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A retrospective study of enteric infections in Kano State between 1985 and 1996.

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ABSTRACT: Cases of enteric infections in Kano State between 1985 and 1996 were reviewed. This was based on hospital and/or laboratory confirmed reports from all the Public Health Centres (PHCs) and the General Hospitals of the then 34 Local Government Areas in the State. The data gathered was attested and analyzed in the Statistics Department of the Directorate of Infectious Diseases, Control and Prevention, Kano State Ministry of Health, following standard epidemiological methods. It was observed that epidemics of diarrhoea with or without blood, typhoid and paratyphoid fever, food poisoning and cholera occurred explosively in 1988, 1990, 1994 and 1996. Morbidity and mortality were highest within January – July 1996. Disease intensity differed among the Local Governments. The study indicates that perhaps Enterobacteria are one of the most important etiological agents. Drinking water and probably the environmental state of hygiene are among the factors contributing to this menace. The research revealed that the people of the areas need safe drinking water and health education, which the Ministry of Health should encourage. A critical look at the situation shows that the communities should be encouraged on oral dehydration therapy, personal and environmental hygiene. Measures directed against the calamity by the Federal and State Government in conjunction with the international organizations like World Bank, WHO, UNICEF, Red Cross, UNDP and others have yielded success to some degree in terms of prevention and control. More research, especially on drug resistance among the etiologic agents should also be undertaken as soon as possible to pave the way for clearer understanding and effective control of the menace.

Key Words: Enteric infections; Epidemiology; Microbial incidence; Kano State; Nigeria.

Introduction

Enteric infections commonly refer to symptomatic disease of the type shigellosis, Yersiniosis, travellers diarrhoea, dysentery. Typhoid and paratyphoid fevers, food poisoning and cholera which involve the gastrointestinal tract of man. The urinary and respiratory tract infections, septicemia, bacteraemia, ulcerative colitis, otitis media as well as neonatal meningitis could also be caused by enteric organism (Jellif, 1981). Transmission is by faeco-oral route. They are among the most dangerous communicable infections occurring all over all World. They present with high morbidity and attendant mortality cases as the result of fever of various grades vomiting, dehydration, loss of appetite, insomnia, shock, and loss of electrolytes, oedema, hyperplasia of lymphoid follicles and congestion (Nea, 1996; Dodds and Gilles 1984).

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The etiological agents are mainly members of the family Enterobacteriaceae which contain both normal microbiota as well as opportunistic and obligate pathogens in man and other vertebrates. They are also allochthonous to water and vegetable matter. *Escherichia coli*, Enterotoxigenic *E. coli* (ETEC); Enteroinvasive *E. coli* (EIEC); *Salmonella typhi* and *S. paratyphoid*, *Shigella*, *Yersinia enterocolitica*, *Vibrio cholera* and *V. parahaemolyticus* are typical members with *Shigella*, *Salmonella*, (ETEC); EIEC, EPEC, *Yersinia* as obligate pathogens (Stokes and Ridge way, 1980). *Proteus*, *Citrobacter* sp. and *Klebsiellae* (inhabiting mainly respiratory and urogenital tract) as opportunistic tract becoming pathogenic only under very exceptional conditions. *Vibrio* sp. ranked as the top most dangerous characterized by a serious epidemic whose incidence is well known worldwide (Ernest et al, 1987). Their epidemiological importance is to the fact that many of them are common pathogens in the urinary and respiratory tracts, wounds (Ulcers), meningitis, gut and associated organs such as appendix, gall bladder and most occasionally acts elsewhere like in ears, heart, lung, kidney as opportunist pathogens in individual with defective defenses (Neal, 1996). Cheesbrough (1984) explained that specific antibodies develop in systemic infections, but it is uncertain whether they last. Antibodies against the core glycolipid of Enterobacteriaceae are associated with protection against the haemodynamic sequelae of bacteremia due to Gram negative rods and also reduce the fever response and augment intravascular clearance of certain organisms. The aetiological agents for enteric symptoms include protozoa such as *Entamoeba* and *Giardia* as well, enteric viruses are implicated (Lucas, 1984). The implication of these diseases ranges from economic losses, social incompatibility in addition to a devastating scourge of high mortality and morbidity. These were evidently experienced in Kano State Nigeria, where in the year 1996 its pilgrims were refused visas and hence deterred of entering Saudi Arabia for their Hajj obligations. It was also for the same reason that the 1996 world cup scheduled for Nigeria was never a reality. Unfortunately, the epidemics are still high, as well as the predisposing factors are still dominant. The low standard of personal and environmental hygiene, inadequate safe domestic and irrigation water, starvation, antibiotic resistance among the casual agents, low awareness and less availability of specific vaccine, even though WHO (1987) has put forward intervening strategies are the questionable epidemiological factors (Mukhtar and Deeni, 1995), presently, there is less or no previously published work on this subject matter by local authors in Kano State.

The objective of this investigation therefore, was to review the incidence of enteric infections in Kano State, Nigeria between the period of 1985 and 1996 with the sole aim of enriching the existing body of knowledge as regards to epidemics in the State as well as strengthening a baseline epidemiological data valuable for control measures and further research.

Materials and Methods

The study area

Kano State, (11° - 12.5° N; 8°E) with its population of approximately 5.6 million (NPC 1991) appeared to be one of the most epidemiologically important areas in Nigeria where the incidence appeared to be one enteric infection was common. This synchronises with condition of some developing countries (Cheesbrough, 1984) where water for domestic purposes was sourced from open wells, leaking water pipes, household reservoirs, river and dams. These might have been contaminated with excretory and faecal matter enteric pathogens (Micro-organisms) directly by man and/or animals (Sleigh and Duguid, 1989). Poor State of environmental sanitation and personal hygiene seems clearly as the common features of the people in many of the study area. These claims are what prompted the present review.

Data Collection

Enteric cases based on hospital and/or laboratory confirmed reports from all the public Health Centers (PHC) of the, then 34 local government areas in Kano State were monitored, collected and analysed according to standard Epidemiological protocols (Beck and Sherwood, 1991; Wald, 1991). The information gathered, were attested in the Statistics Department of the Directorate of infectious Disease, control and prevention, Kano State Ministry of Health.

Results

Table 1 shows the yearly reported of cases of enteric infections in Kano State through the period of ten years (1985-1996). Table 2 indicates the 1996 reported cases of Diarrhoea, Typhoid, and Paratyphoid fevers, poisoning and cholera in the population of the 34 Local Government areas of Kano State. Analysis of the result revealed that Shigellosis, enteroinvasive *Escherichia coli* (ELEC); *E. coli*, enteropathogenic *E. coli* (ETEC) type gastro-enteritis, diarrhoea and dysentery, typhoid and paratyphoid fevers, food poisoning and cholera were most prevalently laboratory confirmed cases. The study showed that a total of 2,227 reported cases with death of 59 was witnessed in 1985. In 1986 it rose to 39,201 out of which 974 died. In 1987, 132,833 cases and 423 death were noticed, in 1988, 978 died and 136,851 treated and discharged. In 1990, 60790 cases with 283 deaths were reported.

In 1991, another outbreak was confirmed by the State Ministry of Health when it was lamented that 376 victims were admitted out of which 109 died. More than 479 outward patients were nevertheless treated and discharged. These sum up to 85,653 cases and 1,816 death (Ministry of Health, Kano 1996).

In 1992, persons became infected and 653 total death reported 180,749 persons were presented with the disease in 1993 out of which 639 died. In 1994, the toll went away with 635 lives out of the afflicted 150,318 individuals.

Another surge was experienced in 1995 but mainly from September, increasing drastically through December the same year attacked 103,856 with corresponding 470 death cases. The intensity of the problem as observed in all the 34 Local Government areas of the State was severe in the early months of the year 1996. There were 6,827 cases due to typhoid and paratyphoid (TP) 14, 948 cases due to the impact of *Vibrio* organism. Thus, total populations of 231,981 individuals were afflicted and out of which 2,836 died. The intensity was at peak through the months of January to June 1996, when cholera according to reports was highly pronounced Table 2).

Discussion

The outbreak of enteric diseases in Kano State was screened local government wise. One will evidently begin to wonder why the devastating situation was so great and frequent (Fig.1). A possible answer was that perhaps water and/or food contamination was probably responsible. A fact that was studied by Mukhtar and Deeni (1995). Kano and Bukar (1998) observed also that the problem relates to microbiological pollution of the irrigation waters of the region.

The areas adversely affected (Albsu, Gezawa, Kumbosta, Madobi, Minjibir, Dala Sumaila. Tsanyawa, T/Wada, Wudil among others) have less access to safe domestic water (Fig. 3.) This was justified by the fact that many villages and even some urban areas depend on ponds/dams and open wells which appeared polluted by human and animals. An earlier pilot study by the authors of this study showed that, there was careless attitude towards repair of broken pipes and protection of their water sources. Tube wells situated close to pit latrines, polluted water irrigation practice, release of industrial effluents at the neighborhood of rivers are also possible reasons. The estimate of WHO (1987) that 80% of all sickness and diseases may be due to polluted water appeared to be applicable here.

The authors observed that this serious scourge with high death rate (Fig. 2) made the State Government to take active towards improving the safety of the drinking water in addition to improving the standard of environmental sanitation. Interviews carried out in some of the most strategic health like Murtala Mohammed Socialist Hospital, Infectious Diseases Hospital (I.D.H), some comprehensive clinics and paediatric hospitals, as well as with some international agencies for the control and prevention of the types of diseases present in Nigeria especially in Kano and Jigawa State; notably medicensis France, MSF BELGIQUE Deprestrat, the UNICEF, RED CROSS and others revealed that the frequency of the reported cases was high. Various reasoning maintained that the prevalence of especially gastro-enteritis was aggravated by the preponderance of the family *Enterbacteriaceae* in water and food especially vegetable items.

Coincidentally, within 1995 and 1996 some species of these organisms were isolated (by the same authors) from the drinking water source of many local Government in the State. That might have been responsible for the outbreak, which occurred shortly afterwards (Table 2). The same problem but with

Table 1: Reviewed cases of enteric infections in Kano State between 1995 and 1996.

Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Total Persons Yrs. & above	ND	ND	102	60429	43164	60570	3232	45353	102789	62026	44282	ND
Total Children 0-4 Yrs.	ND	ND	3382	136854	100561	100220	82421	75143	77960	88292	59574	ND
Total Cases Adult & Children	2227	39201	132835	197286	143725	160790	85653	121096	180749	150318	103856	231981
Total Cases Treated	2227	39201	132733	197286	143725	160790	85653	121096	180749	150318	103856	231981
Recovery	2068	38204	12940	133905	99064	99229	80386	72792	101877	112382	58105	229145
Death	59	474	423	413	225	283	1816	553	689	535	470	2836
Oral Salt Used			172	497	215080	239269	228926	128755	215888	126948	23238	ND
No of Health Personnel	ND	ND	141	273	2997	2328	815	1773	1619	2616	7940	ND
No. of Unit Reporting	3	266	255	320	139	180	44	238	168	202	1433	ND

Source: Primary Health Care Units of All the Local Government Under Permission of the Kano State Ministry of Health (1996).

ND: - Data Not Available

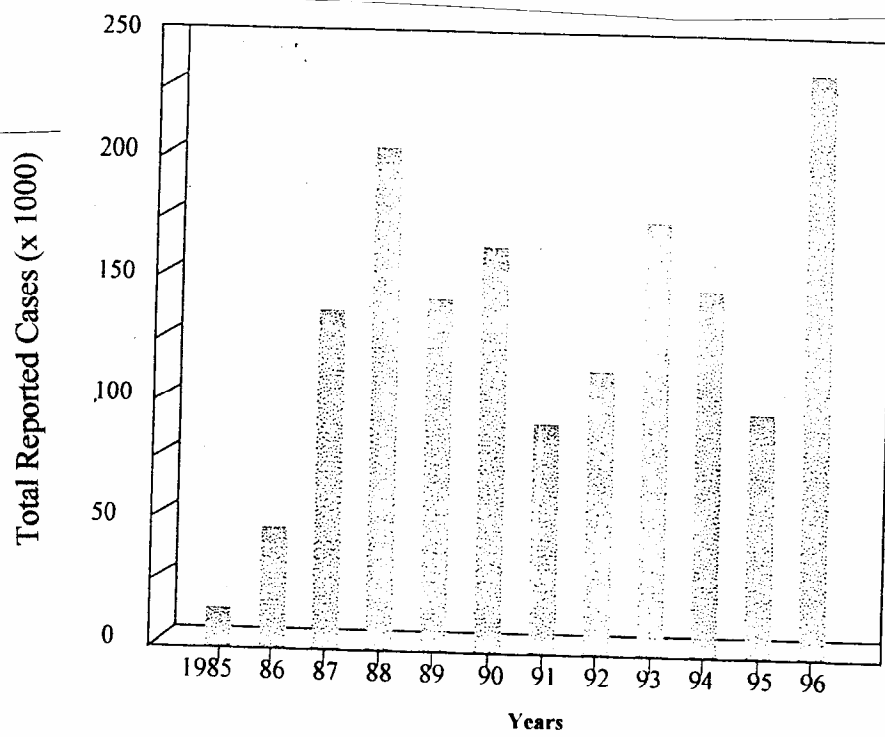


Fig. 1 Intensity of the enteric cases in Kano State between 1985 and 1996.

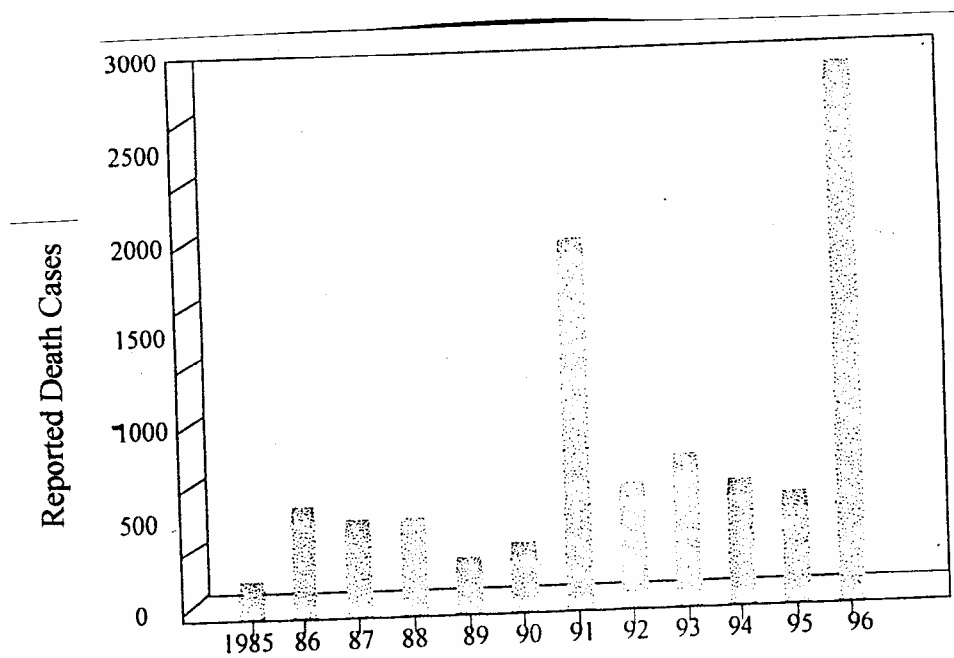


Fig.2 Death Cases due to Enteric Infections in Kano State (1985-1996).

varying degree was observed in other States like Kaduna, Sokoto, Yobe, Adamawa and some parts of Plateau State. Other areas affected were Nigeria and Oyo State (Anon 1996).

Nevertheless, the same UNDP mapped out of concern for emergency check-up of the apparent fearful conditions. Moreso, many local governments have raised alarm for government intervention. Up to four outbreaks within a ten-year period were witnessed. But in 1988, when 197286 suffered and 913 died WHO and the federal Government of Nigeria with other agencies were moved to intervene. Thus, the incidence dropped to 143,725 in 1989 and gradually fell to 85635 cases by 1991. The success indeed might be due to immunization and the awareness on the use of oral dehydration therapy (ORT).

Table 2 Showing the incidence of diarrhoea, typhoid and Paratyphoid, Food poisoning and cholera in the population of the 34 local government areas of Kano State in 1996.

S/N	LGA	Diarr. Without Blood (DN)	Diarr. With Blood (DB)	Typhoid & Para-typhoid (TF)	Food Poisoning (FP)	Cholera (CHL)	Total Cases	Death Cases	Critical Months
1	ALB	5757	3566	-	1892	*16	11231	637	January
2	BBJ	747	292	28	245	*ND	1312	126	
3	BCH	1824	1194	75	85	204	2117	14	Mar/July
4	BGW	1302	320	-	-	495	2117	14	Jan/Jul.
5	BNK	3692	3649	-	764	ND	8125	9	Jan/Apr.
6	DAL	16387	16128	2912	535	2193	38155	203	January
7	DBT	569	376	ND	ND	ND	945	26	Jan/Sep.
8	DKD	573	662	20	230	1142	2627	549	
9	DFT	1332	826	84	1	ND	2243	23	
10	DGW	ND	ND	ND	ND	ND	ND	ND	ND
11	GBS	250	68	-	35	ND	353	26	
12	GYA	1306	370	-	-	495	2171	-	Jan/Jul.
13	GZW	8521	5156	-	-	ND	13677	41	
14	GRZ	2947	2379	73	16	166	5581	41	Jan/Jul.
15	KBK	1089	574	-	-	104	1767	94	Jan/Mar.
16	KRY	3140	2743	6	-	ND	5999	ND	Jan/Jul.
17	KKU	1241	1713	788	-	1605	4605	392	Jan/July.
18	KUR	-	-	-	-	-	-	-	ND
19	KBT	11569	7701	1507	189	5881	26947	ND	
20	MDB	4551	2189	87	172	630	4629	ND	Jan/Jun.
21	MIB	7050	676	-	-	-	13820	ND	
22	KMC	8824	5682	490	39	351	15586	ND	Mar/Aug
23	NSR	2798	1635	43	31	64	5118	282	Jan/Apr.
24	RAN	2800	2660	-	66	-	5526	ND	April
25	RMG	519	357	ND	ND	ND	870	ND	April
26	SNN	5084	1388	-	-	166	6638	41	July
27	SML	7198	4612	-	2639	ND	14449	ND	January
28	TAK	976	505	92	325	525	2423	ND	Feb.
29	TFA	917	721	-	536	933	3107	13	Jan.
30	TYW	8596	4572	-	-	29	13197	ND	July
31	TWD	4418	3276	495	447	363	8099	32	Aug/Sep.
32	UGG	1335	382	25	-	35	1778	256	Jan/Feb.
33	WRA	2220	959	109	123	296	3709	9	Mar/Aug.
34	WDL	4018	4554	75	483	3	10033	ND	May.
TOTAL		114339	86704	6827	9163	14948	231981	2836	

*ND= No Data Available.

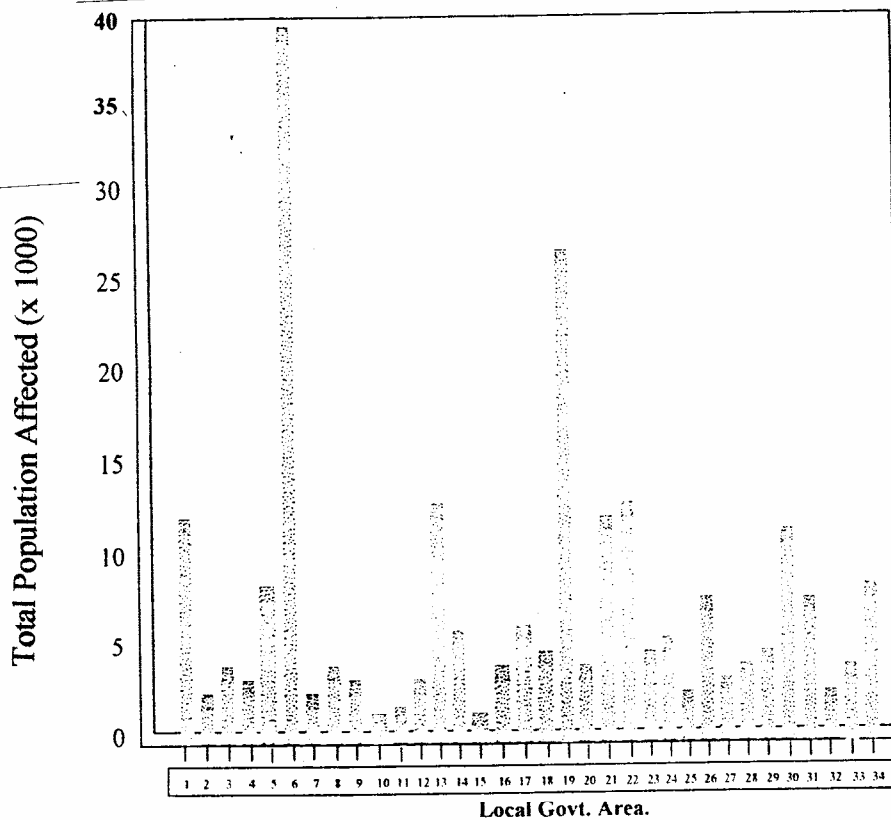


Fig. 3 Intensity of Reported Enteric Cases in the 34 Local Govt. Areas of Kano State for the year 1996.

Key:

1. Albasu 2. Bebeji 3. Bichi 4. Bagwai 5. Bunjure 6. Dala 7. Dambatta 8. Dawakin-Kudu 9. Dawakin-Tofa 10. Doguwa 11. Gabasawa 12. Gaya 13. Gezawa 14. Gwarzo 15. Kabo 16. Karaye 17. Kiru 18. Kura 19. Kumbotso 20. Kano Municipal 21. Madobi 22. Minjibir 23. Nasarawa 24. Rano 25. Rimin gado 26. Shanono 27. Sumaila 28. Takai 29. Tofa 30. Tsanyawa 31. Tudun wada 32. Ungogo 33. Warawa 34. Wudil.

Statistics showed that up to 228926 sachets of ORT had been used. Probably, the slight improvement of Health Education and Water Provision Schemes as facilitated by Directorate for food, Road and Rural Infrastructure (DFRRI), was responsible for a slight decrease in intensity of the menace. However in 1994, another outbreak was encountered, that was meanwhile apprehended by Health Ministry, such that in early days of 1995 the incidence dropped. Epidemic resurgence, was however experienced near the end of 1995, and continued thorough the first 8 months of the year 1996. This posed a real threat to the Nigeria Health sector. Nevertheless, the impact of the National Environmental Sanitation Scheme initiated and enforced by the Federal Government of Nigerian 1983 and 1985 must be appreciated. It is moreover, hoped that the serious attention presently being directed to health, water supply and transport sectors would pave the way for controlling these diseases just like smallpox, which has now become a history. (WHO, 1987). Despite the above steps, the fear was that the seriousness with which the public considers the program of environmental sanitation exercise has diminished. Thus, health education and re-orientation of the population may be desirable.

The recurring disaster could be checked completely out of Nigeria, given proper adjustment and modalities. However health education and economic status among the population has to be improved. These indeed, are the major ways that would invariably aid not only Kano State but the developing nations in standardizing the public health.

Present Control and Preventive Strategies

Federal Government of Nigeria in its effort to root out these epidemics, has declared a staggering sum of ₦1,329 million Naira in Kano State to augment with its 16 million Naira for the purchase of drugs to distribute to all Hospital to give patients at subsidized price. the Petroleum Special Trust Fund (PTF) was the main channel. The P.T.F. further approved another sum of 5 billion Naira to Kano and Lagos State to complete their water projects so that portable water would be made available to the citizens. Accordingly the Challawa, Watari, Magaga and Thomas dams (water) were being rehabilitated. This in addition to making up to 900 boreholes functional throughout the state (Anon 1996).

Recommendations

The World health Organisation (1987) at its 40th assembly, urged member states, (Nigeria inclusive) to support and encourage epidemiological investigation on the source of out brake for emergency interventions. In line with that, the Kano State Government creates awareness through television, radio and public lectures against dangerous infections. Some Non-Governmental organisations (NGOs) such as Youth Society for the prevention of infectious diseases and social vices (YOSPIS) also contributed immensely in this regard. In general, action should be taken at the individual family and community levels and by instituting surveillance charts and health education forum on hygiene, sanitation, oral dehydration therapy (ORT) and nutrition as well as referral when the need arises Cheesbrough (1984). Village and/or primary health care centres are dispensary and/or primary health care centres are cheapest points, according to Lucas (1984). At these levels, specific immunisation, chemoprophylaxis and specific treatments suffice. There was a record of an appreciable assistance from France Government, MSF Belque Duprestrat in collaboration while the UNICEF, WHO, UNDP, World bank assisted programs, Ministry of Health Kano, (1996). Other local, national and international organisation should be informed of the need to assist the State in its health matters. The antibiotics-resistance in *Enterobacteriaceae* and inefficiency of vaccines, due to improper awareness at the part of the populace, mishandling errors at the part of the personnel, storage inadequacies, etc, might be the serious limiting factors requiring attention in the control and prevention of these grievous and revelous incidences. Nevertheless, at international levels, the scientific working group on case management, epidemiology and prevention throughout the world emphasized on the increased research, momentum to exploit better, areas of immunology, microbiology, vaccines development, chemotherapy as well as the control of antibiotic resistance.

In this connection, further research by the authors of this study to investigate in-vitro, antibiotic-resistance among enterobacteria isolated from the drinking waters of the population of Kano states was prompted. That was with a view of finding a lasting solution to this public health hazard. Actually a vigorous and more research is highly needed as to date, less work was done and or published in this area in Kano State.

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