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Short Communication

Prospects and processes of human waste management in the rural areas of Nigeria

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The effect of indiscriminate defecation in the rural areas has degenerated into deadly disease such as, typhoid, tuberculosis, cholera, dysentery, diarrhoea etc. Even some of these killer diseases cause food poisoning when infecting human bodies by causing the various symptoms in some parts of the bodies, such symptoms include abdominal pains, diarrhea, gastroenteritis, prostration and vomiting. In the villages, disposal of night soil is the most neglected element of village sanitation. Open areas are used by grown-up people for answering the call of nature, while front or back of the houses are used by the old, sick and children. Such filthy conditions form very suitable breeding places for flies. These flies carry deadly disease bacteria, such as those that cause cholera, dysentery, small pox, tuberculosis and typhoid. This paper will examine the prospects and processes of human waste management in the rural areas of Nigeria, using ventilated improved-pit latrine (VIP)

Key words: Waste management, human, disease, ventilated improved pit latrine.

INTRODUCTION

Pollution is pervasive, and few countries whether developing or industrialized have adequately safeguarded their water qualities and control waste products by avoiding or minimizing pollution. An average raw sewage contains about 1000 mg/L of solid in solution and suspension and thus about 99% water. Clearly a sample measure of the total contents of a sample is insufficient to specify its character since a clear sparkling groundwater might have the same solid contents as raw sewage (Terbutt, 1981).

Many countries do not have standards to control waste products adequately while others cannot enforce management standards. International development agencies are urging that developing countries like Nigeria, should devote more attention to projecting and improving their waste management polices especially in the rural areas where 70% of the population are illiterates and they are exposed to deadly infectious disease caused by indiscriminate faecal deposition at the near by bushes. These excreta-related diseases which are responsible for large proportion of morbidity and mortality in rural areas, where adequate water supplies and sanitation facilities are often absent. Excreta control is thus of paramount importance if the incidence of these diseases is to be reduced. The sanitation technology selected or suggested to meet the needs of the rural dweller's programme is the ventilated improved pit latrine (VIP latrine). This latrine is the result of extensive research particularly in our rural areas (Oluwande, 1978). This particular latrine is free of odour and flies, clean and durable when correctly built. Ventilated improved pit latrine can be used by individuals or public latrines mostly in the institutions such as schools, colleges, health clinics markets. A discussion of the prospects and process of human waste management using this technology or device will be discussed.

THE VENTILATED IMPROVED PIT LATRINE

In the developing countries the ventilated pit latrine is the cheapest, simplest sanitary method, which can be afforded by most rural dwellers. VIP latrine is an improved pit latrine that gives convenience to the users and does not smell or attracts flies due to vent pipe attached to it, therefore it can be built close to houses and road. In this modern era a large percentage of the people in the rural areas can still afford it as well as its simple and functional method of operation. It has a great advantage over the traditional pit latrine, especially as it controls the usual bad odour and flies that are attracted to the odour. Also, other disease carrying insects are

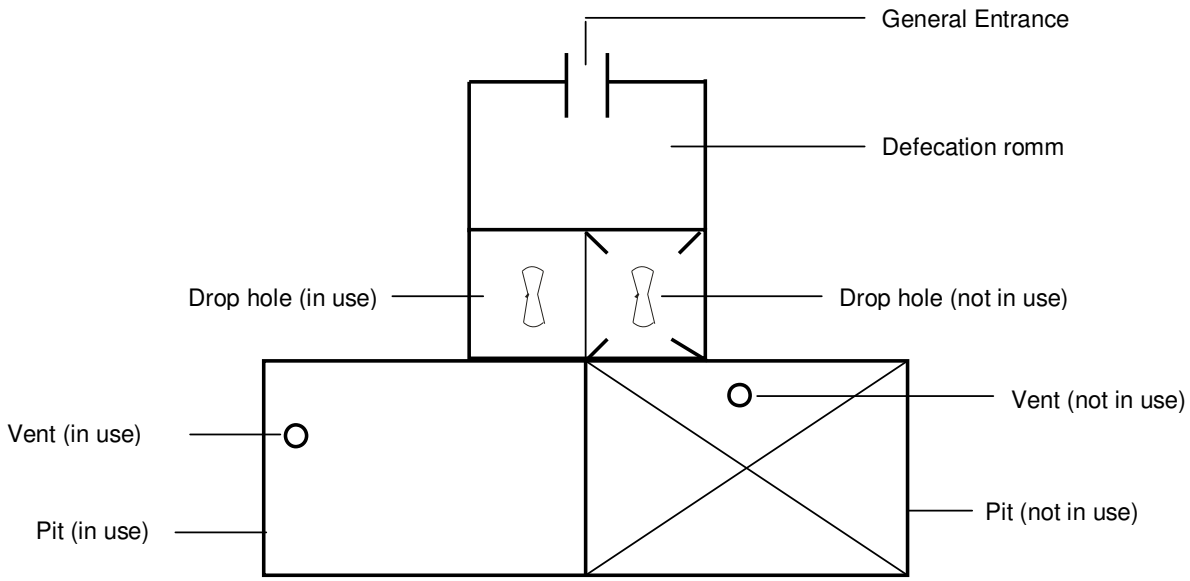

Figure 1. Plan view of domestic alternating pit (VIP latrine).

bred in the pit and container. In addition, VIP latrine is well planned and built for important features, which makes it popular and distinguish it from tradition types of pit latrines. This distinction can be seen in the following areas:

(a) They are designed to be safe from the user and are built to last for a long time. In other words, they have safety and durability advantages.
(b) They have a super structure that is off set from the pit and a tall vertical vent pipe with a fly screen that is fitted outside of the latrine superstructure. The vent pipe is responsible for both odour and fly control.

ODOUR CONTROL

The principal mechanism introducing ventilation in the ventilated improved pit latrine is the action of the wind blowing across the top of the vent pipe and effectively sucking foul smelling gases out of the vent pipe. Obviously, by this action fresh air enters the pit through the squat-hole. Hence there is a strong circulation of air from outside the latrine through the superstructure and squat hole, also up and out of the vent pipe, as a result, the latrine remains odour free (Figure 1).

The latrine doorways are always positive to face the direction of the wind, the resulting increase in air pressure within the superstructure, increase the flow of the air up the vent pipe, and this facilitates the elimination of foul air and further enhances odour control.

This advantage of the VIP latrine over that of the pit enhances the prospects of human waste management in our rural areas if widely adopted.

FLY CONTROL

Flies are attracted by the feacal odour coming out of the vent pipe and not from the interior of the superstructure which does not smell if kept clean. The flies cannot get in through the vent because of the fly screen. As a result of this, fly infestation of the pit is kept to low level. The few flies that do find their way in through the squat-hole and lay their eggs in the pit are prevented from leaving the pit. Flies which are attracted in the pit cannot escape because of the fly screen and they eventually fall back and die in the pit. This is yet another advantage of the VIP latrine that recommends it over and above other types for the rural areas.

ANAEROBIC PROCESS OF VIP LATRINE (DOMESTIC ALTERNATING PIT)

There are two important processes that take place in the ventilated improved pit latrines (VIP latrine) which reduce the rate at which they fill the pit. These processes are:

a. The liquid portion of the excreta soaked away into the soil.
b. The solids in the excreta are broken down into simpler compound by biological digestion – (Biochemcial-Oxygen-Deman [BOD]).

Soluble product of this process is carried into the soil by the liquid portion of the excreta and the gases producedare removed by the vent. Generally this decomposition of sewage by bacteria reaction is anaerobic process of biological treatment, which involves

bacterial attacking complex organic compounds in the sewage and converts them into solid, liquid and gases, humus, ammonia, methane by hydrogen sulphide, carbon dioxide and nitrogen etc.

$$CHONS + xH_2O \longrightarrow yCH_3\ COOH + CO_2 + NH_2 + H_2S + zH$$

where x, y, z represent number of molecules and CH_3OOH represents acetic acid. The second stage involves methane producing bacteria which promote reduction reaction on the product of the acid-former converting them to humus, carbon dioxide sulphides, ammonium, nitrogen and methanes

$$Ych_3\ COOH + ZH \longrightarrow aCH_4 + bCO_2\ \ CH_2O$$

where y, z, a, b, c are numbers of molecules under favourable environmental conditions such as pH 6.5 to 7.5 (Ojiako, 1998). The ventilated improve pit latrine do not fill very quickly when used by large family or a group of people. In fact it accumulates in the pit at the rate of about 0.3 m^3 per person per year. Moreover, VIP latrines are generally designed so that pits are two years old. The fresh excreta is transformed in two years to harmless humus, which does not smell and present no health risk. This humus can be removed manually and spread safely on agricultural land on the gardens.

THE ADVANTAGES OF VIP LATRINES

The VIP latrines have several advantages over the other types. These advantages can be summarized as follows:

(a) They are relatively inexpensive to build and have low annual cost of maintenance.
(b) They are easy to construct and the maintenance cost is relatively low.
(c) There is also the absence of odour and minimal fly and mosquito nuisance.
(d) They only require small quantity of water for cleaning and washing of hands on a general basis.
(e) They constitute minimal risk to health unlike most other types of latrines at this level.

CONCLUSION

Due to these advantages, the VIP latrine is strongly recommended for the management of human wastes in our rural areas. If the proposal of adopting the VIP latrine in our rural areas is adopted, the successful construction and maintenance of these latrines would eliminate indiscriminate defecation which causes extensive transmission of faecally related diseases. It will also guarantee the maintenance of clean and healthy environment especially in the rural areas, where the majority of our people live and literacy rate is equally low. When the VIP latrine is widely adopted, the problems of human waste management in our rural areas would have been solved once and for all.

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