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Impact of Economy Status of Parents on Diarrhoea Infection in Children, in Minna, Niger State, Nigeria

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Abstract: ***One hundred and seventy six stool samples from children with diarrhoea attending the General Hospital Minna, Nigeria were analysed for the causative bacteria using standard bacteriological methods in relation to their parent's socio-economy status using questionnaire method. The economy status parameter used were; education level of the mother, source of drinking water, feeding pattern of the children, and type of residence occupied by there parents. The bacteria identified were as follows: Escherichia coli 84 (47.734%), Shigella species 34(19.32%), Salmonella species 29 (16.6532%). Others were Citrobacter species 8 (4.55%), Enterobacter species 11 (6.65%), Vibro cholerae 4 (2.23%). Ten (5.68%) samples yielded no bacteria growth. The highest percentage prevalence was recorded for the 6-12 months age group in homes where parents use wells and streams as source of drinking water. Findings indicate that the prevalence of diarrhoea in the children could be traced primarily to mode of child feeding, and poor personal hygiene***

Keywords: Diarrhoea, Dehydration, Children,Economy and E.coli

1. Introduction

Diarrhoea is the condition of having three or more liquid and loose stool per day (Odukoya, 1998). It is a common cause of death in Africa countries and the second most common cause of infant deaths worldwide. Diarrhoea causes loss of fluids through frequent bowel movement which can cause dehydration and electrolyte imbalances in the body. Diarrhoea is not a disease, but is a symptom of a number of infections and illnesses (Kandakai-Oluyemi *et al.,* 2009). Reports in the literature indicated that in 2009 diarrhoea was estimated to have caused 1.1 million deaths in people aged 5 years and over and 1.5 million deaths in children under the age of 5years (Odukoya, 1998). Diarrhoea which is usually due to parasitic, bacterial, or viral infection is a common problem that usually ends in 1 or 2 days and can resolves on its own without special treatment (Chen *et al.,* 2010). Dehydration affects the child's natural balance of water and electrolytes (sodium, potassium, chloride) and can be serious if not treated promptly. It have been demonstrated in previous studies that diarrhoea infection is more severe in younger children and incidence of occurrence is highest in the six month period following child birth. In Nigeria, cases of gastroenteritis due to different microorganism have been reported; however the impact of socio-economic status of parents and diarrhoea has not been established among children from different parts of the country. Hence, this study was undertaken to identify the socio-economic relationship between diarrhoea in children in Minna in relation to the socio-economy status of the parents in General Hospital, Minna, Niger State, and Nigeria.

2. Materials and Methods

2.1 Study Base and Study Population

The study was based at General Hospital, Minna, and Maternal and Children Hospital, Minna. The study population included infants and young children between 0 – 5years attending the Paediatric unit and Out Patient Department (OPD) of the General Hospital in Minna, Nigeria. Informed consent was obtained from patients' mothers, hospital authorities, laboratory technician and Clinicians involved in the management of the patients examined.

2.2 Study Procedure

Stool samples were collected from the patients in clean, clear, transparent, wide mouthed bottles. Information were also obtained from each patient regarding age, sex, feeding patterns, types of apartment occupied by the parents, source of their drinking water and maternal education. The sample size of the stool samples collected for the research work was determined by standard statistical formula with prevalence rate of 9%, Confidence level at 95% (standard value of 1.96) and Margin of error at 5% (Standard value of 0.05)

The specimens were processed according to the guidelines provided by Cheesbrough in 2009 for the laboratory diagnosis of enteric pathogens. These include: macroscopy, microscopy, culture, gram's stain, motility testing, and biochemical tests.The stool samples were examined macroscopically and the appearances, consistency and colour were recorded. A loopful of liquid stool or fecal suspension was enriched in selenite F for 24hrs at 37°C and was subcultured by streak method on the following media: .MacConkey agar (MAC), Salmonella Shigella agar (SSA) and Sorbitol MacConkey Agar. The plates were incubated at 37°C for 24hrs. The resultant isolates were purified, gram stained and was characterized. The isolates were grouped into lactose fermenting and non lactose fermenting colonies and was characterised based on the following standard biochemical tests by Cheesbrough. Citrate utilisation Test, Indole Test, hydrogen sulphide production and gas production test (using triple sugar iron agar), Motility test, Urease test, Carbohydrate fermentation test, Voges-poskauer test, lysine decarboxlase test.

3. Results Presentation and Discussion

A total of 176 diarrhoeal stool samples were examined for the presence of different enteric bacteria in children between the ages of 0 – 5 years. Of the total number of 253 isolates

examined, 139 (54.94%) were identified as *Escherichia coli*, 49(19.37%) *Shigella* species, 42 (16.60%) *Salmonella* species, and 8 (3.16%) *Citrobacter* species. Others were *Enterobacter* species11 (4.34%), and *Vibro cholereae* 4 (1.58%).38 (15%) samples did not yield any growth. The prevalence rate of E.*coli* was 2.5 times higher than that of *Shigella* which is the major bacteriological causes of diarrhoea in children below five years of age. This is higher than the 26% prevalence rate document by Olanipekun (1996) for children with diarrhoea attending the Jos University Teaching Hospital in Jos, Nigeria and 15% by kandakai- Oluyemi (2009) for children attending the Abuja national hospital but similar to report by Rotimi *et al.(1994)* for children attending Obafemi Awolowo University Teaching Hospital in Ile-ife and several other international authors who reported that the prevalence rate of E.*coli* is 2.5 higher than that of *Shigella* which are the major bacteriological causes of diarrhoea in children below two years (King *et al*,. 2003, Longstreth *et* al., 2006).

No bacteria were isolated from 0 -6 months age group. One of the reasons for this is because the percentage of mothers that breast fed their children exclusively is higher than those that breast fed with either water or baby formula food reported to contain high levels of immunoglobulin A (IgA) antibodies against bacteria (Cravioto *et al*., 19s98).

Figure 2 shows the prevalence of diarrhoea in relation to types of residence of the parents. The children whose parents live in multiple tenant apartment had the highest percentage 66 (93.94%) of isolates, and was followed by the parents living in one room apartment which recorded 30 (78.94%) isolates. The lowest isolates were recovered from children of parents occupying flat apartments possibly due to the enclosed nature of the apartment. The high percentage of positive cases was found in children whose parents occupied multiple tenant apartments because in such environment, there is possibility of having a lot of children and this might promote transmission of diarrhoea. Poor hygiene during food preparation may also contribute to increased gastroenteritis around the environment. In such home the parents prepare their food in an open place and the children share whatever they have among themselves without washing their hand or sanitizing their environments.

Figure 3 shows the relationship between feeding patterns and the prevalence diarrhoea. Children who had mixed feeding had the highest prevalence rate. No isolates were recovered from exclusively breast fed children, and the difference was found to be statistically significant ($P<0.05$).

Breast milk (colostrums) from mothers living in endemic areas has been reported by Ogunsola and Adenuga (2009) to contain high levels of immunoglobulin A (IgA) antibodies. Bacteria were not isolated from infants younger than 6 months old because of the feeding pattern adopted by their parents (exclusive breast feeding. Data obtained in this study indicate that all children below six months old were exclusively breast fed, whereas those between 7 – 12 months had their breast feeding interrupted with mixed feeding, if they had not stopped completely. These findings therefore corroborate findings from previous studies by Ogunsola and Adenuga (2009) regarding the protective role of breast milk against bacterial gastroenteritis. Faulty weaning practices and poor hygiene during food preparation may also contribute to increased gastroenteritis around the age of 7 – 12 months. The low isolation rate of *E.coli* in children older than 12 months may be associated with the development of immunity or the loss of receptors for some specific adhesion molecules.

The relationship between maternal education level and occurrence of diarrhoea is presented in figure 4. Infants whose mother either had no formal education or primary school education had higher prevalence rate. Illiteracy of mothers has been reported to be a predisposing factor that contributes to infants and young children acquiring the infection.

Figure 5 illustrates the relationship of sources of drinking water to the occurrence of diarrhoea. There was higher prevalence rate among children whose parents used either unboil well water or stream water. Few of the reasons for high prevalence rate include poor hygienic standard of handling drinking water; poor sanitation and the drinking of untreated water by the children. Several authors have reported that stream and well water contains several bacteriological and parasitic agents that cause diarrhoea in developing countries Nigeria inclusive (Cohen, 2000). Children whose parents use boiled water had the lowest prevalence rate.

The highest number of E.*coli* isolated belonged to the 0157 sero-group. 0157 sero-group has been recognized by the World Health Organization (WHO) to be one of the major causes of diarrhoea. However, due to the unavailability of the monovalent typing sera, further specific typing was not carried out to show which serotype occurs more frequently in infantile diarrhoea within the study's geographic area.

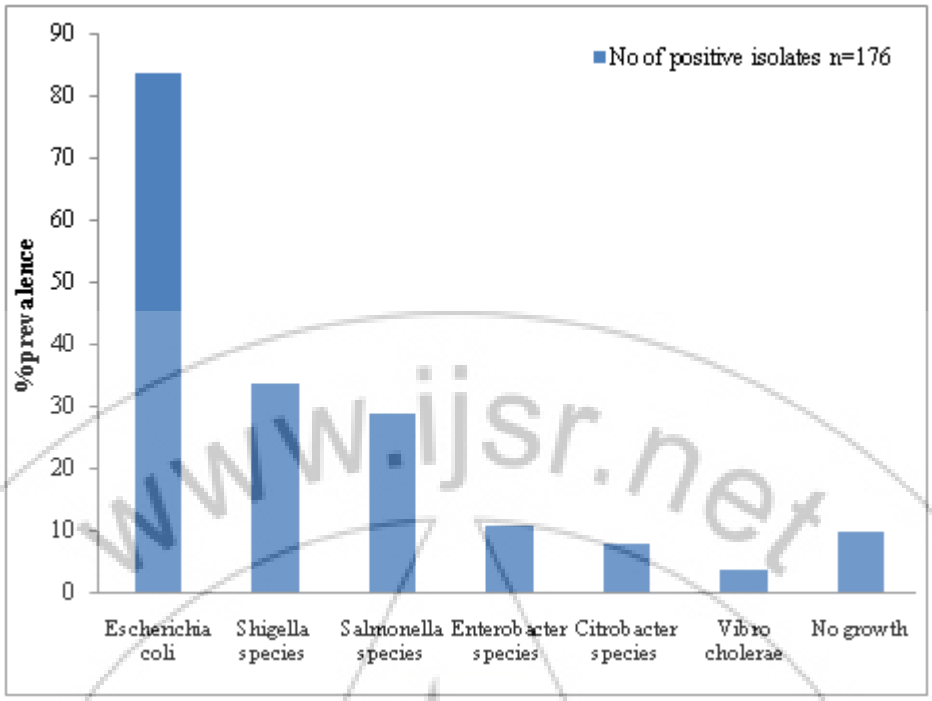

Figure 1: Prevalence of enteropathogenic bacteria in children.

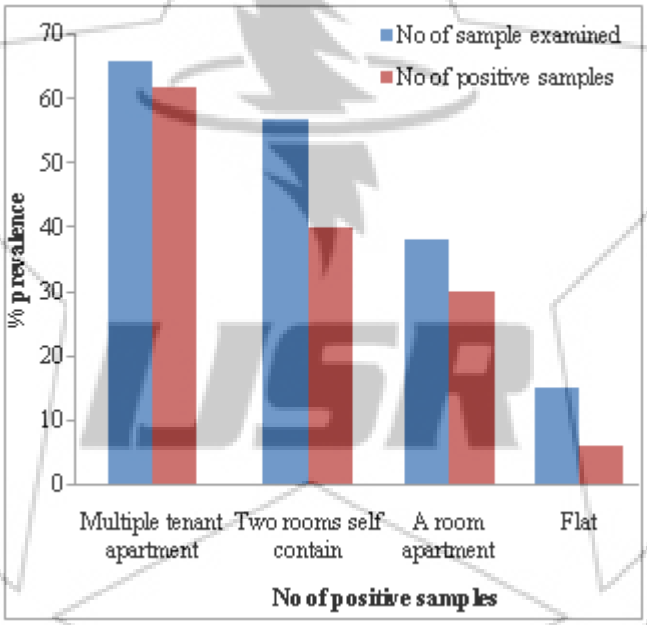

Figure 2: Prevalence of diarrhoea in relation to types of residence of the parents

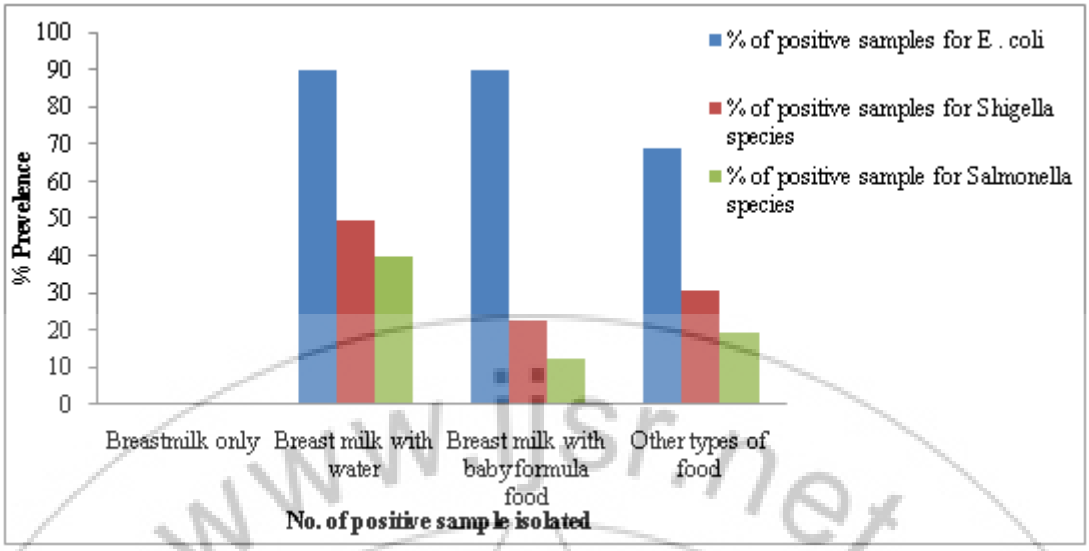

Figure 3: Feeding pattern of infants in relation to frequency of diarrhoea.

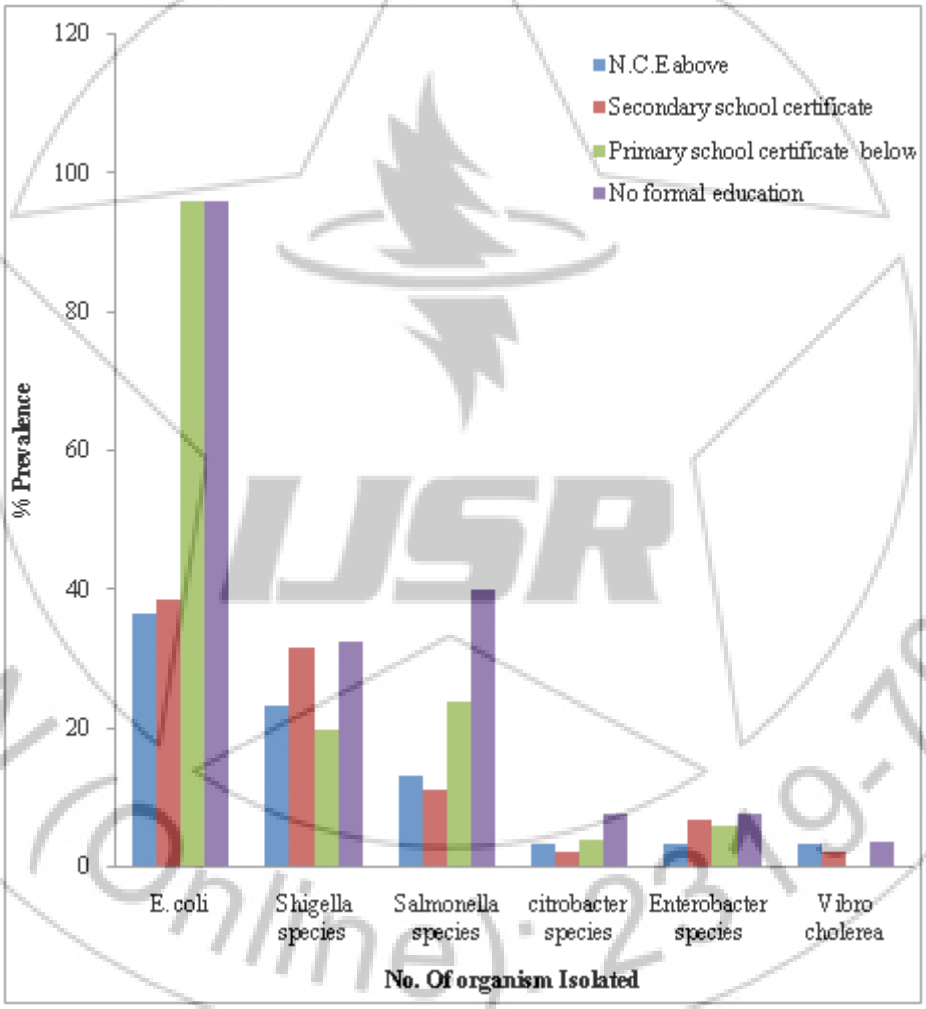

Figure 4: occurrence of diarrhoea in relation to mother's literacy level

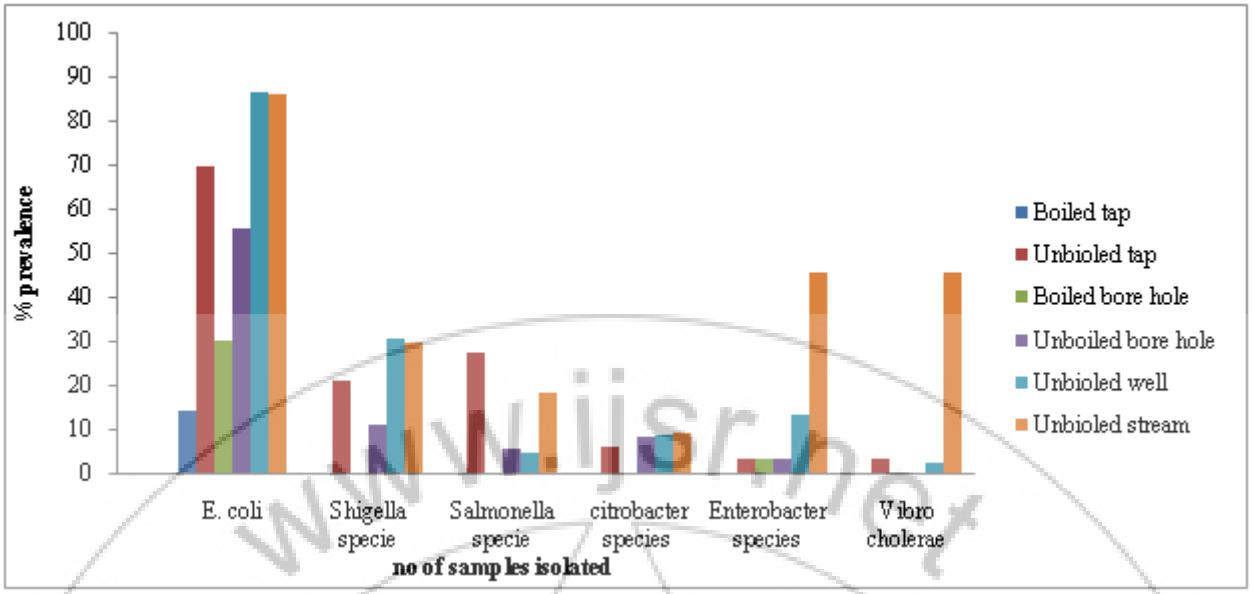

Figure 5: Occurrence of diarrhoea in relation to source of drinking water

4. Conclusion

This study has shown that *Escherichia coli* is the commonest cause of infantile diarrhoea in Minna, Nigeria. In addition, the findings indicate that children feeding pattern, poor personal hygiene, type of apartment occupied by the parents, and source of drinking water contribute to the incidence of diarrhoea in children. Proper dissemination of information and enlightenment of parents, improvement in personal and environmental hygiene and provision of portable drinking water will greatly reduce infantile diarrhoea in Minna, Niger State.

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