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LOW COST SANITATION IN BUILDINGS

INTRODUCTION

The subject title as its name implies gives an instant thought of sanitation applicable to a rural area; for obviously, in an urban area where good pressure water mains, electricity supply, public sewers and sewage treatment works invariably exist, the sanitation no longer becomes a low cost one.

This paper has attempted to treat on this basis problems and solutions to them of popular but very important areas of sanitation which touch on the habit of the society generally. These include principally water supply and sewage disposal.

WATER SUPPLY

Estimation of Demand

While many authorities, books and others suggest quantities required per head per day as ranging between 81 litres (18 gallons) and 382.50 litres (85 gals), I have come to a figure of only 50 litres (11 gals) for people in rural areas based on facts and recorded over a period of time.

During a rural sanitation visit with a team of Public Health Inspectors in the areas of the former Western State of Nigeria, experiments made on dwellers of residences revealed that an adult female who uses slightly more quantity of water than male would bathe satisfactorily on a stout galvanised bucket of water of about 18 litres (4 gals) in the morning. Drinking takes a very maximum of 4.5 litres (1 gal) for a whole day for a manual worker. Cooking (cleaning of meat, fish or vegetables) 6.75 litres (1.5 gals), washing of plates and cooking utensils also 6.75 litres (1.5 gals) and the remaining 13.5 litres (3 gals) built up daily towards the weekend provides some 100 litres (22 gals) about 6 bucketsfull with which clothing is washed just before a bath on Sunday morning.

Rainwater

Rainwater is naturally very pure and would have been an ideal source for the provision of low cost water supply to dwellings but it unfortunately has its many problems including that of collection of suspended impurities as it falls through the atmosphere.

Roofs and other surfaces receiving rainwater for collection and storage are invariably open and large areas, which readily attract and harbour pollutants. These of course include dust, birds and insect droppings, accumulation of organic matter etc. It is also very irregular being seasonal in nature and for these reasons does not offer a satisfactory provision.

Rivers and Streams

Where a river or stream is the only available source of supply for a rural area, the method of purification should principally be sedimentation and filtration. The risk of possible pollution is greatest in water from these sources and in addition, contain heavily suspended particles of river sand and many foreign matters. Some form of coagulants are sometimes introduced into the water at sedimentation stage to assist and hasten the process. Good practice is to allow the water to be undisturbed for a period of between 18 and 24 hours for optimum results.

There are various methods of achieving end results from this system. They all almost invariably require electric pumps and other sophisticated equipment. As the scope of this paper is limited only to rural areas, treatment method to water required in small households will be discussed.

A small circular covered and vented plastic cistern 135 litres (30 gals) is installed on a wooden platform raised 1.52 (5 ft) in the kitchen or other suitable area in the house. This quantity represents a 24 hour actual demand in a household of two adults and three children after allowing for the probable simultaneous usage. Fig. 1 shows the installation and working principles of a typical system. After having a dialogue on the possible commercialising of this equipment with Messrs Metalloplastica, assurance was given for full cooperation upon approval by a

local authority. Arrangement if necessary may be incorporated for the manual dosing with chlorine depending on the source of water and degree of pollution.

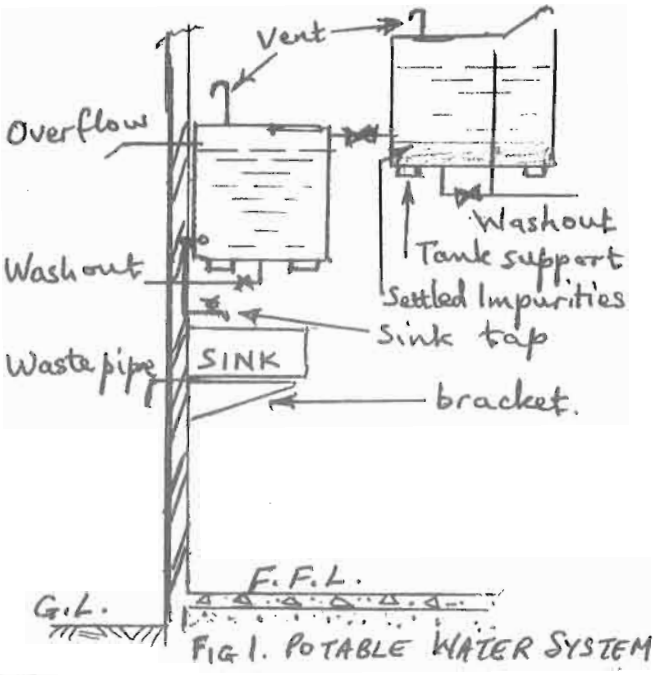

FIG 1. POTABLE WATER SYSTEM

Wells

Water from wells should be similarly treated. Well water is normally drawn by a bucket and windlass (See Fig.2) The advantages include:-

(a) a considerable saving of time and energy involved in not having to walk the distance to the nearest river or stream to fetch water and

(b) convenience; while the disadvantages include:-

(a) high initial capital outlay in providing a well, and

(b) the constitution of a much greater risk of pollution especially after a heavy storm.

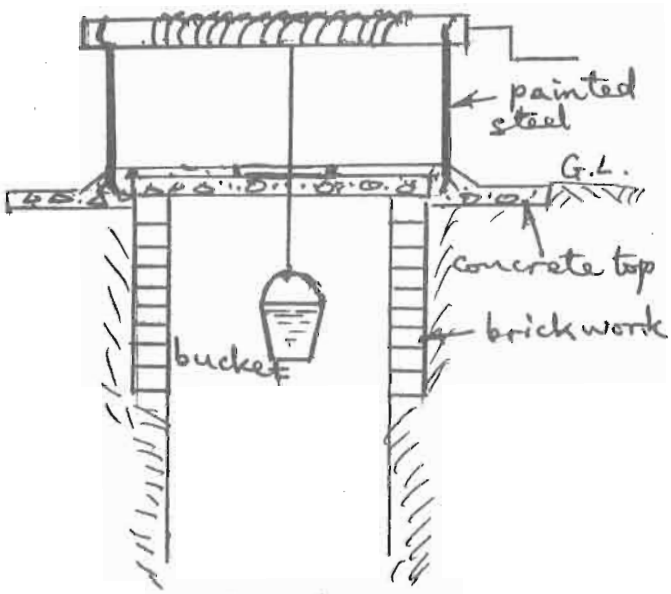

FIG 2. A WELL

Sewage Disposal

The principal aim of providing low cost sanitation on sewage disposal is to effect a relatively small proportion of crude sewage matter to be changed into an effluent reasonably stabilised and ready to be discharged into streams without causing any nuisance. In this connection, the septic tank readily comes to mind. However, for a septic tank to function, one requires good pressure piped water to automatically supply and cease as necessary from the flushing cisterns plus other pumping equipment. This then boils down to high cost sanitation quite reminiscent of a fully developed urban area.

Pit Salga

The pit salga may now be critically looked into for possible modification and improvement. It appears that this may be the only solution combining efficiency with economy.

Pit salgas are normally of between 0.75m and 1.00m diameter and anything up to 10.00m in depth. Care must be taken not to site one within 10.00m vicinity of a well which source is used as drinking water. One of the most important features is adequacy of ventilation which must be suitably provided. Method of construction of a typical pit salga is shown in Fig. 3. It may be roofed over with advantage of use during inclement weather. This system has been known to exist for well over a century but usually abused by users where salgas are badly constructed and local mass education programmes are not organised.

When its construction and use is properly supervised, claims to the merits of the system include:-

1. Comparatively "low cost", which is the cream of the subject matter.
2. Efficiency - will not breed flies nor smell.
3. Minimum area of land is required being just only 0.8m diameter as stated.
4. A disused pit, left for a period of two years or more undisturbed may be re-excavated and cleared for use again.
5. Excavated humus is a useful fertiliser for farmers.
6. In suitably porous land, a pit salga may last 8 to 10 years providing completely trouble and maintenance free use. Fig.4 shows a table of comparison of costs and life between a septic tank and a pit salga.

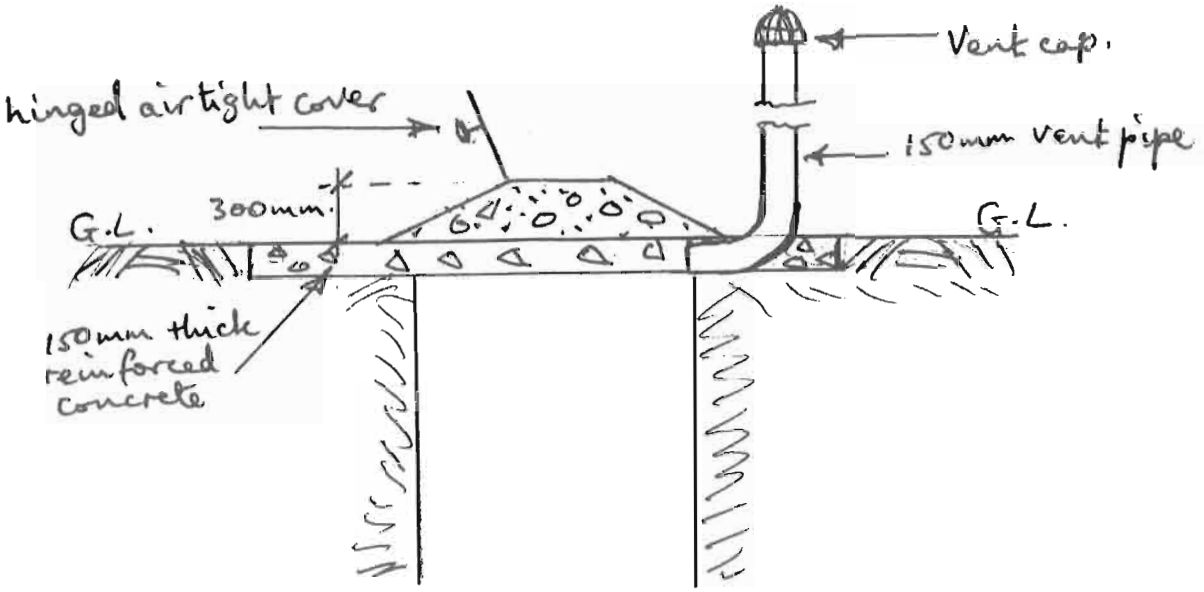

FIG 3. A PIT SALGA

CONCLUSION AND RECOMMENDATION

While pipeborne potable water supply from the treated source to the point of consumption is accepted as the most hygenic, it is correspondingly the costliest. Heavy and specialised equipment, the professionals, specialists and others involved in running the system characterise huge sums of money associated with it. A local authority would normally charge or levy water rates even if subsidised. In a society, the type in question where per capita income is ₦250,00, a water rate of ₦80.00, one of the lowest ever, is very unlikely to be met and therefore, the foregoing low cost methods are the most suitable and practicable.

If put to practice, the systems of provision of low cost sanitation discussed here could yield tremendous results beneficial to health. At present, Nigeria improves the state of health of her citizens as more and more State Governments introduce free health schemes. In many other African countries today where the financial and economic situations are not as buoyant as to permit Government involvement in such free health schemes, the aforementioned systems will prove valuable to local people.

Existing sanitary regulations and bylaws especially those applicable to the rural areas should be enforced by the various local authorities. Obsolete sections should be deleted while new ones which should reflect modern concepts and tradition have to be enacted.

Mass appeal and open invitation should be extended to our engineers, scientists, manufacturers and others to come out with ideas and produce simple designs, appliances and gadgets which would considerably improve on the sanitary living standard of the society.

Incidentally, at the time of going to press, a news flash, broadcast on the Federal Radio Corporation of Nigeria quoted a State Government as setting out to award contracts for rural electrification of 58 towns and villages. There is no doubt that no sooner the scheme is completed than central or municipal water supply scheme follows. If this pattern of action is taken by all our state governments, there will be little or no rural areas as such lacking sanitary facilities left at the end of the century. Then, who knows? The problem may turn the other way round; namely, "High Cost Sanitation in Urban Areas".

Table 4_a Comparison of Initial Cost between a Septic Tank and a Pit Salga for 30 years - Amount in Nigerian Naira (₦)

YEAR	1950	1955	1960	1965	1970	1975	1980
Septic Tank	240.00	450.00	600.00	800.00	1050.00	1200.00	1700.00
Pit Salga	13.00	18.00	40.00	62.00	80.00	110.00	160.00

Table 4_b Comparison of Maintenance Cost

YEAR	0	5	10	15	20	25	30
Septic Tank	NIL	300.00	600.00	800.00	1000.00	1080.00	1160.00
Pit Salga	NIL	NIL	New Salga	NIL	New Salga	NIL	New Salga

Table 4_c Comparison of Total Cost (Initial and Maintenance) for a period of 30 yrs.

YEAR	1950	1955	1960	1965	1970	1975	1980
Septic Tank	240.00	540.00 450.00	900.00 530.00 600.00	1040.00 730.00 800.00 800.00	1240.00 930.00 1000.00 1000.00 1050.00	1320.00 1230.00 1300.00 1300.00 1350.00 1200.00	1400.00 1530.00 1600.00 1600.00 1650.00 1500.00 1700.00

YEAR	1950	1955	1960	1965	1970	1975	1980
Pit Salga	13.00	13.00 18.00	53.00 18.00 40.00	53.00 58.00 40.00 62.00	133.00 58.00 120.00 62.00 80.00	133.00 138.00 120.00 170.00 80.00 110.00	293.00 138.00 230.00 170.00 240.00 110.00 160.00

TOTAL COST IN NAIRA

References

1. Mc Guiness and Stein - Sanitary Drainage. M & E Equipment in Buildings Fifth Edition by Wiley, 1971.

2. The Public Health Engineer Vol. 7 No. 2 of April 1979 by Crane.