QUALITY STATUS OF PURE (SACHET) WATER PRODUCED IN ABA URBAN, IMO STATE, SOUTH EASTERN NIGERIA

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ABSTRACT

Portable water availability in the burgeoning cities of Sub-Sahara Africa over the past two decades has experienced a gradual degradation and collapse of catchment areas, treatment and delivery installations managed by parastatal water corporations. Private entrepreneurs now proliferate in this sector, which is fraught with illegality and lack of good manufacturing practice with health and environmental implications. The paper analyses the quality status of sachet-vended water and concludes that it is sub-standard. This is as a result of lack of honesty, integrity, good manufacturing environment and hygienic conduct in the industry. There is general consensus that sachet-vended water has come to stay and that what is needed is to create an enabling environment for the improvement of quality and for effective sachet disposal and treatment

Keywords: Quality status, sachet-vended water, health, hygiene, control and quality improvement, environment, good manufacturing practice.

INTRODUCTION

Unclean water is a danger to humans and is the major cause of water borne disease such as diarrhea, dysentery, typhoid fever, stomach pains, guinea worm infection schistosomiasis, trachoma, ascariasis, trchuriasis and look worm (Population Reports, 2002).

It is for this reason that all societies long and crave for clean and potable water. Unfortunately only a tiny percentage of people globally have access to good water. The number of urban residents without access to improved water sources increased from 113 mfllion in 1990 to 173 million in 2000 (World Population Report, 2002). In Nigeria, the problem of water is such that demand outstrips supply. In Calabar less than 11% of the residents can boast of in-house water supply (Ekpo, 1991). The situation is not getting better with the current increases in connection fees by the cross River State Water Board Limited to ₦27,000 for connection or reconnection. The situation is even more pathetic for Aba, the commercial capital of Imo State with a population of 648,531 persons as at 1991 (National Population commission). Here the taps have become old, rusty, broken at several points and perpetually dry for most parts of the year (Anakwe, 2002). This has made water supply in the town to be dominated by the

private sector who vend water to the public through commercial boreholes. It is also from these boreholes that the packaged water in polythene sachets originate. The production of sachet water is motivated mainly by commercial reasons, hence quality considerations are secondary (Anakwe 2002). And Aba, the so-called japan of Africa (by residents) is littered with many production centers from where these products are distributed to other towns in Eastern Nigeria.

However, it is important to note that the packaging of water in polythene sachets (pure water) has been an old practice in Aba town since the 70's. It is therefore wrong for some people to claim that the practice began in the early 90's (champion, August 4, 2001). Indeed, in Aba town especially around the major markets, it was common those days (in the 60's & 70's) for water vendors to sell water to traders and their customers using thin Nylon bags also called "water proofs". This was usually done right there in the market place in the full glare of prospective customers. The idea was to provide water to quench the thirst of people who come from afar to the market to do business. It was cheap (just one sachet for one kobo!) and provided quick income to the water vendors.

It is this practice that has metamorphosed into the current method of packaging drinking water in polythene bags using automated sealing machines and different kinds of labels/trade names. This, of course is aimed at standardization and improvement of quality. Some scholars who are interested in water quality have analyzed pure water samples in their domain and have given us indications that these so-called pure water are poor in quality and indeed not pure. This paper is the contribution of the authors to the on-going discourage on the quality of pure water sold to members of the public. And it is coming at a time when pure water is generating a lot of debate at the national level and is even a subject before the national assembly. This is not surprising considering the fact that the issues affect health and the environment.

LITERATURE REVIEW

The literature on pure (sachet) water is quite scanty and limited to newspaper publications except for the recent work of the pharmacist, Dr Udoma Mendie, of the Department of phamaceutics and pharmaceutics Technology, College of Medicine, University of Lagos. This is virtually the most current academic work on this subject as far as these authors are privileged to know.

In the literature, the water that is packaged in polythene bags is variously reformed to as 'sachet water', 'pure water', 'Nylon water', 'packaged water', travellers water' etc (Anakwe 2002, David 2004, Mendie 2003, Okolo 2004).

However, the most popular and widely used name for this brand of water is 'pure water' (Akunyili, 2004). Almost every Nigerian knows that the water that is packaged in transparent Nylon bags and sold in almost every street or market in the Country is called 'pure water'. In this paper we shall use the term pure water and sachet water interchangeably.

The packaging of drinking water in polythene bags using machines started in Aba town in the early 90's (daily champion, August 4, 2001). The proliferation of production centers and pure water vendors is however fraught with a lot of illegality (Daily champion, June 26, 2001). In other words most people go into the business without registering with the National Agency for Food, Drug Administration and Control (NAFDAC), the regulating body. This had led people to question the quality, safety and wholesomeness of this type of drinking water. Infact some persons have gone ahead to call for a complete ban on the production of sachet water alleging that it is the greatest disgrace to the environment (Vanguard, July 6, 2004). This people argue that the sachets are not biodegradable and that they liter the environment. Infact, David (2004) stated that 'from beginning to the end' pure water is a danger to humanity'.

The recent work by Mendie (2003) clearly shows that it is the non-adherence of manufacturers t Good Manufacturing Practice (GMP) that is the root cause of the poor quality of the product. Howeve the question of honesty, integrity, manufacturing environment, sub-standard equipments, unhygieni conduct during packaging, lawlessness and greed have been seen as contributing factors to th substandard quality of pure water (Anakwe, 2002). For this industry to provide quality service to thi country, there will be need for NAFDAC to enforce existing legislation (Anakwe 2002). And talkin about legislative, Okolo (2004) observed that there has been a rush to push a ban on pure water throug legislation. In otherwords the executive arm of government has already forwarded a bill to the legislativ arm to ban the production of pure water. This latter development is hinged on the indiscriminat disposal of pure water sachets. On the issue of the disposal of pure water sachets, Anakwe (2002 suggested that pure water producers should be asked to convert to bottled water. This according to he will reduce indiscriminate disposal, reduce participation by unserious manufacturers, enhanc monitoring, quality and control.

Writers like Okolo (2004) have argued that the issue of disposal is not the entirely th responsibility of pure water manufacturers but all stakeholders.

The controversy surrounding pure water not withstanding, there is a general consensus that it ha come to stay and that what is needed is to create the enabling environment for the improvement o quality and for effective sachet disposal and treatment.

THE STUDY AREA

Aba is located between longitude 6^0 30'E and 8^0 30'E and latitude 4^0 20'N and 6^0 15'N of th Equator. It is a major commercial city in Imo State, South Eastern Nigeria. Aba is a town with

population of over 648, 000 (NPC, 1991). It is a town with high residential density, over crowding and chronic traffic congestion. This has been attributed to the industrial status of the town.

The city is grounded on top of the south-east coastal plain sands, a late tertiary (Neocene) deposit composed of lateritic material and minor fine grained sands (Udo, 1970). The entire topography of Aba is characterized by undulating plains and the maximum elevation not exceeding 50-70 m above sea level.

The Aba River also called Ogbor Hill stream is the dominant drainage of the town. At present the town comprises of two separate Local Government Areas, namely Aba North and Aba south with headquarters at Eziama and Aba urban respectively. Generally speaking, Aba is one of the oldest towns in Eastern Nigeria which is famous far the Aba women tax riot of 1929.

The climate is that which is typical of most places in south-eastern Nigeria with very torrential down pours in the rainy season and high temperatures in the dry season. The annual rainfall totals is between and temperatures range between - making people very thirsty especially during the dry period.

STUDY METHOD

For the purpose of sampling the different kinds of pure water produced in Aba, the town was divided into five(s) geo-political zones which was adopted from the National population commission Report as follows:

Zone	Population
1. Port Harcourt Road (A)	98, 088
2. Ngwa – Obolia Road (B)	150, 300
3. Ezukwu – Country axis (C)	90, 650
4. Faulks /Ariaria/Owerri Road area (D)	194, 520
5. Aba Urban Ogbor hill (E)	114, 973
TOTAL	**648, 531**

* Source: N. P. C., 1991.

We then proceeded to identify the pure water manufacturing points using their labels and information gotten from field guides. The team comprising not less than two researchers visited such locations to pick samples for analysis. The entire exercise lasted for 8 weeks.

Two sample each were collected from each location and then taken to the laboratory for analysis. Five locations were visited and ten samples were analysed in all. The number of samples were limited by the prohibitive cost of analysis. The water samples were analysed for PH using the PH meter, total hardness in terms of Ethylenediamined. Tetracetic acid (EDTA) method, chloride and sodium, using the MOAR method, total iron using the phenanthntere method (APHA, 1975). Potassium and manganese cations were equally analysed to assess their concentration using standard titration methods. The results of the above analysis were compared with WHO specifications for potable water.

RESULTS AND DISCUSSIONS

Table 1 shows the location of pure water factories which were identified in the course of any study. Table 2 shows the results of the pure water quality analysis while. Table 3 compares their values with the WHO standard for potable water.

Table 1: Location of pure water factories in Aba Urban.

Of the thirty nine (39) pure water factories encountered in the study only three had NAFDAC registration numbers. In otherwords one out of 13 (thirteen) packaged water produced in Aba is illegal. Yet NAFDAC certification is necessary to establish purity status and suitability for human consumption. The danger clearly is that the uncertified ones may be unhinegenically produced and therefore contaminated. This is dangerous to the health and well being of the people.

Table 2:

Water quality parameters of samples of pure water produced in Aba

Source: Laboratory Analysis.

Table 3:

International Water Quality Guidelines for Drinking Water (WHO) 1984.

It was generally observed the pure water samples in Aba had a PH value of between 3.4 to 6.92. Their appearance (colour) was clear except for the samples from zone E whose appearance was considered objectionable. With respect to total hardness we observed that the samples were quite within the acceptable limits of WHO guidelines.

The concentrations of (iron) in the samples did not show marked differences between (iron) concentration was as high as 7.8 mgl^{-1} as against the WHO standard of 0.3 mgl^{-1}. The level of chlorides in the samples was rather low (1.0 mgl^{-1} – 28 mgl^{-1}) when compared with the WHO standard of 250 mg/L. The same is true for sodium and potassium. Surprisingly, the level of manganese in all the

samples were higher than the limit set by WHO. Although the effect of these elements on the human body is unknown to the authors, it advisable to abide by the limits set by the World Health Organization.

In terms of ranking, using the identified quality parameters, samples from zone D was adjudged the best by the authors in terms of purity status. This is not surprising since this zone had more NAFDAC approved pure water samples such as Ecoson and Royal pure water.

CONCLUSION

The result of the analysis of pure water samples collected from Aba Urban shows a rather high concentration of manganese in the water. Although the immediate impact of this on human health was not investigated, it was seen as a type of contamination which must be handled in line with the 'clean water act'.

In general, we conclude that the pure water produced in Aba is not entirely safe for drinking even though most of the analyzed parameters did not exceed the Who standard. Moreover, further shows that field observation most manufacturers of pure water merely market untreated water to the public. With minimum education and quest for profit, the producers simply fetch water from boreholes and seal in cellophane bags for people.

The situation has been rather be worsened by the absence of institutional control in terms of supervision, monitoring and legislation. Most urgently, the sanitary condition in the town needs immediate attention as every street in Aba is littered by pure water sachets.

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FIG 1a: Map of Aba showing Sachet Water Sample Distribution Points

FIG 1b. Map of Nigeria Showing Aba (Abia)

TABLE 1

Zone	Name of factory	Location of NAFDAC REG.
A. Port Harcourt Road.	* Bendonac Hygienic pure water	16 Eziora Street NIL
	* Nenue Pure Water	58 Crystal Park NIL
	* Oasis Pure Water	1 Uratta Sreet NIL
	* Amaka Pure Water	8 Crystal Park NIL
	* De Blessed Pure Water	20 Assanetic NIL
	* Evita Pure Water	20 PH Road NIL
	* New Life Pure Water	60 Furo Street NIL
	* Living Spring Pure Water	128 PH Rd. NIL
	* Salcon Rouae Water	05 Isioma Layout YES
	* Blosson Royal Pure Water	12 Ukpo Street NIL
B. Ngwa – Obolia axis	* Precious National Water	No. 8 College Rd. NIL
	* Mercy Pure Water	1 Ngwa Rd. NIL
	* Favour Pure Water	316 Oboliva Rd. NIL
	* Topmost Pure Water	36 B Ngwa Rd. NIL
	* Anex Pure Water	6 Lreogi Rd. NIL
	* Every Pure Water	43 Mbieri Street NIL

	* Fonnry Pure Water	15 Olanku Rd. YES
C. Ezlukwu-Cametry area	* City Pure Water	38 Market Road NIL
	* Dandy Pure Water	16 Market Road NIL
	* Divine Pure Water	70 Osobuike Street NIL
	* Leisure Pure Water	11 Equeyon Street NIL
	* Umon Pure Water	35 Street Philips Street NIL
	* Ifeco Royal Pure Water	3 Over Rd. NIL
	* High quality Pure Water	43 Ogobuike Street NIL
	* Special Care Pure Water	57 Cametry Rd. NIL
	* Chekwas Hygienic Pure Water	20 Onyeagroa Street NIL
	* Standard Pure Water	14 Onye Agwa Street NIL
	* Ecoson Pure Water	33 Onyebuchi Street YES
D. Faulks/ Ariaria/ Owerri Rd	* Perfect Water	228 Faulks Rd. NIL
	* Brifat Pure Water	174 Faulks Rd. NIL

	* Top-Hill Pure Water	15 Ukah Street NIL
	* Leder Pure Water	138 Faulks Rd. NIL
	* Blessed Pure Water	24 Okigwe Rd. NIL
	* Royal Pure Water	131 Faulks Rd. NIL
E. Aba Urban *Ogbor hill*	* Aquafresh Pure Water	175 Tenant Rd. NIL
	* Divine Pure Water	72 Cameroun St. NIL
	* Soma Pure Water	16 Jubilee Rd. NIL
	* Augelic Pure Water	24 Tenant NIL
	* Luna Pure Water	10 School Rd. NIL

Table 2

Parameter	Value				
	Zone A	Zone B	Zone C	Zone D	Zone E
PH	5.8-6.5	3.4-6.5	5.2-6.92	5.2-6.0	5.3-6.2
Appearance	Clear	Clear	Clear	Clear	Objectionable
Total hardness (Mg/L)	10.0-72.0	8.0-68.0	25.0-38.0	15.0-33.0	8.0-17.0
Fe(total, Mg L^{-1})	0.05-7.8	0.02-0.09	0.02-0.08	0.02-0.08	0.01-0.50
Chtoride (Mg L^{-1})	1.0-25.8	8.08-20	8.0-20	10-28	7.60-6.0
Sodium (Mg L^{-1})	0.1-15.0	20.0-22.5	0.5-1.8	0.5-1.8	0.5-0.8
Potassium (Mg L^{-1})	0.8-1.5	0.8-1.5	0.8-1.5	0.8-1.5	0.45-2.5
Manganese (Mg L^{-1})	2.85-10.0	3.0-10.0	3.0-10.0	3-10.0	Not detected

Source: Laboratory Analysis.

TABLE 3

S/N	PARAMETERS	UNIT	GUIDED VALUE
1	PH		65 – 8.5
2	Tempoc		Varios
3	Colour		50
4	Turbidity		50
5	Calcium	Mg/L	200
6	Magnesium	Mg/L	150
7	Sodium	Mg/L	200
8	Sulphate	Mg/L	400
9	Chloride	Mg/L	250
10	Nitrate	Mg/L	20
11	Fluoride	Mg/L	1.5
12	Chlorine	Mg/L	0.5
13	Iron	Mg/L	0.3
14	Manganese	Mg/L	1
15	Total hardness	Mg/L	500
16	Farcical Coliforms of Water	Mg/L	100

Source: International Water Quality Guidelines for Drinking Water (WHO) 1984.

FIG. 1 MAP OF ABA SHOWING SACHET WATER SAMPLE DISTRIBUTION POINTS

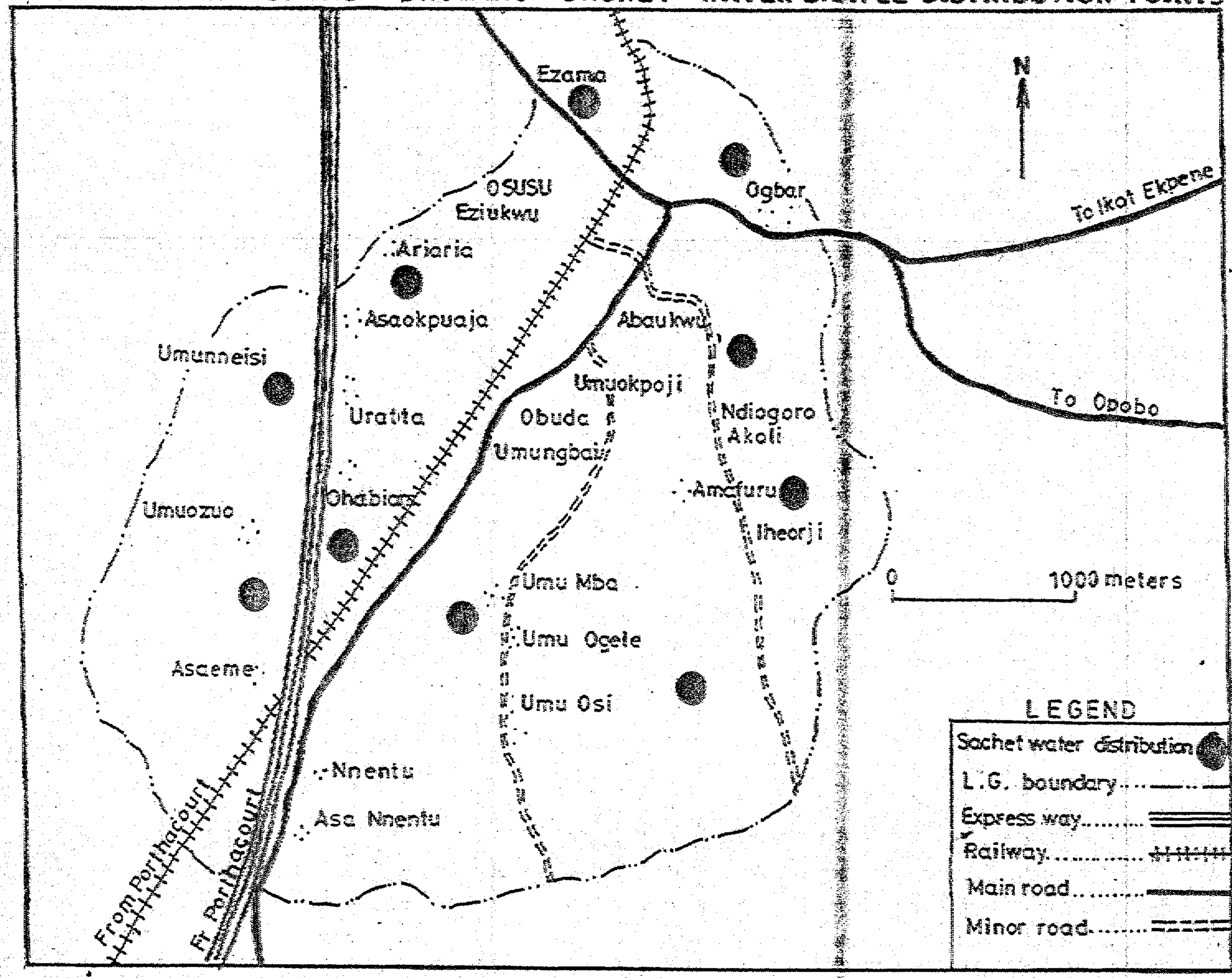

Fig. 1

Fig 2: Map of Nigeria Showing Imo