

6th WEDC Conference: March 1980: Water and waste engineering in Africa

N EGBUNIWE

ALTERNATIVE EXCRETA DISPOSAL SYSTEMS IN EASTERN NIGERIA

Introduction

Modern sanitary facilities for the disposal of excreta are lacking or may not be possible in many parts of Eastern Nigeria. The possible reasons for this situation are: ignorance of the role of excreta in disease transmission, lack of pipeborne water supplies to many communities, shortage of water where pipeborne water is available, high cost of sewerage, the need to have low cost systems and the placement of sanitation as a low priority item by the state governments. Sanitary facilities in use in Eastern Nigeria are briefly described here. The need for appropriate technologies in sanitation that are safe, effective and economic cannot be over-emphasized in the area under consideration.

Characteristics of Faecal Wastes

Table 1: Some physical and chemical characteristics of faecal materials per person

Composition	Faeces	Urine
Quantity (wet) per day	501-800 gm(1)	950 - 110 gm
Quantity (wet) per toilet	200-301 gm	-
Moisture	70-83%	-
Total Nitrogen	0.5-0.8%	-
Phosphates	0.3-0.4%	-

(1) Values got from measurements of nightsoil at Umuahia and Nsukka.

The quantity of wastes per person per day is an important parameter in the design of disposal systems. Wastes consist mainly of faeces, urine and cleansing materials. Cleansing materials in use in the area include sticks, leaves especially those of plantain and banana, pages of newspapers, walls of toilets and toilet rolls. The faecal output of a person depends on the diet, age, body weight and liquid intake. Some physical and chemical characteristics of human wastes are presented in Table 1. Values got from nightsoil included

cleansing materials and some urine. The mean number of use of toilet per person per day in the area is two. The following quantities are proposed as adequate for design purposes:

Faeces including cleansing materials	600 gm per person per day
Urine	1000 gm " "
Total	1600 gm " "

The high output of faeces is due to the high cellulose content of the diets in the area. The low nitrogen and phosphate contents of the faeces tested show low protein and mineral intake of the people of the area.

Bush Method of Excreta Disposal

Table 2: Disposal systems in some towns and villages in Eastern Nigeria

Town or village	Percentage of Population served by				
	Central Sewer	Septic Tanks	Pit Latrine	Bucket latrine	None
Nsukka(1) (excluding the University)	-	32	14	50	4
Enugu (1)	2	34	1	57	6
Ovoko (2)	-	2	90	-	8
Umoye (2)	-	-	89	-	11
Obukpa (2)	-	3	87	-	10

(1) Urban centre

(2) Village

This method includes defecation in parks, uncompleted buildings, market places and open fields. A look at table 2 shows that about 5% of the population of the urban centres studied have no excreta disposal facilities. Most of these people live in shanty towns at the fringes of the urban centres. The percentage that use this method in the rural areas is higher due to reasons already mentioned. There is also a practice in the rural areas of fertilizing the field with excreta. The health hazards posed by this method are enormous.

Pier Latrine: A squatting plate with a hole is constructed on a wooden platform held over the



Fig.1: Pier Laterine



FIG. 2: SOILS OF EASTERN NIGERIA

body of water by tree trunks or planks driven into bed of the river or sea. The platform is connected with banks of the creeks by a wooden bridge (Fig.1). This method is in use in the riverine and estuarine areas of Eastern Nigeria. Studies conducted in Port Harcourt show that 15% of the population depend on this system. Little or no nuisance from smell and flies is associated with this system. It is the cheapest disposal facility in the study area. Tremendous dilution of the wastes is provided by the large bodies of water. Sometimes, the same body of water used for excreta disposal is also used for domestic purposes. The sanitary consequences of this situation are grave.

Pit Laterine: A squatting plate or a wooden seat is constructed over a pit of about .9m in

diameter dug in a permeable soil. Referring to fig.2 it could be seen that most of the soils in the study area are laterites and sands. Impermeable clays and basement complex east of Abakaliki and north of Calabar are unsuitable for construction of pit laterines. Table 2 shows that up to 90% of the population in the villages studied depend on this system. Pit laterine is not popular in the urban areas because of the unavailability of land to dig more pits when the old ones are full. The pits in the study area are usually badly constructed and cave-ins are common. Pit laterines when properly built are hygienic and can function without smell or fly nuisance.

Bucket Laterine

Table 3: Disposal Systems in Enugu

Ward	Percentage of population served by				
	Central Sewer	Septic Tanks	Pit Laterine	Bucket Laterine	None
Ogui Urban area	-	10	2	84	4
Uwani	-	68	-	27	5
Abakpa Nike	-	22	1	70	7
Riverside Estate	99	-	-	-	1
GRA	-	99	-	-	1
Colliery Qtrs.	-	33	5	60	3
Iva Qtrs.	-	6	10	81	3
Ogbete	-	9	1	84	6
P&T & Rlway Qts	-	60	-	40	-
Asaba	-	7	-	83	10
Secretariat Qts	-	86	-	12	2
Ogui New Layout	-	37	-	60	3
China Town	-	4	-	84	11
Emene	-	4	4	80	12
New Haven	-	80	-	8	12

A seat is usually built over a bucket located in a rectangular fly-light chamber. This is the system mostly used in the urban areas. Table 3 shows that up to 34% of the population of the urban areas studied use this system. The cost of the bucket is low but the cost of removal and disposal of the bucket contents is becoming increasingly high.

Conservancy system is the method of collecting and disposing of nightsoil from bucket laterines by hired or employed labourers. The conservancy projects are handled by the Health Departments of the Urban Councils. The Health Departments award contracts to registered conservancy contractors. These contractors employ labour and buy necessary equipment approved by the Health Department.

Conservancy Practice in Enugu

Table 4: Conservancy Service At Enugu

Contractor's zone	Staff Population	Annual Expenditure on Staff	Annual Expenditure on equipment	State of health of staff	
				Good	Poor
Ogui, Asaba, Ogui Urban & New Layout	40	40,000	10,000	35	5
Ogbete, Awkunanaw & Uwani	25	33,000	8,000	24	1
Emene & Abakpa Nike	30	36,000	8,000	20	10

Table 4 shows that Enugu is divided into three conservancy districts. A contractor handles each district. The contractors' problems are:

- Unavailability of Scavengers since the present labourers are ageing and younger men are hard to come by.
- Irregular subventions from the urban councils causing regular strikes of the nightsoil men.
- No care of the bucket facilities by the customers.
- Over population of the houses.
- Shortage of water for cleaning the facilities.

The existing system of conservancy violates all laws of sanitation. Most units each serve a population of over 30 persons and the frequency of collection and disposal of the nightsoil are irregular. The collection chamber is often badly kept. The health hazards resulting from these conservancy practices are alarmingly obvious.

Septic Tank

This is the most popular system in use in most towns in Eastern Nigeria because tanks can be built for single housing units. In 1960 7% of the population of Enugu depended on this system and in 1978 the percentage was over 34. Some urban councils have enacted laws requiring all houses in their local government areas to convert to this system. This has not been possible due to the incessant shortage of water. The septic tanks are usually constructed to take sewage from the W.C. while sullage from the kitchen and bathrooms is run into the street gutters. From the studies at Enugu, Nsukka and Onitsha, the desludging intervals range between 3-5 years and the rate of accumulation of sludge per person per year is between .03 and .06 m³ with an average of .043 m³.

Aqua Privy: This is a simplified version of the septic tank. It receives excreta through the drop hole and requires only a small volume of added water to maintain the liquid level in the tank. This system is not popular in Eastern Nigeria. Only one aqua privy was located at Abakpa Nike, Enugu. Due to lack of water the owner built a hut on top of his septic tank and drained the sullage from the bathrooms into the tank. A drop hole was made on the slab covering the tank. This privy was constructed in 1975. It is in good structural condition and has operated with little nuisance from smell and flies. The only problem so far encountered is that the tank is a breeding ground for mosquitoes. Aqua privies should provide one of the best compromise systems of sanitation as they need less water, less capital equipment and less maintenance than any other system capable of the same degree of protection from nuisance and disease. A design formula for the tank volume has been given by Mann (1) as $V = PQ + SP$ where

V is the tank volume, P is the average number of users, Q is the average volume of liquid discharged in l/person/day and S is the volume of sludge storage allowed in the tank per person (120 - 150 l/person allows for a desludging interval of 2 years).

Discussion

Excreta disposal system according to Wagner (2) should satisfy the following requirements:-

- (a) No contamination of surface soil
- (b) No pollution of groundwater or surface water.
- (c) No handling of fresh excreta
- (d) Excreta should not be accessible to flies or rodents.

The pier laterines will be in use in the estuarine areas of Eastern Nigeria for a long time, because the disposal system is simple and cheap and land may not be available for other types. The creek waters are saline most of the year and there is no possibility of using such waters for domestic use. The laterines can be located such that their beds are never exposed during low tides. Contact with water in bathing and fishing, is still hazardous.

The bucket system will be phased out of the urban areas when staff for the conservancy system are unavailable. The average age of such staff at Enugu is 45 years and with the introduction of universal free primary education, it is unlikely that younger men will join the ranks of nightsoil men. It is noteworthy to point out that the governments of Eastern Nigeria have embarked on massive water supply programmes for the urban centres and this will enable the various laws enacted to compel house owners to change to septic tanks be effective. Septic tanks are very popular in the study area and will replace all other systems as water is available. The rural areas will depend on pit laterines for a long time due to inadequate rural water supply programmes. Efforts should be made to construct better pit laterines. The Vented Indirect Pit (VIP)

laterines described by Wright (3) should be introduced since they have been shown to be safe, effective and acceptable from economic and socio-cultural standpoints for people of identical cultural practices. The people should be educated to construct aqua privies when water supply is inadequate and convert them to septic tanks when supplies improve.

References

1. Mann H.I. Sanitation without Sewers. Overseas building Notes, No.168, Building Research Station, England, 1976.
2. Wagner E.G. and Lanoix, J.N. Excreta disposal for rural areas and small communities, WHO 1958.
3. Wright A.M. A review of Rural Excreta Disposal Systems, Prog. Wat. Tech. Tech. Vol.11, 211-218, 1978.