts, the incidence is exacerbated by Salmonella spp. spreading transplacentally to the fetus. This means that medical professionals must continually resolve moral conundrums involving the diagnosis and management of enteric fever in expectant mothers. Because of the aforementioned, enteric fever should be prevented rather than treated, especially in high-risk areas of Africa [12].

Bacterial enteric fever continues to be a major health concern in Nigeria. More than 80% of the Salmonella typhi strains that were recovered were shown to be resistant to many antimicrobial medications [13]. This would suggest that Nigeria's antibiotic security is being threatened by typhoid fever. In addition, the World Health Organization advises vaccination in addition to addressing inadequate environmental conditions, ensuring access to portable, clean water, ensuring food safety, and maintaining proper sanitation and hygiene. However, widespread adoption of bacterial enteric fever immunizations in Nigeria has not been successful. Many pregnant women remain more susceptible to enteric fever as a result of the poor immunization rate, particularly in rural areas. Pregnancy-related infections with Salmonella spp. may result in fatalities like meningitis, septic miscarriage, and fallopian tube inflammation [14]. As a result, Nigeria has documented pregnancy-related mortality from enteric fever [15].

When it comes to gastrointestinal disease prevention, there is a big gap. The steps performed to prevent enteric fever from emerging or occurring are referred to as preventive. Effective preventative and control methods against enteric fever, which affects vulnerable populations like pregnant women, are essential for the development of future public health programs and their targeted implementation. In light of this, it is appropriate to conduct a new study that evaluates the preventative strategies pregnant women employ, as it will significantly advance the body of knowledge already in existence. In light of this, a study of this type that evaluates the prevention of enteric fever in expectant mothers in both urban and rural Rivers State, which is located in Nigeria's Niger Delta, is once again warranted. This groundbreaking research will contribute to closing the current knowledge gap.

Materials and methods

Area for the study

The area of study involved the urban and rural settlements in Rivers States. Rivers State is located within the Niger Delta region of southern Nigeria. It has 24 local government areas namely Abua-Odual, Ahoada East, Ahoada West, Akuku-Toru, Andoni, Asari-Toru, Degema, Bonny, Eleme, Emuohua, Etche, Gokana, Ikwerre, Khana, Obio-Akpor, and Ogba-Egbema-Ndoni. Others include Ogu-Bolo, Okirika, Opobo-Nkoro, Oyigbo, Port Harcourt, Omumma, and Tai. The urban areas in Rivers State include Port Harcourt, Obio-Akpor, Ahoada East, Ahoada West, and Oyigbo. The rural areas include Abua-Odual, Akuku Toru, Andoni, Asari-Toru, Degema, Bonny, Eleme, Emuohua, Etche, Gokana, Ikwerre, Khana, Ogba-Egbema-Ndoni, Ogu-Bolo, Okirika, Opobo-Nkoro, and Tai. Each of the mentioned settlements has at least one Comprehensive Primary Health Centre (CPHC) which offered maternal and child health services. The CPHCs were the sites of contact between the researcher and the respondents. Figure 6 below shows the study area.

Target population for the study

The total population for the study was estimated to be 301,526 pregnant women. It was estimated based on the context that there were 5,198,716 people from the 2006 national census. Rivers State has using a population growth rate of at least 3% per years and a birth rate of 4% (National Population Commission [Nigeria] & ICF, 2019). Using the fore mentioned in 2021, the general population would have grown to 7,538,138 (Using the arithmetic as follows: (5,198,716 x (2021-2006) years x 0.03 population growth rate) + 5,198,716). Since the birth rate is 4%, the researcher assumed that 4% of the estimated population is likely to be pregnant at each single time, hence a target population of 301,526 pregnant women in Rivers State.

Design

A cross-sectional design was applied to compare the enteric fever prevention and control measures among pregnant women in rural and urban areas of River State. A cross-sectional study is a kind of observational research that examines data from variables gathered at one moment in time across a pre-defined sample, population, or subgroup. The study involved a sample of pregnant women carefully selected from the urban and rural areas of Rivers State.

Sample size determination

A sample size of 460 (n = 230 in the urban group and n = 230 in the rural group) was calculated for the study using Bolarinwa's (2020) formula $n = [(Z_{1-\alpha/2}+Z_{1-\beta})^2 \times P(1-P) \div (p1 - p2)]$; Where n = minimum sample size; $Z_{1-\alpha/2}$ = Type 1 error at p < 5% = 1.96; $Z_{1-\beta}$ = power 0.84. P = pooled incidence of enteric fever in pregnant women 63%; p1 = 0.07 and p2 = 0.06 based on pivotal data. Mathematically, $n = [(1.96+0.84)^2 \times 0.63(1-0.63) \div (0.07-0.06)] = 183$. To guard against the high potential fallout rate in prospective cohort study designs the minimum sample size was increased by 20%, using the non-response adjustment formula nf = [n ÷ (1 – attrition)]; hence nf = [14 ÷ (1 – 0.2)] was computed and a sample size of 230 for each arm of the study was obtained, hence a total sample size of 460.

Sampling technique

Cluster sampling by lottery was utilized in the selection of participants for the study. A total of 920 plastic tallies labelled YES and NO were put into a lottery bag. The pregnant women were approached and encouraged to blind-pick from the lottery bag. Those who pick a YES tally were selected for this study and those who picked a NO tally were excluded from the study. The use of cluster sampling provided some benefits. It gave an equal chance of selection to the members of the target population, minimize systematic bias, produce a data set suitable for inferential analysis, and will produce a normally distributed sample that approximates the target population. For the urban resident pregnant women, 46 pregnant women was selected from each of Port Harcourt, Obio-Akpor, Ahoada East, Ahoada West, and Oyigbo (n = 230). For the rural resident pregnant women, 23 pregnant women was selected from each of Degema, Emuohua, Etche, Eleme, Gokana, Ikwerre, Khana, Ogba-Egbema-Ndoni, Okirika, and Andoni (n = 230).

Inclusion criteria

The inclusion criteria for enrolment include:

1. Gestation at 20-41weeks
2. Maternal age between 15 and 49 years

Exclusion criteria

The criteria for exclusion from this study include:

1. Visibly sick at the time of commencing this study
2. Women admitted into a health facility for hospital care
3. Incomplete demographic information

Ethical considerations

An application for ethical approval was obtained from the University Institutional Review Board. Administrative permission was obtained from the Primary Health Care Management Board, the Local Government Councils, and the Community Heads. Participant's responses were kept anonymous throughout the period of data collection. All collected data was protected and used only for the approved academic purpose. The study protocol adhered strictly to the provisions of the Helsinki Declaration.

Procedure for data collection

Data collection was done during antenatal visit. The pregnant women (20-37 weeks gestation) in the Comprehensive Primary Health Centres were briefed on the purpose and procedure of the study. The voluntary nature of the study was also highlighted. The respondents who picked the YES tally in line with the sampling procedure were given the consent form to give their written informed consent. The consenting eligible pregnant women were given the instrument for data collection to fill their responses to section A and B. The respondents were further tested for Enteric fever on the spot by the researcher using the Rapid Test Method and the result of the test was filled in by the pregnant women themselves.

Testing for Enteric fever (Rapid Test Method)

Required tools were one automated lancet device (Accucheck brand produced by Roche Diabetes Care Inc., Indianapolis, Indiana, USA), packs of lancets, packs of disposable plastic sample dropper, a buffer solution, a flat table top, an electronic stop watch, and packs of test cassettes (RAPKIT® Enteric Fever (IgM/IgG) Rapid Test for whole blood/Serum/Plasma produced by Nectar Lifesciences, Chandigarh, India).

An automated lancet device was used to prick the pregnant woman's fingertip. A sample dropper was used to transfer 1 drop (approximately 20µL) of blood onto the sample well of the test cassette that is placed flat on the table top. Then 2 drops (approximately 80 µL) of the buffer solution were put in the sample well on the whole blood sample. The test cassette was allowed to sit for 15 minutes before interpretation of results. The occurrence of one control line and one IgM line was read as positive as it represents a recent enteric fever infection (Shahapur, et al., 2021). The occurrence of one control line, one IgM line, and one IgG line was read as positive as it represents a recent enteric fever infection (Ousenu, et al., 2021). The occurrence of one control line and one IgG line was read negative as it signifies a sustained immune footprint from an infection long ago. The occurrence of one control line only was read as negative. The occurrence of no line at all was read as an invalid test and was redone following the stated procedure.

Statistical analysis

Categorical and discrete-interval data was collected. Categorical data from parity, employment status, level of education, and residence was summarized using descriptive statistical tools such frequency and percentage. Interval data from age was summarized using mean, standard deviation, frequency and percentage. Test of statistical difference (comparison) between groups was done using Fisher exact test and Odds Ratio inferential statistics at a 5% level of significance. Test of association was done using Chi square inferential statistics at a 5% level of significance. All statistical analysis was done with the aid of SPSS 25 (IBM Chicago, USA).

Results:

Item	Never	Few	Often	Always
	f (%)	f (%)	f (%)	f (%)
How often do you wash your hands?				
Before preparing food	55 (23.5)	61 (26.5)	53 (23.0)	62 (27.0)
Before eating	66 (28.7)	64 (27.8)	58 (25.2)	42 (18.3)
After eating	48 (20.9)	50 (21.7)	62 (27.0)	70 (30.4)
After toilet	68 (29.6)	55 (23.9)	59 (25.7)	48 (20.9)
Once I come home from work	49 (21.3)	66 (28.7)	62 (27.0)	53 (23.0)
How often do you use soap when you wash your hands?	48 (20.9)	67 (29.1)	61 (26.5)	54 (23.5)
How often do you eat food at food stalls and restaurants?	59 (25.7)	49 (21.3)	68 (29.6)	54 (23.5)
How often do you drink palm wine from palm wine stalls?	62 (27.0)	58 (25.2)	57 (24.8)	53 (23.0)
How often do you boil your drinking water?	64 (27.8)	60 (26.1)	53 (23.0)	53 (23.0)
How often do you urinate or defecate on?				
Latrine or toilet	79 (34.3)	79 (34.3)	72 (31.3)	-
River/pond	63 (27.4)	84 (36.5)	83 (36.1)	-
Field	77 (33.5)	76 (33.0)	77 (33.5)	-
When you fall sick and use the toilet very often, where do you seek help?				
Hospital	-	102 (44.3)	128 (55.7)	-
Patent medicine shop	-	101 (43.9)	129 (56.1)	-
Herbal doctor	-	125 (54.3)	105 (45.7)	-

% = percentage, f = frequency, n = sample

Table 1: Prevention/control measure against Enteric fever by rural pregnant women **n = 230**

Table1 revealed that majority of the rural resident always washed their hands before preparing food (27%), but never washed their hands before eating (28.7%), always washed their hands after eating (30.4%), but never washed their hands after using the toilet (29.6%), and washed their hands few times after returning from work outside the home (28.7%). They used the soap few times when washing the hands (29.1%) and often eat food from street food stalls or street food vendors (29.6%). They never drank palmwine from street palm wine stalls (27.0%) and never boiled their drinking water (27.8%). They defecated in the Latrine (34.3%) and the river (36.5%) few times, but often defecated on open field (33.5%). When they fall sick, they often use often visit the hospital (55.7%), patent medicine shop (56.1%), but consult the herbal doctor few times (54.3%).

Item	Never	Few	Often	Always
	f (%)	f (%)	f (%)	f (%)
How often do you wash your hands?				
Before preparing food	48 (20.9)	61 (26.5)	65 (28.3)	56 (24.3)
Before eating	54 (23.5)	58 (25.7)	48 (20.9)	69 (30.0)
After eating	53 (23.0)	51 (22.2)	52 (22.6)	74 (32.2)
After toilet	48 (20.9)	64 (27.8)	63 (27.4)	55 (23.9)
Once I come home from work	55 (23.9)	54 (23.5)	62 (27.0)	59 (25.7)
How often do you use soap when you wash your hands?	53 (23.0)	67 (29.1)	53 (23.0)	57 (24.8)
How often do you eat food at food stalls and restaurants?	53 (23.0)	66 (28.7)	53 (23.0)	58 (25.2)

How often do you drink palm wine from palm wine stalls?	55 (23.9)	48 (20.9)	68 (29.6)	59 (25.7)
How often do you boil your drinking water?	52 (22.6)	62 (27.0)	60 (26.1)	56 (24.3)
How often do you urinate or defecate on?				
Latrine or toilet	-	-	-	230 (100.0)
River/pond	230 (100.0)	-	-	-
Field	230 (100.0)	-	-	-
When you fall sick and use the toilet very often, where do you seek help?				
Hospital	-	102 (44.3)	128 (55.7)	-
Patent medicine shop	-	89 (38.7)	77 (33.5)	64 (27.8)
Herbal doctor	230(100)	-	-	-

Table 2: Prevention/control measure against Enteric fever by urban pregnant women n = 230

Table 2 above revealed that urban resident respondents often washed their hands before preparing food (28.3%), always washed their hands before eating (30.0%), always washed their hands after eating (32.2%), but washed their hands few times after using the toilet (27.8%), and often washed their hands after returning from work outside the home (27.0%). Few times, they use the soap for washing hands (29.1%) and eat from street food vendors or food stalls (28.7%). They often drink palm wine from palm wine street stalls (29.6%) and boil their drinking water few of the times (27.0%). They always deficate in toilets or latrines (100%), but never in rivers and fields (100%). When they fall sick always visit the patent medicine shop (27.8%), often visit the hospital (55.7%), but never consult the herbal doctor (100%).

Variable	**Enteric fever status**		**df**	**OR (95%CI)**	**p**
	Positive	Negative			
Residence			1	1.58 (1.09-2.28)	0.015
Rural	137	93			
Urban	111	119			

Table 3: Comparison of prevalence of bacterial enteric fever in rural and urban resident pregnant women n = 460

Table 3 above demonstrates that overall, 53.9% (n = 248) of the pregnant women tested positive to IgM for Enteric fever. About 29.8% were from the rural communities and 24.1% were from the urban communities. The test of hypothesis revealed that the rural resident respondents had 58% greater odds of testing positive to IgM for Enteric fever compared to the urban dwelling respondents (OR: 1.58, 95%CI: 1.09-2.28, p = 0.015).

	Rural				**Urban**					
Item	**Never**	**Few**	**Often**	**Always**	**Never**	**Few**	**Often**	**Always**	χ^2	**p**
How often do you wash your hands?										
Before preparing food	55	61	53	62	48	61	65	56	1.88	0.598
Before eating	66	64	58	42	54	58	48	69	8.91	0.030
After eating	48	50	62	70	53	51	52	74	1.25	0.742
After toilet	68	55	59	48	48	64	63	55	4.74	0.192
Once I come home from work	49	66	62	53	55	54	62	59	1.87	0.600
How often do you use soap when you wash your hands?	48	67	61	54	53	67	53	57	0.89	0.828

How often do you eat food at food stalls and restaurants?	59	49	68	54	53	66	53	58	4.84	0.184
How often do you drink palm wine from palm wine stalls?	62	58	57	53	55	48	68	59	2.65	0.449
How often do you boil your drinking water?	64	60	53	53	52	62	60	56	1.79	0.617
How often do you urinate or defecate on?										
Latrine/toilet	79	79	72	-	-	-	-	230	460.00	<0.001
River/pond	63	84	83	-	230	-	-	-	262.20	<0.001
Field	77	76	77	-	230	-	-	-	229.30	<0.001
When you fall sick and use the toilet very often, where do you seek help?										
Hospital	-	102	128	-	-	102	128	-	0.00	1.000
Patent medicine shop	-	101	129	-	-	89	77	64	77.88	<0.001
Herbal doctor	-	125	105	-	230	-	-	-	460.00	<0.001

% = percentage, f = frequency, n = sample

Table 4: Comparison of the prevention/control measure against Enteric fever by rural and urban pregnant women n = 460

Table 4 above revealed that there were significant differences between the rural and urban resident respondents in hand washing before eating (p = 0.030), place of defecation (p = < 0.001), health seeking behaviour (p = <0.001). The rural women were less likely to wash their hands before eating (p = 0.030), more likely to defecate in rivers and fields than use the latrine (p = <0.001), and more likely to patronize herbal doctors than patent medicine shops (<0.001).

Discussion:

According to this study, the majority of rural residents—29.6%—frequently eat food from street food sellers or stalls. The bulk of rural dwellers may be dining from street food sellers or stalls for a number of reasonable reasons. Access to formal food facilities, such restaurants and supermarkets, may be restricted in rural locations. There might be more street food sellers and stalls, making it easier for locals to get meals on the go. When compared to meals provided in restaurants or other formal eating places, street food is frequently less expensive. For locals who are strapped for cash, eating on the street could be a more cost-effective option. Rural dwellers may prefer and be familiar with the cuisine that street food vendors serve. These meals are attractive options for regular consumption because they may have sentimental or traditional meaning. For locals who do not have the time or resources to prepare meals at home, street food vendors and stalls are convenient options because they are frequently found in busy areas or close to marketplaces. The quick service and ready availability of street food make it a convenient alternative for busy persons. Street food sellers and booths can act as community gathering places where locals go to eat, chat, and build relationships. Rural populations may find street food restaurants appealing due to their casual and social ambiance, which may encourage them to patronize them frequently. When it comes to eating, some rural dwellers might think that street cuisine is more genuine and fresher than food that has been made commercially. Customers may view street food vendors' meals as healthier and more

wholesome because they frequently create food on the spot using products that are acquired locally [16].

According to this study, 27.8% of rural households never boiled their drinking water. The conclusion that most rural dwellers never boiled their drinking water could have various valid explanations. It's possible that many rural dwellers are unaware of how important it is to boil drinking water in order to get rid of germs and dangerous bacteria. If people aren't properly informed on the dangers of drinking untreated water, they might not think of boiling water as a preventative strategy. A steady and dependable supply of fuel or energy, whether firewood, gas, or electricity, is needed to bring water to a boil. It may be challenging for people to regularly boil their drinking water in remote locations where access to these resources is few or unpredictable. It takes time and work to bring water to a boil, particularly if one has to gather fuel or firewood first. Some residents of rural areas, whose everyday tasks may already require a lot of labor and time, may choose to use quicker and simpler techniques for treating their water, or they may choose to just drink untreated water out of convenience. There may be cultural traditions or beliefs about water purification in some rural areas that do not place a high priority on boiling. Instead of boiling the water, locals may rely on conventional techniques like filtration, settling, or the use of specific plants that are thought to cleanse the water. When boiled, water might occasionally taste or smell different from untreated water. People who live in rural locations with limited access to clean water sources may have heated water instead of boiling their own since they have become accustomed to the taste of untreated water. Fuel or energy is needed to boil water, which could add to the expenses already faced by rural people with limited resources. To save money, some households might decide not to boil their water, particularly if they think there is little chance of contracting a waterborne sickness or if they would rather spend their money on other essentials [17].

According to this study, 28.7% of rural inhabitants never cleaned their hands before eating. The observation that most rural individuals never wash their hands before eating could have a number of reasonable explanations. Access to soap and clean water may be scarce or inconsistent in many rural places. Without these essential hygiene supplies, people could find it difficult to wash their hands before eating. Access to health education and awareness campaigns about the value of hand washing may be restricted in rural areas. If people don't know enough about the advantages of washing their hands before eating, they might not prioritize it. Hand washing habits may be influenced by cultural customs and norms. Lower compliance rates may result from a lack of attention on basic hygienic habits in some rural communities, such as washing your hands before eating. Rural dwellers may experience socioeconomic obstacles that make it difficult for them to regularly wash their hands. Lower rates of hand washing may be caused by elements including poverty, congested living situations, and conflicting demands for scarce resources. In rural places, the lack of proper hand washing facilities and other sanitation infrastructure can deter people from routinely washing their hands. Before meals, people could find it inconvenient or impracticable to wash their hands if hand washing stations are not easily accessible. Public health initiatives that encourage good hygiene practices are among the healthcare tools and services that are frequently inaccessible to rural areas. People could be less inclined to start washing their hands if community leaders and healthcare professionals don't provide them with enough encouragement [18].

According to this study, 29.6% of rural residents never cleaned their hands after using the restroom. This result could be the result of several reasonable explanations. It can be difficult to get soap and clean water in rural locations, despite these necessities for proper handwashing. Inadequate resources and infrastructure may make it difficult for people to wash their hands properly after using the restroom. In rural populations, handwashing habits may be influenced by cultural customs and beliefs. It's possible that certain cultures place less value on handwashing or have distinct views on hygiene that diverge from accepted standards. Low hand washing rates in rural regions may be caused by a lack of knowledge about the value of handwashing and its role in halting the spread of illness. Restrictions on access to health education and information could lead to residents not being aware of the dangers of not washing their hands properly. Hand washing habits can be influenced by socioeconomic factors such as low educational achievement and poverty. People who are struggling financially could put other demands ahead of their cleanliness habits or might not have the money to buy soap and other hygiene supplies. People may be discouraged from washing their hands after using the restroom by inadequate sanitation amenities in rural regions, such as the lack of hand washing stations next to toilets. Inadequate infrastructure could make it difficult to maintain good hygiene. It could be frowned upon in some rural cultures to publicly engage in hygienic practices like hand washing. People may be reluctant to wash their hands in public or social situations because they feel awkward or ashamed about it [19].

According to this survey, the majority of rural dwellers (36.5%) feces in rivers, but some also feces in latrines (34.3%) and open fields (33.5%). The majority of rural individuals in the research area may have defecated in open fields or rivers for a variety of reasons. Proper sanitary infrastructure, such as latrines and toilets, is frequently lacking in rural regions. People may choose to conveniently defecate outside in fields or rivers close by if there are no

easily available restrooms. It's possible that people don't know enough about good sanitation techniques or the health hazards connected to open defecation. Because of cultural conventions or habit, people may continue to defecate in public places without considering the consequences of their behavior. Defecation practices may be influenced by geographic and environmental conditions, such as the proximity of open fields or rivers to residential areas. Because rivers are easily accessible and are thought to be able to wash away feces, they might occasionally be thought of as ideal places to dispose of human waste. In remote locations, poverty and resource scarcity might make it difficult to build home sanitation facilities. Because of their financial situation or inability to obtain the materials needed to construct latrines, people can be forced to urinate in public places. Attitudes on sanitation and hygiene may be influenced by cultural and traditional beliefs. Convenience may take precedence over health concerns when it comes to human waste disposal in some communities due to ingrained habits or beliefs [20].

This result is greater than that of an Ethiopian study [21] that looked at household prevention strategies for bacterial enteric fever. Few households do not wash their hands before eating (3.4%) or after visiting the restroom (5.1%), according to Ethiopian research. The Ethiopian study looked at patients who were requesting treatment in a tertiary healthcare center; these patients may have been more knowledgeable about health issues than the participants in this study, who said they would see herbal doctors if given the opportunity. This could explain the gap in findings. The results of this investigation were greater than those of an Indian study by [18], which stated that 5% of homes did not ever treat their drinking water. The type of the data gathering tool utilized in the study is related to the discrepancy in findings. Additionally, the results of this study are not as high as those of a study done in Malawi by [19], which found that 49% of rural households never used soap to wash their hands after using the restroom, and at least 44% of rural households never treated their drinking water. The differential in Malawi and Rivers State, Nigeria's access to high-quality pipe-borne water is linked to the disparity in findings. While many communities in Malawi rely on the community water program sponsored by the African Development Bank, communities in Rivers State rely on their own surface water streams and rivers as well as private boreholes.

According to this survey, 28.7% of urban dwellers eat from food booths or street sellers. The study's urban participants may have reported eating at food stalls or from street sellers for a variety of reasons. People may easily reach street food sellers and food stalls in metropolitan areas due to their handy location. This is especially true for individuals with busy schedules or little time to prepare meals. When compared to formal dining venues or restaurants, street food sellers usually provide more affordable selections, making them a more cost-effective option for people with limited funds or discretionary income. In order to accommodate a wide range of tastes and preferences, street food vendors frequently provide a large selection of foods and snacks. Urban dwellers looking for alternatives to typical home-cooked meals or restaurant fare can find this variety appealing. Street food consumption is a deeply embedded part of the local culture and social fabric in many urban locations. It might be viewed as a social event or a means of establishing ties with the neighborhood, encouraging a feeling of unity and belonging among locals. Street food sellers are renowned for delivering savory and occasionally unusual foods that might not be easily found elsewhere. The unique scents and sensations that street food vendors offer may entice urban dwellers, who seek out these encounters for their gastronomic delight. One of the few practical options for getting meals in certain metropolitan neighborhoods may be the street food vendors due to restricted access to conventional grocery stores or restaurants. In these situations, locals could depend on street food vendors more out of need than choice [20].

According to this study, 27.8% of urban dwellers did not always wash their hands after using the restroom. The study's urban participants may not have always washed their hands after using the restroom for a number of reasons. Access to soap and clean water, which are necessary for adequate handwashing, may be difficult in some urban locations. The infrequent availability of these resources may make it more difficult for people to regularly wash their hands. Inadequate infrastructure, such as broken or nonexistent hand washing stations in public restrooms, can deter people from cleaning their hands after using the restroom in some metropolitan locations. Without easy access to hand washing facilities, people could forget to follow this important hygiene habit. Hand washing behavior can also be influenced by socioeconomic differences. Financially strapped urbanites could put other needs ahead of buying soap or keeping up sanitary standards. Furthermore, people who have busy schedules or several occupations could feel pressured and forget to wash their hands. It's possible that people living in cities are unaware of how crucial hand washing is to stopping the spread of illness. A lack of understanding regarding good hand hygiene habits and their function in illness prevention may be attributed to the dearth of health education and awareness initiatives in metropolitan areas. Hand washing habits are among the hygiene activities that might be influenced by cultural variables. Even when there are sufficient resources available, hand washing may not be prioritized in some metropolitan neighborhoods due to cultural conventions or beliefs. People may believe that their surroundings are cleaner in metropolitan settings where sanitation infrastructure is more developed than in rural regions, leading them to undervalue the significance of hand

washing [21]. This idea may cause people to become complacent about their cleanliness habits. The thoughts and habits of an individual greatly influence their hand washing behavior. The documented poor compliance rate may be attributed to engrained routines or habits among urban dwellers that do not prioritize washing their hands after using the restroom [23].

According to this study, 27.0% of urban dwellers did not always boil their drinking water. Despite the established dangers of drinking untreated water, there could be a number of reasons why the study's urban participants did not always boil their water. In comparison to rural areas, urban communities frequently have greater infrastructure and access to piped water. If piped water from municipal sources is safe to drink and doesn't require further treatment, such as boiling, then residents may depend on it. It's possible that some city dwellers believe their tap water is sufficient and safe to drink without further treatment. Public health initiatives that promote the safety of tap water and local government-implemented water purification systems could have an impact on this impression. Urban dwellers may find it inconvenient or unnecessary to boil water because it takes time and effort, particularly if they lead busy lives or have access to other drinking water sources like bottled water [24].

It's possible that some city dwellers are unaware of the significance of water treatment for the prevention of waterborne illnesses, even though they live in places with greater access to information and healthcare facilities. It's possible that they are unaware of all the dangers involved with drinking untreated water. Instead of boiling their drinking water, some city dwellers may use chemical disinfection or filtration as alternatives. They might have faith that these techniques can successfully rid the water of impurities. Urban socioeconomic inequality could also be a factor. Low-income households might not have the money to buy fuel for a water boiler or might put more important requirements ahead of water treatment. The way urban dwellers behave may be influenced by cultural traditions and ideas surrounding water treatment. For instance, some people could consider boiling water superfluous or strange because they weren't raised in this manner. Boiling water can change its flavor and smell, which some city dwellers could find offensive. To maintain the water's original flavor, they might decide not to boil it. Urban dwellers may assume that tap water is safe to drink without further treatment because they have faith in government rules and supervision of water quality standards. Some city dwellers can just grow apathetic toward water treatment methods, particularly if they have never before suffered any negative health consequences from drinking contaminated water [25].

According to this survey, when urban dwellers became unwell, they drank concoctions (100%) and never sought advice from herbalists. The following factors may contribute to this healthy lifestyle. Formal healthcare facilities, such as hospitals, clinics, and pharmacies, are usually easier to access in urban areas. Therefore, rather than turning to traditional healers, urban dwellers may prefer to seek medical attention from qualified healthcare experts. Urban dwellers might possess greater knowledge and consciousness regarding contemporary medical procedures and the possible hazards linked to conventional treatments. When it comes to personal health issues, they could be more likely to seek professional medical advice and rely on evidence-based medicine. Cultural alterations brought about by urbanization frequently include adjustments in the ways that people seek health care. Urban dwellers may give up on conventional healing techniques and embrace Westernized healthcare approaches as they grow more assimilated into contemporary society. Compared to their rural counterparts, urban people may have a higher socioeconomic standing, which enables them to pay for formal healthcare services. Because they can now obtain and afford contemporary medical care, they might be less inclined to turn to ancient healing methods. Using traditional treatments or consulting herbalists in metropolitan areas may carry some stigma. When using traditional treatment procedures, urban inhabitants may avoid them completely out of fear of being judged or labeled as ignorant or backward. People who live in cities could have more faith in the efficiency of contemporary medical treatment and healthcare systems. Compared to traditional healers, they might believe that official healthcare providers are more dependable and equipped to meet their demands [26].

According to this study, 100% of urban dwellers never engaged in the practice of open defecation in fields or rivers. The following factors may contribute to urban dwellers' protective behavior toward public health. The infrastructure and availability of superior sanitary amenities, such flush toilets and communal restrooms, are frequently better in urban locations. Consequently, there might be hygienic and practical alternatives to open defecation for city dwellers. Sanitation laws may be more strictly enforced in urban areas, and open defecation may result in penalties. Governmental actions and public health campaigns may help to discourage open defecation and encourage good sanitation habits. It's possible that people living in urban areas are more informed and conscious of the health dangers of open defecation. They could know more about the hazards of contaminating water sources and the significance of using sanitary facilities. Compared to rural settings, urban surroundings may have different societal attitudes and cultural norms about open defecation. Open defecation may be less common among inhabitants in metropolitan environments due to increased social stigma. There are usually more options for alternatives to open defecation in urban settings, such as public bathrooms in restaurants,

retail centers, and parks. The presence of these alternatives could deter city dwellers from defecating in the open [27]. According to this study, rural women had a lower likelihood of washing their hands before eating ($p = 0.030$). The finding that rural women are less likely than their urban counterparts to wash their hands before eating could be attributed to a number of factors. There may not be easy access to soap and clean water in many rural regions. In the absence of these fundamental hygiene resources, rural women would find it difficult to wash their hands before eating on a regular basis. Compared to metropolitan regions, rural populations frequently have lesser levels of knowledge and awareness regarding the significance of hand hygiene practices. Rural women might not completely comprehend the dangers of not washing their hands before eating as a result. Social conventions and cultural values might have an impact on hygienic practices. It's possible that certain rural communities have cultural customs or beliefs that place less emphasis on washing hands before eating. Social factors that influence women's ability to prioritize hand hygiene include gender roles and home obligations. It's possible that there isn't enough infrastructure or access to hand sanitizer in rural locations, making it difficult to wash your hands there. It could be harder for rural women to make hand washing a daily habit if these supplies are not easily accessible. Rural women who work in agriculture or domestic service may have hectic schedules and hefty workloads. Therefore, if they think hand washing is time-consuming or unnecessary, they could prioritize other duties over it before meals. In contrast to metropolitan environments, health promotion initiatives and outreach programs could be harder to access in rural communities. It's possible that rural women are less likely to follow advised hand hygiene practices if they don't receive enough information and encouragement from medical professionals or community health workers [28].

According to this study, rural women were more likely to use the latrine than to urinate in rivers ($p = <0.001$). The discovery that rural women were more prone than urban women to urinate in rivers rather than utilize latrines could have numerous explanations. The availability of better sanitation amenities, such flush toilets and latrines, is frequently restricted in rural regions. Rural women may turn to open defecation as a handy alternative to good sanitation facilities, and they may even use rivers or other bodies of water. inequality in sanitation practices between rural and urban areas can be attributed in part to economic inequality. Some people may find it more practical to defecate outside since rural households may not have the necessary funds to build or maintain latrines. Behaviour can be influenced by cultural norms and ideas on cleanliness and hygiene. Certain rural populations may have long-standing customs or cultural behaviors surrounding defecation that put ease of use ahead of sanitation. Furthermore, choices for sanitation facilities may differ between rural and urban communities based on their notions of hygiene and cleanliness. Sanitation practices can be impacted by geographic considerations, such as the proximity to latrines or the availability of water supplies. Women may decide to use rivers as convenient places to urinate in isolated rural locations when there are few latrines and easy access to them. The prevalence of this practice among rural women may be attributed to limited access to education and awareness campaigns about the significance of sanitation and the health hazards associated with open defecation Without sufficient awareness or comprehension of the repercussions, people can carry on with their unhygienic behavior [29].

According to this study, rural women were more likely to visit herbal doctors than pharmacies ($p = <0.001$). Rural women may visit herbal doctors more frequently than patent pharmaceutical stores for a variety of reasons, particularly when it comes to avoiding and managing bacterial intestinal illnesses. Regarding the prevention and control of bacterial enteric infections, rural women's choice for herbal doctors over patent medicine stores is probably influenced by a mix of cultural, economic, accessibility, and belief factors. Strong cultural and traditional views about healthcare are common in rural areas. Rural communities may have a strong cultural tradition of using herbal medicine, and herbal doctors are well-liked and regarded there. Access to formal healthcare services, such as pharmacies, may be restricted or nonexistent in many rural locations. On the other hand, herbal doctors might be easier to find and more easily accessible, which makes them a sensible option for rural women's healthcare. Comparing herbal medication to contemporary drugs sold at patent medicine stores, one may conclude that herbal treatment is less expensive. Herbal medicines can be a more affordable option for rural women with limited financial means. Certain rural communities could be skeptical of contemporary medicine, especially the drugs found in patent medicine stores, and harbor mistrust towards it. Rural women may consider herbal medication to be a safer and more dependable option because it is seen as natural and holistic. Rural women, especially those who have grown up in areas with a high prevalence of traditional healing methods, could feel more at ease and knowledgeable about herbal therapy. Because of this, people could favor to receive treatment from herbal doctors that they know and trust. In comparison to traditional medicine, herbal therapy is frequently thought to have less adverse effects and be more successful in treating specific illnesses. Because herbal medicines are thought to be more effective in preventing and controlling bacterial enteric illnesses, rural women may opt for them [30].

The risk of bacterial enteric illnesses is increased in rural locations due to the inferior availability to latrines and pipe-borne water. Compared to metropolitan environments, where there may be a greater availability of better sanitation facilities, rural people could depend on alternate water

sources like rivers, which are frequently tainted with human waste. The practice of stooling into rivers is one example of a cultural ritual that further contaminates water supplies and raises the risk of bacterial transmission. Furthermore, the unsanitary use of herbal remedies may unintentionally expose people to pathogens in rural regions, increasing the risk of gastrointestinal diseases. Consequently, community members engaging in home chores with water originating from contaminated sources face a heightened risk of direct contact with enteric fever bacteria, potentially leading to accidental infection and contributing to the observed differences in disease prevalence between rural and urban areas [31].

This finding supported a Malawian study conducted by [32] that reported that in 17 randomly selected rural communities only 34% of households treated their water with hypochlorate (chlorination) and only 51% utilized soap regularly for hand washing. This would eventually suggest that rural dwelling respondents stand a significant chance of exposure to the enteric fever bacteria. Furthermore, this result corroborated the findings of [32], which reported that rural residents had poorer defecation practices (OR = 26.62), drank water from untreated sources (OR = 1.80), had intermittent access to portable water (OR = 2.40), and consumed unwashed produce (OR = 3.48). In summary, this study confirms the previously noted greater incidence of enteric fever in rural as opposed to urban residents.

Conclusion:

Both groups' poor hand hygiene habits were noted, with urban women showing poor hand hygiene before eating and after using the restroom and rural women showing lower rates of hand washing before eating and after using the restroom. It's interesting to note that enteric fever was more common in rural women than in urban ones. These results highlight the significance of focused interventions to enhance healthcare-seeking behavior and cleanliness habits among pregnant women, especially in rural regions, in order to reduce the incidence of enteric fever.

Conflicts of Interest:

The author declare no conflicts of interest.

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