



## **Incidence of *Salmonella* Bacteraemia among Patients Attending Selected Hospitals in Katsina State, Nigeria**

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### **Abstract**

*Invasive Salmonellosis or Salmonella bacteremia is an infection cause by eating foods such as milk, eggs, vegetables, meat or water contaminated by faeces from an infected persons. It remains a threat to public health in many parts of the world especially developing countries where it becomes endemic. About 21.5 million cases occur per annum world-wide with 200,000 deaths in Asia, Africa and Latin America. About 80% of deaths due to Salmonella serovars occur in Africa. This research was conducted to find out the incidence of Salmonella bacteraemia among the patients attending selected hospitals in Katsina State, Nigeria. A total of fourteen (14) Salmonella serovars were recovered from 300 blood samples collected from patients that show some symptoms of invasive salmonellosis and were subjected to Biochemical and Serological tests. Nine (9) out of the 14 isolates were found to be Salmonella typhi and 5 were Salmonella paratyphi a. Incidence of Salmonella bacteraemia among the patients screened was found to be highèr among the age group 1-10 (9.7 %), Male (5.1 %), Business men (6 %) , patients using bore hole water (10.7 %), Informal Education status (5%) and untreated status (7.8%) respectively. These higher incidences observed among the study groups is a threat to public health that require immediate intervention by the authority .*

**Keywords: Incidence, Invasive, Salmonella, Immunization, Endemic**

### **INTRODUCTION**

Salmonellae are gram-negative motile rods that characteristically ferment glucose and mannose without gas production but do not ferment lactose or sucrose, most produce hydrogen sulphide. They belong to the phylum Proteobacteria and genus Salmonella. All Salmonella are motiles, except two species *Salmonella Pullorum* and *Salmonella gallinarum*. All Salmonellae apart from *Salmonella typhi* are non- capsulated. The genus was named in honour of Daniel Salmon an American Veterinary pathologist (FDA/CFSAN, 2009). Salmonella infections are endemic in Nigeria. Record has shown that about fifty three (53) Salmonella serotypes are found in Nigeria out of these figures 30 serotypes were responsible for Salmonella bacteraemia and 31 serotypes were associated with gastroenteritis. Typhoidal Salmonella like *Salmonella typhi* is commoly linked with invasive Salmonellosis Where as *S.typhimurium* is associated with non-invasive Salmonellosis (Arubana, 2012). Salmonella serovars are spread mostly via the fecal-oral route. Salmonella outbreak is usually link to consumption of contaminated water, milk, fish and eggs (Miriajou *et al.*, 2006). Treatment is achieve by fluid and electrolytes replacement, followed by prescription of effective antibiotics which can reduce the morbidity and motality rate (WHO, 2010). Antibiotic such as Chloramphenicol has been a drug of choice for treatment of invasive Salmonellosis for about 40 years, but alternative drugs for treatment



are required due to emergence of "multi-drug" resistant invasive *Salmonella* (Udeze *et al.*, 2010). The true incidence of *Salmonella* serovars especially those associated with invasive Salmonellosis is difficult to evaluate in Nigeria because of the lack of a proper coordinated epidemiological surveillance system. However, information on prevalence of invasive Salmonellosis has been well documented by several researchers in some state in Nigeria ranging from 0.07 % In Oyo to 47.1% in Osun and 14% in Katsina State Abdullahi (2010).

## MATERIALS AND METHODS

### Isolation of *Salmonella* species

A total of 300 blood samples were collected from patients, who show some symptoms of enteric fever from the three hospitals selected namely General Hospital Katsina, Baure and Daura. The samples were processed via broth enrichment method using thioglycolate broth, followed by subculturing on deoxycollate citrate agar (Oxoid U.K). Cultures were incubated over night at 37°C and colonies growing on the plate were further sub-cultured onto Bismuth Sulfide Agar and incubated overnight at 37°C. Colonies growing on the Bismuth Sulfide Agar plates that exhibit morphological and biochemical properties typical of *Salmonella* spp were selected for Gram staining, biochemical test and serological tests.

### Biochemical characterization

*Salmonella* Species isolated were subjected to Gram staining and various biochemical tests including Motility test, Urease, Indole, Citrate and Triple Sugar Iron agar test as described by Cheesbrough (2006).

### Serotyping.

Biochemically characterized *Salmonella* isolates were further characterized into various serotypes using Kauffman-White Classification Scheme. Slide agglutination test as described by Abdullahi (2010) was employed in which a drop of physiological saline was placed on two separate sections of a glass slides. By using a sterilized wire loop a portion of growth from surface of TSI was removed, mixed and emulsified in each drops of physiological saline on the slide. A small drop of Vi antiserum was added to the first suspension and antiserum were mixed and then the aslide was tilted back and forth to observe for agglutination. The procedure was repeated for the detection of *S. paratyphi A* .

## RESULTS

In the research conducted at the study area a total of 14 (4.7%) *Salmonella* serovars were recovered from the 300 blood samples. The incidence of *Salmonella* bacteraemia with respect to age shows that patients in the age group 1- 10 has higher incidence of bacteremia than the other age group (Table 1).

**Table 1: The incidence of Salmonella bacteraemia in Relation to Age Group of Patients tested**

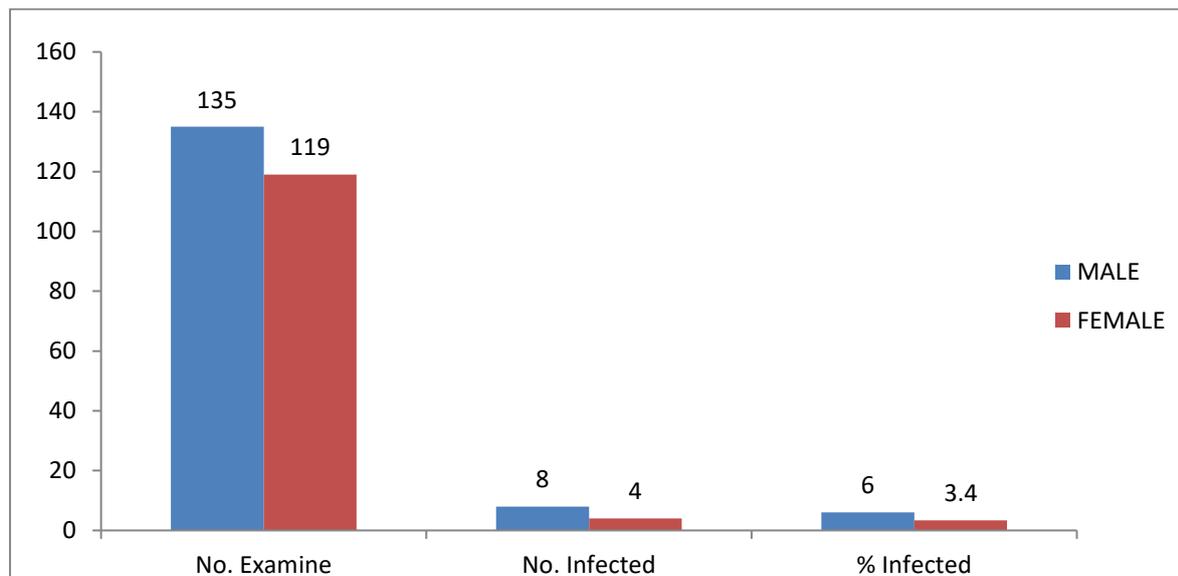
Age Group	No. Examined	No. Positive	No. Negative
1-10	62	6(9.7%)	56(90.3%)
11-20	56	4(7.1%)	52(92.9%)
21-30	69	3(4.3%)	66(95.7%)
21-30	69	3(4.3%)	66(95.7%)
41-50	60	0(0.0%)	60(100%)
<b>Total</b>	<b>300</b>	<b>14(5%)</b>	<b>286(95%)</b>

The incidence of Salmonella bacteremia is higher among the untreated patients 10(7.8%) than the treated patients 4(2.3%) (Table 2).

**Table 2: Incidence of Salmonella Bacteraemia with regards to Treatment status**

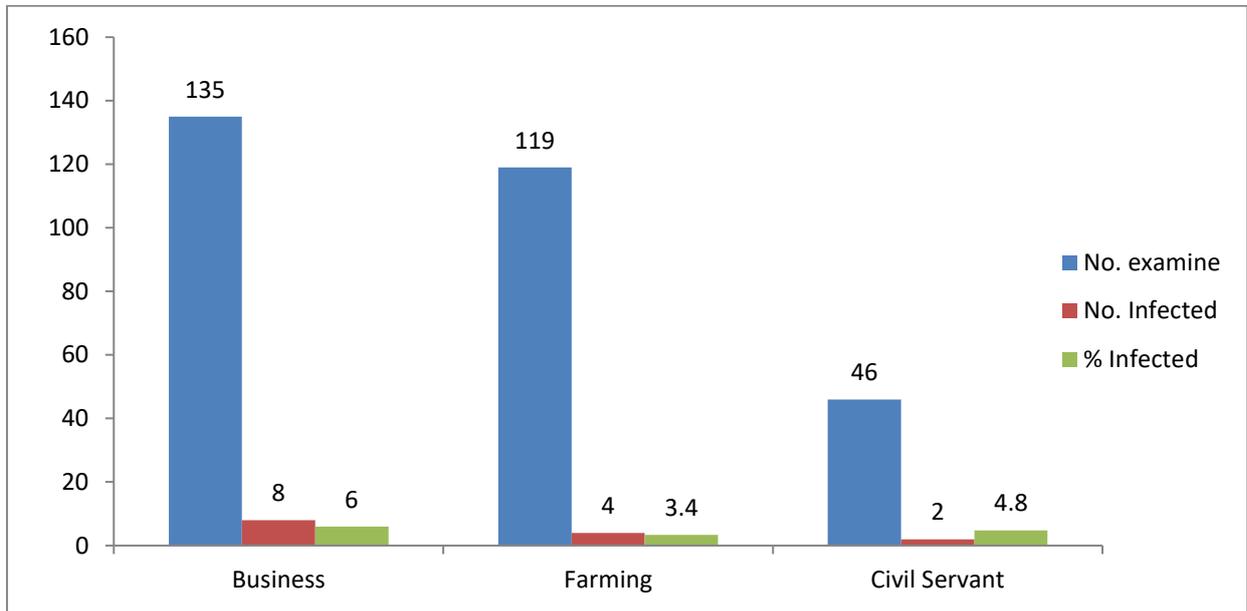
Treatment Status	No. Examined	No. Infected	% Infected
<b>Yes</b>	172	4	2.3
<b>No</b>	128	10	7.8
<b>Total</b>	<b>300</b>	<b>14</b>	<b>5</b>

The incidence of bacteremia with respect to gender shows that males are more infected than their female counterparts as depicts by the following figure 1.



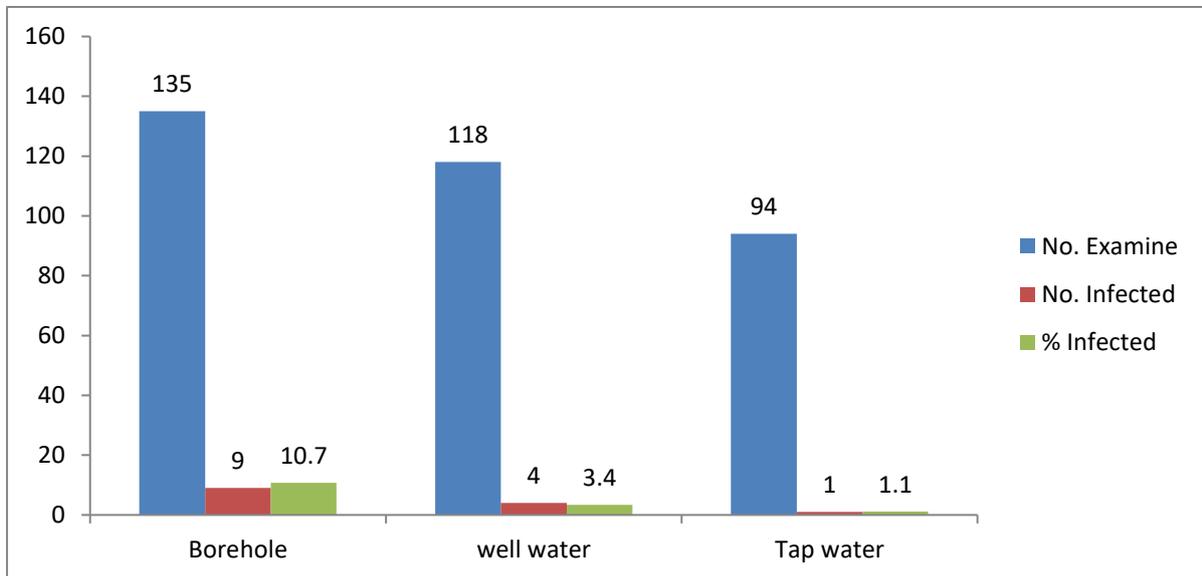
**Figure1: Incidence of Salmonella bacteraemia with respect to gender of Patients.**

The incidence of bacteremia is found to be higher among business men 8(6%) followed by farmers 4(3.4%) and civil servants 2(4.8%) Figure 2.



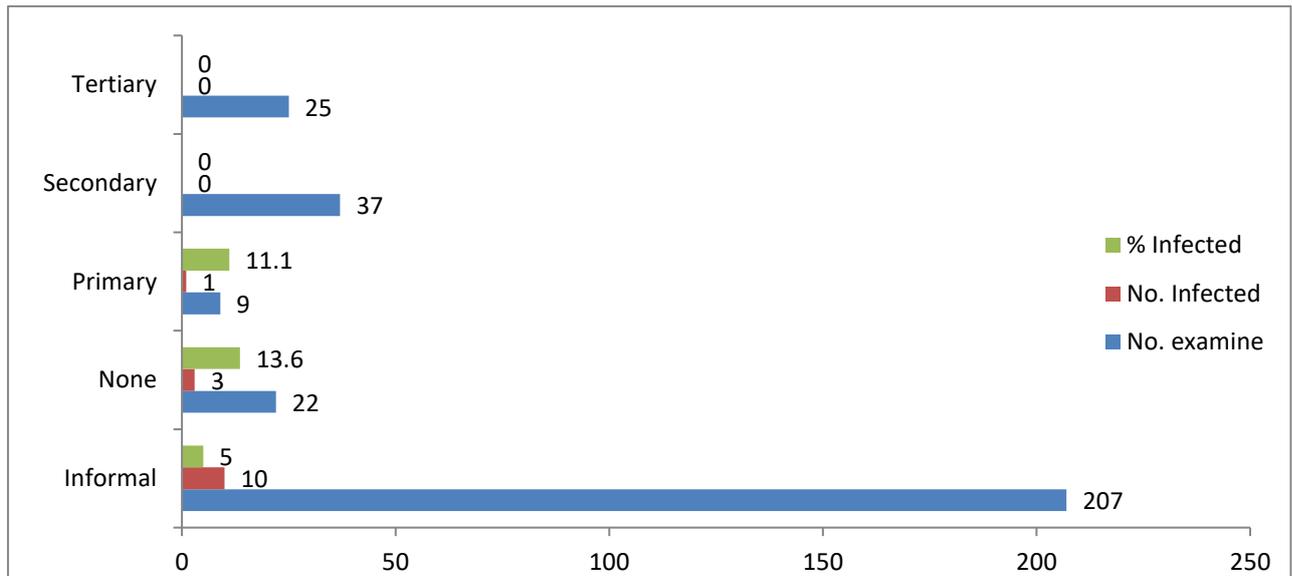
**Figure 2: incidence of Salmonella Bacteraemia with regards to occupation.**

Figure three (3) shows that bacteraemia is common among people using bore hole water followed by people using well water and least was seen among people using tap water.



**Figure 3: Incidence of Salmonella Bacteraemia with regards to Water source**

Incidence of bacteremia is higher among patients with informal education and least among patients with secondary and tertiary education



**Figure 4: Incidence of Salmonella Bacteraemia with regards to Educational Status**

## DISCUSSION

In the study conducted a higher incidence was recorded among the age group 1-10 years 6 (9.7%) and least incidence was seen among the age group 41-50 (0%), this difference between children of age group 1-10 and adults age group 41-50 years may be associated with the immune system difference between children and adults (Abdullahi *et al.*, 2014). Salmonella infections manifest more in children than the adult as shown by (Lin *etal*, 2014)

The incidence of Salmonella bacteraemia is higher in males 8(5.1%) then their female counterpart 6(4%) with no significant difference ( $P>0.05$ ). Udeze *et al.*,(2010) reported 16% incidence of Salmonella spp from stool and blood specimens of patients with enteric fever from Ilorin, Nigeria. Incidence was higher among business men 8(6%) but lower among civil servants 2(4.8%) without any significant difference ( $P>0.05$ ) this is similar to 11% prevalence of Salmonella spp as reported by (Iruka *et al.*, 2011).

The incidence is higher among patients with informal education 10(5%) and lower among patients with secondary and tertiary educational status (0.0%) and 0(0.0%) respectively. This is in line with the finding of (Udeze *et al.*,2010) who reported an 11% occurrence among the similar people from Ilorin, Nigeria. The lower incidence among patients with tertiary educational status may be connected with their exposure and knowledge of the disease. The rate of Salmonella bacteraemia is higher among the untreated patients 10(7.8%) than the treated patients 24(2.3%). This is similar to the finding of Abdullahi *et al.*, (2014).

## CONCLUSION

This study identified higher incidences of Salmonella bacteraemia among children, Business men, male, people using bore hole water and untreated patients. This implies a serious threat to public health which require urgent attention of the stakeholders concern.

## REFERENCES



- Abdullahi B: Abdulfata K., Wartu J.R Mzungu, I., Muhammad H.I.D and Abdussalam A.O (2014). Antibiotics susceptibility pattern and characterilization of clinical *Salmonella* seotypes in Katsina State. Africa Journal of Microbiology research.
- Abdullahi M. (2010). Incidence and Antimicrobial susceptibility pattern of *Salmonella* spp in children attending some hospitals in Kano State Nigeria. Bayero journal of pure and applied sciences 3(1);200-205.
- Aruvana D.S, Umochandran S. A. Ganesh K. and Mugudeshwaran,K, (2012). Moleculler characterilization of *Salmonella enterica serovar typhi isolated from typhoidal humans*. Malaysian Journal of Microbiology 8:148-155.
- Cheesbrough (2006). District laboratory practice in tropical countries (Part II) Cambridge university press PP.182-18
- FDA/CFSAN (2009). Food safety A-Z Guide salmonella FDA- Centre for food safety and applied nutrition Retrieved 2009-02-14(dead line).
- Lin, F.Y.Ho, YA ad Kiam,HB (2001). The efficacy of *Salmonella typhi* Vi, Conjugate vaccine in two to five years old children, new England journal of medicine 344,1263-9
- Smith T.(2001). The cholera group of bacteria U.S Bur Animal and Bull 6,6-40.
- Udeze A.O, Abdurrahman I.O,Okonko, A. and Arubijiwon I. (2010). Sero Prevalence of *Salmonella typhi* and *Salmonella partyphi* among the first year student of university of Ilorin-Nigeria. Middle East Journal of scientific research 6(3), 257-262
- Wallis, T.S ad Galyov E.E.(2000) Monocular basis of salmonella induced enteritis, MOL. Microbial .36,997,1005
- WHO (2010) Laboratory protocol susceptility testing of enterobacteriaceae using disc diffusion Who global food borne infection network.
- Willey, M, Linda, S, Christopher, J. (2008). Prescott Harley and Kleins Microbiology seventh Edition MC, Grow-hill, 34,835-870.
- Youssef, R.A, Abbas, A.M, EL\_Shehawi, A.M. Mabrouk M.I Aboshanabi, K.M, (2020) serotyping and Antimicrobial Resistance profile of Enteric non typhoidal salmonella recovered from febrile neutropenic patients and poultry in Egypt .Antibiotics 10,493,http:#doi,org/10.3390/Antibiotic 10050493.
- Zailani S.B, Okonko and Udeze A.O (4004). Effect of socioeconomic status age and sex antibody titre profile to *Salmonella typhi* and *Salmonella paratyphi* in ile-lfe. Journal of American science 3(4).