

PREVENTION OF INTESTINAL PARASITIC INFECTION
IN MAKURDI VIA THE PUBLIC LATRINE SYSTEM

BY

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fulfillment for the award of Degree of Master of Public Health (MPH)

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DECLARATION

I hereby declare that this is an original work carried out by me in the Community Medicine Department of Ahmadu Bello University, Zaria under the supervision of Dr. E. Essien Ph.D.

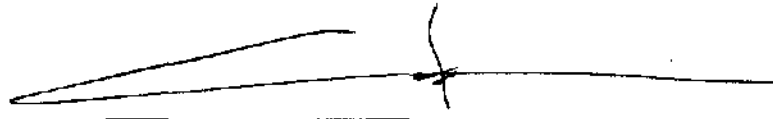
I duly acknowledge the works of other researchers referred to in this project. No part of this project has been previously submitted for a degree or diploma.



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CERTIFICATION

This thesis entitled "Prevention of Intestinal Parasitic infection in Makurdi via the public latrine system", meets the regulation governing the award of the degree of Master of Public Health of the Ahmadu Bello University, Zaria, and is approved for its contribution to science and literary presentation.



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DEDICATION

To the inhabitants of Makurdi town who, inspite of the hard times, have to fend not only for themselves and their families, but also for the numerous intestinal parasites they harbour.

ACKNOWLEDGEMENT

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ABSTRACT

This descriptive cross-sectional study assessed the community's knowledge of the relationship between excreta disposal and health, their sanitary practices regarding excreta disposal as well as factors militating against public latrine utilization in Makurdi town of Benue State, Nigeria.

Four hundred and thirty-three (433) respondents answered a questionnaire each, four focus group discussions were conducted, one each with young men, older men, young women, and older women, and an inspection of some public latrines was done.

A mini survey was also undertaken to take a "window view" of the magnitude of the intestinal parasitic infections rate in the town.

Knowledge of the harmful effects of human excreta exposure is high, in spite of this, only 19.2% of premises sampled had latrine/toilet facilities, and another 16% of those without latrines use their neighbours.

Open field defaecation is rampant, 22% (in the bush, gutter, refuse dumps).

Public latrines are not, or only poorly utilized because the respondents are ignorant of their existence and even those aware of their existence find them repulsive due to lack of maintenance.

Respondents are even willing to pay to use public latrines that meet their standard (81%). Suggested locations for such latrines include markets, motoi parks, high population density areas etc.

Public latrine use can be improved if the above measures are put in place and the people educated on the dangers of indiscriminate defaecation as well as the availability of public sanitary facilities in the town.

Public latrines planned and implemented along these lines could also encourage individual household demand for similar facilities thereby further improving the excreta disposal system. A beneficial fall out of this will be the elimination of, not just intestinal parasitoses but, many other enteric infections as well.

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CHAPTER ONE

1.0 INTRODUCTION

Makurdi, the capital of Benue State is situated in the Guinea Savannah vegetational belt of Nigeria. The climate is typically tropical with two distinct seasons. The dry season runs from November to April, while the rainy season lasts from April to November. The topography is undulating. The town is sited on both sides of the river Benue and is naturally drained by several rivulets and streams all of which empty into the Benue river.

Ground water level is very high and flooding is common particularly at the height of the rainy season usually in July - August the large fadama areas of Wurukum, Wadata and Idye are particularly prone to this flooding.

1.1 Socio-cultural features

Like most state capitals in Nigeria the population of Makurdi comprises people from all parts of the country, and beyond. The indigenous ethnic group of Tiv, however, dominates.

Polygamous marriages are common though monogamy is also practised. Communal feeding with family members eating from the same plate on the dining table is the norm.

Hand washing before and after meals is revered and all wash their hands in the same water. The culture of "handshake" as a sign of peace and welcome is widespread without restrictions to sex or status. However, the young do not offer elders a handshake, they only receive when offered.

Housing

Makurdi town can, on the basis of population density, be divided into low, medium, high, density areas as well as traditional housing or settlement areas.

While the low, and medium density areas are characterised by the availability of basic social amenities such as water, electricity and good housing, the lack or inadequacy of these is the norm in the high density and traditional settlement areas.

The traditional settlement areas also differ from the rest in the absence of a well planned layout and the absence of household toilet facilities - a characteristic it shares with some households in the high density areas. Though a few latrines exist, majority of the people patronise the bush which is fast disappearing as the town grows bigger.

Water supply and sanitation

Despite its location astride the River Benue, Makurdi has inadequate pipe borne water supply, most parts are not supplied at all. Even in the areas supplied pipe-borne water, water rationing is the norm especially in the dry season with each section getting water for a day or two per week. Majority of the people therefore resort to shallow hand dug wells, the numerous ponds and puddles, as well as the ever flowing River Benue, for their water supply. Water vending is a good business in Makurdi during the dry season, and the source of this water, no one cares to find out!

Solid waste disposal appears fairly well organised with a few refuse bins strategically located from which the state Urban Development Board vans evacuate them at regular intervals. However, these refuse bins are not many. In several parts of the town, therefore, refuse dumps spring up without the knowledge of the board. Also, sometimes refuse bins are overfilled and spill over due to their non-evacuation consequent upon breakdown of refuse vans. Maintenance of these vans seems to be a problem.

Open field defaecation is very common especially in the high density areas and in the traditional housing areas found at the town fringes.

The high density areas are reputed for housing most of the large capacity public places such as the market/motor parks, the stadia and the public square among others.

The vicinity of these places, especially following a crowd pulling activity lasting upto two or more days are common sites for this practice (open field defaecation). Other sites used for this unwholesome practice include refuse dumps, open drainages (gutters) and undeveloped plots of land.

Economy

Makurdi town is described by many as a civil servants town. Most of the civil servants combine their primary occupation with farming. Indeed, it will not be an exaggeration to state that many civil servants take to farming either to supplement their salaries or as a hobby.

Farming is under taken with traditional implements such as hoes, cutlasses, while crops grown include rice, cassava, maize and groundnuts.

Vegetable farming at the river banks and the various fadama thrives particularly in the dry season water for irrigation comes from the river Benue and the various ponds/puddles.

There are several markets at which food stuff as well as industrial goods are sold. These include the Wadata market in the Wurukum, Woilomayo and North Bank markets located in Wadata, Wurukum, Woilomayo and North Bank parts of the town respectively.

There is also the ultra modern Makurdi market in the Ankpa ward part of the town.

All these are located in the high density areas of the town with the exception of the modern market which is located in the traditional settlement area. The town layout has however, become contigons with this market.

The Problem

Though Markudi has a network of natural drainages (which have been augmented by artificial drainages constructed by the state government), rapid urbanisation has rendered many of the natural drainages inadequate.

Flooding has become an annual occurrence thereby further compounding the twin problem of inadequate potable water supply and open-field defaecation. These have favoured the transmission of intestinal parasitic infection often manifesting in diarrhoea.

In 1997, 4,06 cases of diarrhoea were recorded, while the figures were 708 and 697 for 1998 and 1999 respectively. Thirteen deaths due to diarrhoea were recorded in 1997, no death was recorded the following year, while a single death occurred in 1999¹.

Though the mortality from this is not high, the morbidity certainly is. It must also be noted that poor record keeping may have led to a gross under estimation of actual cases. Home management of diarrhoea, actively promoted by the Control of Diarrhoea Diseases (CDD) programme, may also have contributed to the low rate of presentation at the health facilities.

Though records of the exact pathogens implicated in these diarrhoeas, could not be traced, Bello *et al.* (1997) found in a similar setting, 40% of stools samples contained parasitic agents².

Many intestinal parasitic infections, however, may not present with diarrhoea³; and although the researcher has come across many cases of intestinal parasites, the monthly disease surveillance and notification form (DSN 002) does not reflect them.

Studies done elsewhere have put the national prevalence at about 18.16% with some areas having a prevalence of over 50%², Makurdi must be between these values.

Cholera out-breaks have become a yearly phenomenon with devastating consequences. In 1998 alone, 49 cases were reported with one death, while the figure for 1999 stood at 30 cases with 12 deaths giving a case fatality rate of 40%¹.

Though the parasites do not cause such high mortality as the cholera bacteria their effect on victims is, nevertheless, worrisome. These include malabsorption, diarrhoea, blood loss, which may result to malnutrition. Others are, impaired work capacity and some surgical emergencies 4.5, 6. For an economy that is depending on physical labour these costs must be enormous.

The state government, not unaware of this health malady occasioned by a combination of inadequate potable water, and insanitary excreta disposal, constructed public latrines in different parts of the town; whilst efforts continued to provide pipe borne water to all Makurdi residents.

The level of utilization of these latrines has however, been varied, ranging from non-use, use, to misuse, with some public latrines looking like night soil dumps.

While the exact factors responsible for the low level of utilization (or non-utilization) of the public latrines are not known, it has been found that people may refuse to use them if they are not clean⁷; due to the nearness of the latrine to their houses - they may choose to use their own latrine. Lack of privacy has also been adduced as a reason for non-patronage of public latrines.

In addition, it has been noted that structurally unsafe latrines, smelly, and attracting flies discourage potential users⁹. Religious taboos, such as is obtained in some muslim countries where it is forbidden to defaecate while facing Mecca, may also affect latrine use if not taken into account during construction¹⁰. The belief that dysentery is contracted by using the latrine¹¹, if widely held, could also scare people from patronising the public latrines.

Several attempts have been made by various governments aimed at safe-guarding the environment and thereby promoting the health of Nigerians. For instance, war Against Indiscipline of the Buhari - led military junta (1984 - 1985), gave sweeping powers to law enforcement agents to met-out instant punishment to persons caught urinating or defaecating in public.

To "achieve sustainable development in Nigeria with particular reference to securing for Nigerians, a quality of environment adequate for their health and wellbeing", a national policy on the environment¹² was formulated in 1989. One of the strategies for implementation of this policy includes the involvement of the sanitation and wastes management sector.

In addition, public health laws dealing with sanitation and hygiene abound in statutes books of Benue¹³ and possibly other states of the country.

Sanitation courts constituted in Benue state have tried and sentenced several offenders for breaching these regulations.

In spite of all the fore-going, open field defaecation in Makurdi continues unabated, while the public latrines remain un patronised (or poorly patronised) with the attendant health and aesthetic consequences.

It does appear that other approaches need to be considered. One such approach is health education, through which the people can be sensitised and mobilised to support the public latrine system. There after, public latrine construction and use could even become demand driven, An expected fall out of this is the demand by households for latrines! All these will lead to prevention of intestinal parasitic infections and improvement in the general sanitary condition of the town.

1.2 Justification

Intestinal parasitic infections have world wide distribution⁴; but tend to be more prevalent in tropical climatic conditions which are very congenial for the parasite multiplication. This, when coupled with the low sanitation standard, makes the Nigerian environment a fertile ground for their development and transmission^{4,7,14,15,16,17}.

Prevalence rates have been put at 18.6% and 50.7% for urban and rural areas of the country respectively, the difference being possibly explained by differences in the availability of sanitary amenities².

Children are more affected than adults, the problem can be linked to the indiscriminate (open-field) defaecation which contaminates the soil¹⁶, and also gets washed into water sources with the onset of the rainy season. The problem is most marked in the high density, and the traditional settlement (town fringes) areas of the town where both water supply and sanitary conditions are lacking or inadequate. These, also constitute more than 80% of the town's population.

Apart from the morbidity and sometimes mortality associated with these intestinal infections, there is retarded growth, on the children. Hard-earned funds which would otherwise have been ploughed into income generation or other developmental activities are used for treatment. Productivity also falls due to sub-optimal performance or to absenteeism from work^{4,14}.

The problem assumes more significance if it is realised that over 2/3 of the under five (u-5) diseases can be related to the twin problem of poor water and unsanitary condition¹⁸. And that an effective sanitary excreta disposal can reduce death attributable to these diseases by as much as 2/3 and eventually to nil.⁷

The high endemicity of these infections in Makurdi is, therefore, an indication that the excreta disposal system (of which the public latrine is a part), is inadequate or inefficient or both.

Public health laws and coercion have not checked the practice of insanitary excreta disposal hence intestinal parasitic infections in Makurdi.

New approaches will need to be adopted. One such approach which looks promising but which has not been tried in the state is that which targets the beneficiaries of the intervention strategy - the community participation approach.

To enhance the quality and level of participation, community understanding of the strategy and its benefits is vital. This can be greatly improved by health education based on what the community already knows, believes and practices regarding excreta disposal^{10,19}.

Health education strategies can then be developed which will not only promote the demand and use of latrine generally, but will also lead to improvement in personal hygiene. Hence, interruption in the transmission of intestinal parasitic infections.

As long as the this knowledge, attitude and practices of the community regarding safe excreta disposal remains unknown, so long will the particular factors militating against utilization of (public) latrines remain a mystery, and the solutions a mirage, while the health and aesthetic consequences of indiscriminate excreta disposal continue to rise.

1.3 Aim

To prevent intestinal parasitic infections in Makurdi via the public latrine system.

1.4 Objectives

To:

1. conduct an indept interview among Makurdi residents with a view to assessing their awareness of the relationship between excreta disposal and good health.
2. mount an inspection drive within Makurdi town, focusing on sanitation practices regarding excreta disposal.
3. identify barriers (physical and social) militating against the utilization of public latrines in Makurdi town.
4. prepare simple health messages on proper use, care and maintenance of public latrines.

CHAPTER TWO

LITERATURE REVIEW

2.0 Parasite

This has been defined as an animal or vegetable organism that lives on or in another and derives its nourishment there from.²⁰ In other words it is an organism which lives at the expense of its host, deriving all its requirements from the host and giving nothing back. Indeed, in some cases it actually inflicts some injury which may be severe enough to cause disease or death¹⁴.

Intestinal parasitic infections have a worldwide distribution with regional variations both in types of parasites and their prevalences. Prevalences of Ascariasis of 26.7% -97% have been reported in Brazil with national prevalence of 59.5%. The value for Africa is about 32% mainly affecting children below 17 years old.⁴

In Malaysia, parasite rate of 39.6% have been reported with 89% of those affected falling between the age of 6 years and 12 years.³

Other parasitic infections of the intestine include hookworm with 26.5% prevalence in Brazil; *Entamoeba histolytica* (amoebiasis) as well as *Trichuris trichura* (trichuriasis) these four are noted for being among the ten most common infections worldwide⁴. The list of intestinal parasitic infection also includes the tape worm (*Taenia solium*), *Enterobius vermicularis*, *Giardia lamblia* ^{2,4,5,14,21,22}.

Amoebiasis, giardiasis, trichuriasis and ascariasis are reported to have global prevalences of 500, 200, 800, and 1000 million respectively.¹⁶

2.2 Intestinal Parasites in Nigeria

Like in other parts of the tropics intestinal parasites are ubiquitous in Nigeria with national prevalence rate of 18.16%. Rate as high as 50.73% are not uncommon in rural areas.²

Individual parasite rates of 35% (ascaris)⁶ 19.6% (*E. histolytica*), and 1.1% (*G. lamblia*)²³ have been reported in various parts of the country.

Another review reported rates of 36.14% (hookworm), 32.60% (*E. histolytica*), 11.13% (*A. lumbricoides*), 2.39% (*Trichuris trichiura*) and 2.22% (*G. lamblia*)² clearly these accounted for over 80% of the intestinal parasitic infection.

These parasites are known to infect a person singly and/or in groups. Most of the multiple infection involve hookworm and one or more of the other parasites.

Polyparasitism also commonly involves *Entamoeba histolytica* and *Ascaris lumbricoides*².

2.3 Transmission

The intestinal parasites have a relatively simple life-cycle. In the host, they attain sexual maturity and are passed in faeces as eggs, cysts, or free living organisms.^{5, 15}

During life outside the host they may remain dormant as cyst (*E. histolytica*) or undergo active growth and development (*Ascaris lumbricoides*, hookworm) the infective ova (*Ascaris*) or larvae (hookworm) is capable of living in the soil for several weeks, under favourable conditions, infecting a new host when ingested (*Ascaris*) or brought into contact with the host's skin hookworm.^{4,5,15,24,25}

Each adult female *Ascaris lumbricoides* is capable of producing 134,000 - 360,000 eggs daily for a period of 300 days (i.e 40-108 million eggs per year). Consequently where open field defaecation is common, the environment becomes so contaminated that avoidance of infection is almost impossible.

Hookworm infection is enhanced by activities or conditions that encourage skin contact with contaminated soil.

Indeed, factors which favour intestinal parasite transmission have been summed up as including poverty, (which makes putting on of footwear unlikely), inadequate sanitation, overcrowding and poor hygiene practices.^{5,14,15,16,26,27,28, 29,30.}

In combination, these factors determine the spread and prevalence of the parasites.

2.4 Source of Infection

For the intestinal parasites under discussion, the source of infection ultimately is infected human faeces.^{5,7,16,21, 24,27.}

2.4.1 Mode of Transmission:

This is either faeco-oral (amoebiasis, ascariasis, enterobiasis, giardiasis) or through skin penetration (hookworm infection).^{4,5,9,14,15,22,27,31,32} or ingestion of improperly cooked infected pork/beef (tapeworm).

2.5.0 Vehicle of Transmission

The parasites get to man through contaminated arthropods, hands, food, water, or soil or any combination of these.^{7,9, 15,16.}

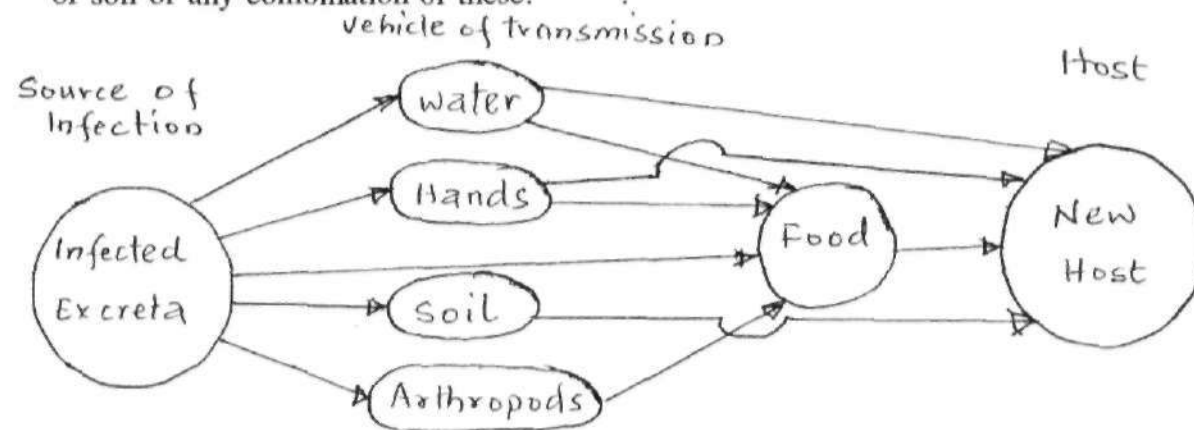


Fig. 1: **Transmission of Diseases from Excreta: Channels of transmission of disease from excreta (culled from Wagner & Lanoix)⁷.**

2.5.1 Contaminated hands have been known to transfer cysts, ova or parasites to the mouth.^{26,34} In this, transmission occurs auto-genously, as when *Taenia salium* ova⁵ or *Enterobius vermicularis* ova¹⁵ from the perianal skin, are transferred (by scratching) to the mouth of the same individual. Heterogenous transmission occurs when the transferred infective agent is from another source.

2.5.2 Food may contain the infective agent as in meat containing (*Taenia* specie) or through contaminated water used for its preparation, or nightsoil used as fertilizer or hands of food handlers.^{15, 16}

2.5.3 Water provides a veritable means of food contamination.³³ and a medium for ingestion of cysts¹⁶ ova or larvae. Water contamination is often due to unsanitary excreta disposal practices.^{15,34,35}

2.5.4 Under favourable conditions of moisture and temperature, contaminated soil is a favourable environment for development of the extracorporeal stages of soil mediated helminthic infections (hookworm, ascariasis)^{15,28,33}.

2.5.5 The arthropod *Musca* specie (housefly) has been implicated in mechanical transmission of protozoan and helminthic infection to man,^{36, 37} and as the mechanical vector for diarrhoeal diseases in filthy places.

2.6.0 The intestinal parasite gains entry into its host either through the oral route or through passive penetration of the skin.^{5,17}

It has been observed that lack of sanitation, low standards of living, overcrowding and absence of hygienic facilities, the promiscuous disposal of excreta etc, favour this transmission^{4,7,14,15,16,17,22}. Other socio-cultural conditions favouring intestinal parasitic infections include consumption of raw or insufficiently cooked (infected) food^{5,15} or food contaminated by nightsoil or polluted water.^{4,9,17} These conditions may not all be necessary for the transmission of each of the parasites, but due to the fact that they occur concurrently in any one geographical region, polyparasitism is common.^{2, 14}

2.7 Importance of Intestinal Parasitic Infections

The importance of intestinal parasitic infections is said to be underestimated.⁴ This is partly due to the fact that many of these infections are asymptomatic or of insidious onset and the mortality from them is relatively low.^{4,14} They are however, known to impact negatively on three aspects of human life:-

- a. Growth, nutrition and development.
- b. Work and productivity
- c. Medical care costs⁴.

2.8 Growth, Nutrition and Development

The high prevalence of intestinal parasitic infections is more among the children than adults.^{4,29}

Chronic ascariasis, trichuriasis, and giardiasis have been shown to be associated with malnutrition, growth retardation and underweight.^{4,16,29} Malnutrition is well known for increasing peoples susceptibility to infections³⁸ with the potentials of worsening the nutritional and growth status of affected children.

Studies have also shown "non-anemic children to be faster and more accurate in standard achievement tests; and anemic, when treated with iron, become faster and more accurate than those treated with placebo⁴. It is not however, certain whether such findings mean that hookworm infection, a major cause of iron deficiency anemia in Nigeria, reduces children's intellectual performance.²⁹ Repeated spontaneous abortions and stillbirths resulting from hookworm induced anemia have also been reported.¹⁴

2.9 Work and Productivity

Iron - deficiency anemia is known to impair performance of physical work.^{4,28,29} Consequently where prevalence of hookworm infection is high productivity is bound to be negatively affected.^{4,14,39}

Studies have also shown that anemic workers performed significantly less than their non-anemic counterparts when subjected to similar physical tasks.⁴

Protozoa infections, like amoebiasis, affect productivity mainly by being a major cause of absenteeism, and have relatively high mortality rate especially if not properly diagnosed and treated.

Indeed parasitic diseases and their complications lead to losses in productivity and man power that runs into millions of US dollars throughout Africa.¹⁷

2.10 Medical Care Costs

The medical costs of handling intestinal parasitic infections are not surprisingly high. This is in view of the high prevalence of this condition.²⁹

These costs are borne both by the individual victims or their families, and the government.^{4,14} These have been put at US \$340,000 for the government healthcare system and more than half of that amount for family in studies conducted in Kenya.^{26, 40}

Treatment of one patient with cysticercosis resulting from migration of larval form of *Taenia solium* to the brain has been estimated to cost about US \$2,173 in 1982.⁴

2.11 Prevention

The knowledge of the life cycle of the parasites is vital in designing control programme as it affords the planner the opportunity to know at which stage interventions can most effectively be instituted.

2.12 Cysts of Protozoa are Infectious as passed in faeces while eggs of helminthes undergo some maturation in the soil (*Ascaris lumbricoides*) or pass through an intermediate host before attaining the infective stage (Tapeworm, *Taenia solium*).⁵

It is also well established that whilst the other intestinal parasites gain entry into their host via the oral route with the exception of hookworm, *T. solium* infection is by

ingestion of improperly cooked pork containing the infective larvae. Hookworm infection is dependent upon skin contact of the potential host with soil containing the infective larvae.^{4,5,15,17,23,25,39}

2.13 Measures for the control of these infections can therefore be targeted at:

1. Eliminating the reservoir of infection.
2. Interrupting the pathway of transmission
3. Protecting the susceptible hosts.⁵

In intestinal parasitic infections, the reservoir of infection is the human host, except for taeniasis where the pig also exists. Consequently reservoir elimination is not feasible.

Health education on hygiene practices as well as behaviour change such as handwashing after defaecation, wearing of shoes can protect susceptible hosts.

The most effective intervention in this area therefore, is interrupting the pathway of transmission. This, for these faecal borne intestinal parasites, can be achieved by sanitary disposal of faeces. The ideal measure would be for sewage disposal of excreta but wherever drinking water is inadequate, as is the case with Makurdi, that can not be feasible.⁴¹

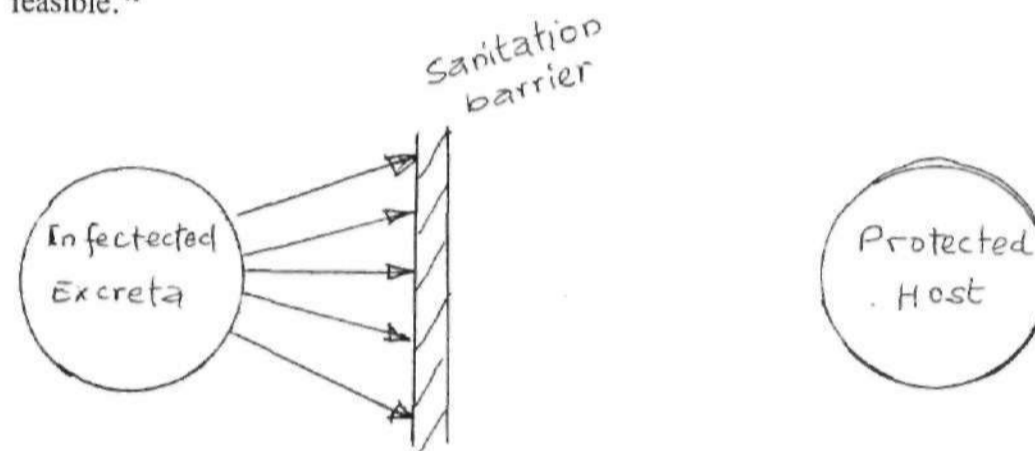


Fig. 2: Stopping the Transmission of Faecal borne disease, by means of sanitation (Wagner and Lanoix).⁷

The promotion of latrines in such areas should be undertaken. Sanitation programmes have been used for the prevention and control of intestinal parasitic infections with varying degrees of success.^{4,7,8,10,14,16,32,42.}

Esrey *et al.* (1991) have demonstrated this in their analysis of 144 studies, examining the impact of improved water supply and sanitation facilities on these parasites and concluded that "interventions to improve excreta disposal and water quality, which are associated with better hygiene practices, produce greater impacts than improvement in water quality only".⁴²

It has also been established that the provision of water and sanitation alone does not lead to a reduction in the prevalence of intestinal parasitic infections.⁷ In fact a (public) latrine that is not properly used with excreta on the floor, surroundings etc may even worsen the prevalent situations.⁹

Crompton found that indoor (or household) sanitary excreta disposal facilities have been associated with larger reductions than public facilities in terms of intestinal parasitic infections.¹⁶ This may not be unconnected with their better maintenance hence cleanliness which enhances utilization.⁷

Rarely used, and poorly maintained latrines will certainly not reduce intestinal parasitic infection prevalence.^{7,9} This has been the bane in most public latrine systems.⁷

It has also been noted that if such interventions are preceded by health education on hygiene and sanitation, the results are much better.^{9,25} If communities do not consider inadequate excreta disposal facilities as a problem, they may not be ready or interested in such facilities and may even be hostile towards it.⁷

To be effective therefore such interventions require the understanding, support and participation of the community right from the planning stage.^{25,38,43,44,45,46.}

The Panchkhal project (Nepal) amply demonstrates the value of community participation in the success and sustainability of sanitation projects.

In this projects:

"the community found that medical treatment alone did not eliminate the problem of intestinal parasites. They enquired about what could be done. On being told that protection of water supply from contamination and the construction and use of sanitary latrines were required, they asked for demonstration pit latrines in each village. Thereafter demand for latrines continued to grow with the people bearing 75% of the costs".⁴⁴

CHAPTER THREE

METHODOLOGY

This descriptive, cross-sectional study had a study population that consisted of male and female residence of Makurdi town, aged twelve years and over.

A multistage (stratified) simple random sampling technique was used with the primary study unit being the individual.

Tools for data collection were: self administered questionnaires, focus group discussions (FGD) and physical inspection of public latrines.

The town was divided into four broad categories based on population densities/household pattern thus:-

- High density areas: (a) markets (b) residential areas.
- Medium density areas
- Low density areas, and
- Traditional settlement areas.

High Densities Areas

These include:

	Residential Areas	Markets
1	Ankpa ward	1. Makurdi modern market
2	Clerk/mission ward	2. Wadata market*
3	Wadata	3. Wurukum market
4	Wurukum	4. Woilomayo market
5	(Woilomayo)*	5. North Bank market
6	North Bank	

Medium Density Areas

1. Federal low cost housing estate, North Bank
2. Federal Low Cost Housing Naka Road
3. Kwarrafa Quarters*

Low Density Areas

1. Old GRA
2. New GRA
3. HUDCO Quarters North Bank*

Traditional Settlement Areas

1. Kanshio
2. Agboughul*
3. Nyiman
4. Log I and II settlement areas.

* = Selected areas.

Sampling Frame

Several sampling frames were used at the different stages of sampling. Having divided the town into the above strata, the list of the various clusters within each stratum was used as the first set of sampling frame (for the respective stratum). For the next stage, the list of streets and markets served as the sampling frame. The list of streets was drawn from street map of Makurdi obtained from the Ministry of Lands and Survey.

Street numbering for the selected streets was obtained from the Urban Development Board while shops/store numbers were obtained from the Revenue Department of Makurdi Local Government. These two lists served as the sampling frame for the next stage of sampling. That is, stage III.

Sample Size

A sample size of five hundred was taken distributed among the various strata (i.e high density, medium, low density and traditional settlement areas) according to their relative populations thus:

SN	Strata	Estimated Population	Sample Units
1	High Denisty Areas: - Markets - Ressidential areas	} 145699	300
2	Medium density Areas	13,599	50
3	Low Density Areas	9,713	50
4	Traditional Settlement Areas	25,254	100
	Total	194,265	500

Sampling

The multistage simple random sampling was done.

For each of the strata (High density, medium density, low density and traditional settlement areas), a list of the component clusters was used as the sampling frame. One cluster was then selected from each of the strata by simple random technique using the *random number table*.

The high density areas were divided into the markets and residential areas as sub-strata. Two clusters were then selected - one from each sub-stratum by simple random technique.

Five streets (or avenues) were selected from each of the clusters using the list of streets for each cluster as the sampling frame.

Using the list of street numbers, fifty premises were selected per street by simple random technique.

For the selected market, the list of stores/shops formed the sampling frame from which fifty of them were selected by simple random technique.

The first person met in the premise aged twelve years or over, was then given the questionnaire to fill.

Where a selected premise was found to be locked at the time of visit, a revisit was made later or the following day. However, if such a premise was unoccupied, a substitute premise was taken by simple random technique with the list of premises as sampling frame.

If the first person met on a premise was a visitor/customer who was not willing to respond to the questionnaire and return same, it was given to the next person.

Illiterate respondents had the questionnaire read and translated for them (to respond) and the field worker filled the questionnaire.

Completed questionnaires were retrieved two days after distribution. Revisits on the third and subsequent days was necessary in some cases to ensure retrieval of completed questionnaires.

Latrine inspection was carried out on the third day of post-questionnaire distribution using the latrine inspection checklist (Appendix II).

Focus Group Discussions (FGDs) were conducted with young men, older men, young women, and older women using a prepared FGD guide (Appendix III).

3.1 Stool Collection and Analysis

Aim: To have a "window view" of the prevalence of intestinal parasitic infections in Makurdi.

Procedure

Seventy (70) of the 433 premises from which questionnaires were retrieved were randomly selected using their list as the sampling frame. This figure was arbitrarily chosen, the main consideration taken into account being monetary cost and time. 70 clean bottles were distributed to the selected premises a day prior to specimen collection date.

Participants were informed that it was the concluding part of the research for which they had good naturedly answered a questionnaire and their co-operation- once more requested.

Stool specimens were collected the next morning, and analysed under the light microscope.

3.2 Data Analysis

The data collected came in the form of answered questionnaires, latrine inspection notes as well as notes taken of the focus group discussion sessions.

These were scrutinised for accuracy and completeness. Questionnaires with more than 50% unanswered questions were discarded.

Analysis was with the aid of the statistical package for social sciences (SPSS), while open ended questions had their contents analysed manually.

The contents of the FGDs and the latrine inspection notes served as triangulation data for the responses to the questionnaire.

3.3 Recruitment/Training of field workers

Fieldworkers were recruited from the state School of Health Technology, Makurdi. This was at variance with the project plan of recruiting five from the relevant ministries/parastatal of Health, Urban Development Board, Water and Environment and Benue Rural Water Supply and Sanitation Agency (BERWASSA).

The change was necessitated by the short time, which made the civil service beurucratic process for obtaining staff release unsuitable, as well as the need to cover all the selected areas within the time limit.

Training

Intensive practical training covering the objective of the research, schedule, and conduct of the data gathering process was done on the 1st day.

The 2nd day was used for testing the process and instruments of data collection in the town. Areas of the town slated for the research were deliberately avoided for this pilot.

Day three was used for reviewing the process and instruments in the light of fieldworkers' experiences. Appropriate amendments were made. Some attitudinal changes were also recommended.

Thereafter, nine fieldworkers were randomly allocated to nine places for the data gathering exercise. The tenth person served as the logistician for the group. The areas sampled included:

1. **High Density Areas:**
 - Wadata market
 - Otukpa close
 - Katsina Ala Street
 - Konshisha street
 - Ogbomosho Street
 - Aliade Street.
2. **Medium Density Areas**
 - Kwararafa Quarters
3. **Low Density Areas**
 - HUDCO Quarters
4. **Traditionaal Settlements**
 - Agboughul village

Questionnaire distribution and retrieval was expected to be completed in four days. This had to be increased by one day due to the need for revisits.

Latrine inspection was however, undertaken by the researcher himself; who also acted as the facilitator in the various FGDs.

Photographs of some of the public latrines were also taken.

CHAPTER FOUR

RESULTS

Four hundred and thirty three (433) of the 500 questionnaires distributed were retrieved representing retrieval rate of 86.6%. There was a slight preponderance of female respondents over males 247:177 with 9(or 21%) of the respondents not indicating their gender status.

Age of respondents ranged between 12 years and 90 years with the age group of 21-30 years as the modal class (fig.1).

Religion: Three hundred and forty seven (347) of the respondents or 80.1% are christians, followed by 30 (or 6.9%) moslems, 23 (6.2%) traditionalists, while other unspecified religion accounted for 6(or 1.4%) of the respondents. However, 23 (or 5.3%) of the respondents did not indicate their religion.

Table 1: **Educational Status of respondents**

Educational Status	Frequency	Percentage
Not stated	10	2.3
Illiterate	41	9.5
Primary education	89	20.6
Post-primary education	144	33.3
Higher education	149	34.4
Total	433	100

More than half of the respondents (293 or 67.7%) had at least, post primary education.

NB: Any post secondary (including post-technical college) education was regarded as higher education.

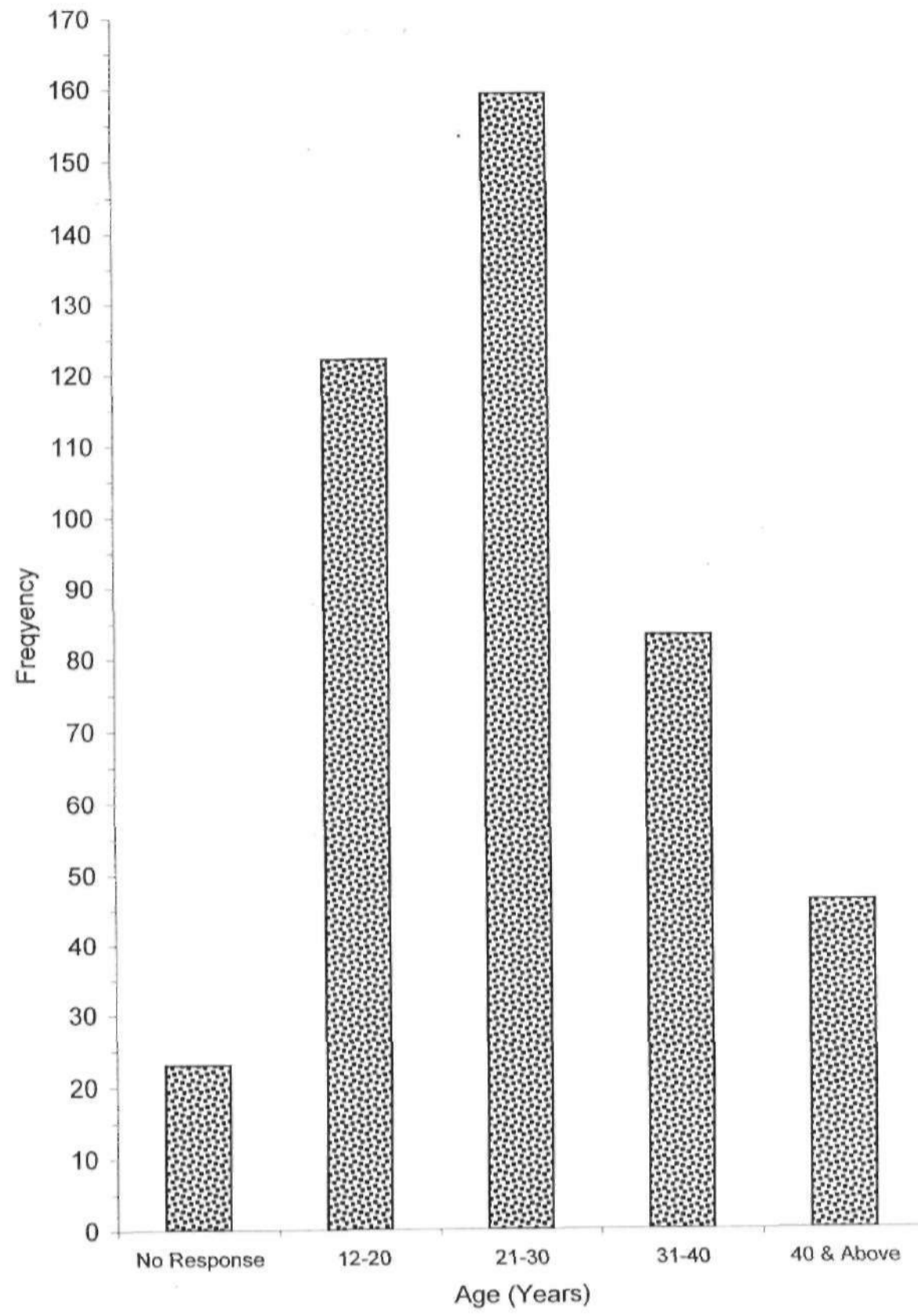


Fig. 1: Age distribution of Respondents

Residence/Population Density Status of respondents

In all, two hundred and twenty nine (229 or 52.89%) come from Woilomayo part of Makurdi while 44 (10.16%) come from Wadata Market. Both of these places constitute high density areas (63.05%). Also 50 (11.5%) respondents come from Kwararafa (medium density area), while the low density area (HUDCO) had 44 (10.16%) and 65 (15%) from traditional settlement area.

Stool Sample Results

Of the 65 stool samples taken 24 were of males and 41 of females. Twenty (83.33%) of the males and 27 (65.85%) of the females had positive stool samples for parasite. These differences are however not statistically significant. $P > 0.05$ (Table 8).

More children under 15 years had statistically significantly higher parasite rate than those aged 16 years and over (93.75% and 65.31% respectively). $P < 0.05$ (Table 9).

The overall parasite rate is 47 (72.3%) out of the 65 samples. (Table 8).

The commonest parasite isolated was hookworm (37 or 45.68%) closely followed by *E. histolytica* (32 or 39.51%). *Ascaris lumbricoides* and *Giardia lamblia* each had positivity in 4 respondents (4.94%) while *Strongyloides stercoralis* and tapeworm were isolated from 2 samples each (Table 10) polyparasitism is common.

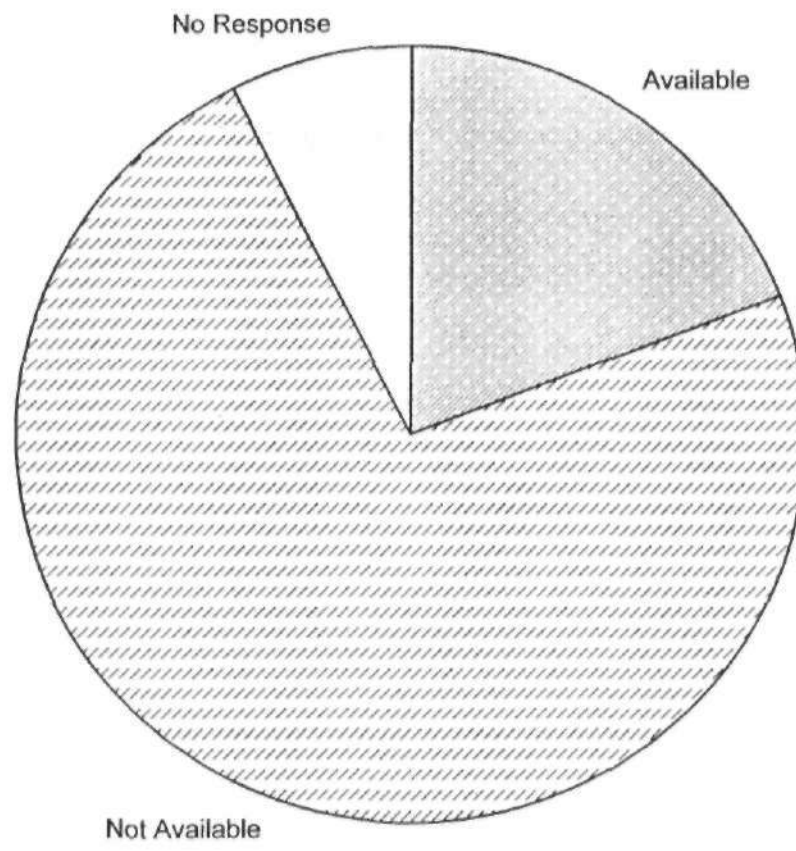


Fig. 2: Latrine availability on premises

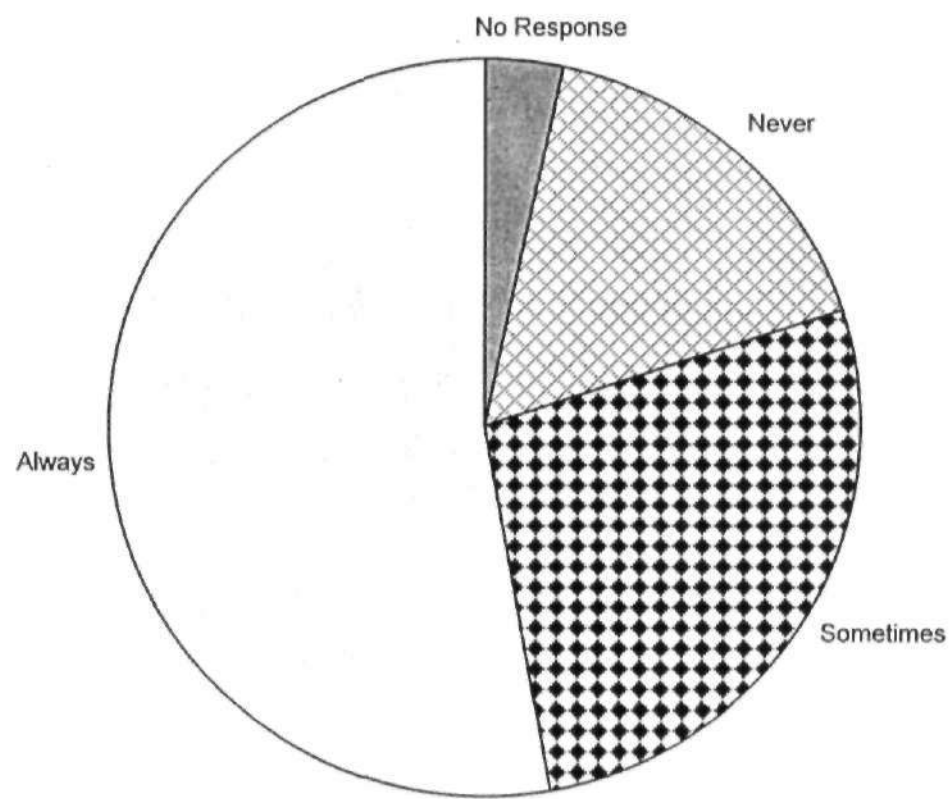


Fig. 3: Latrine use by Respondents

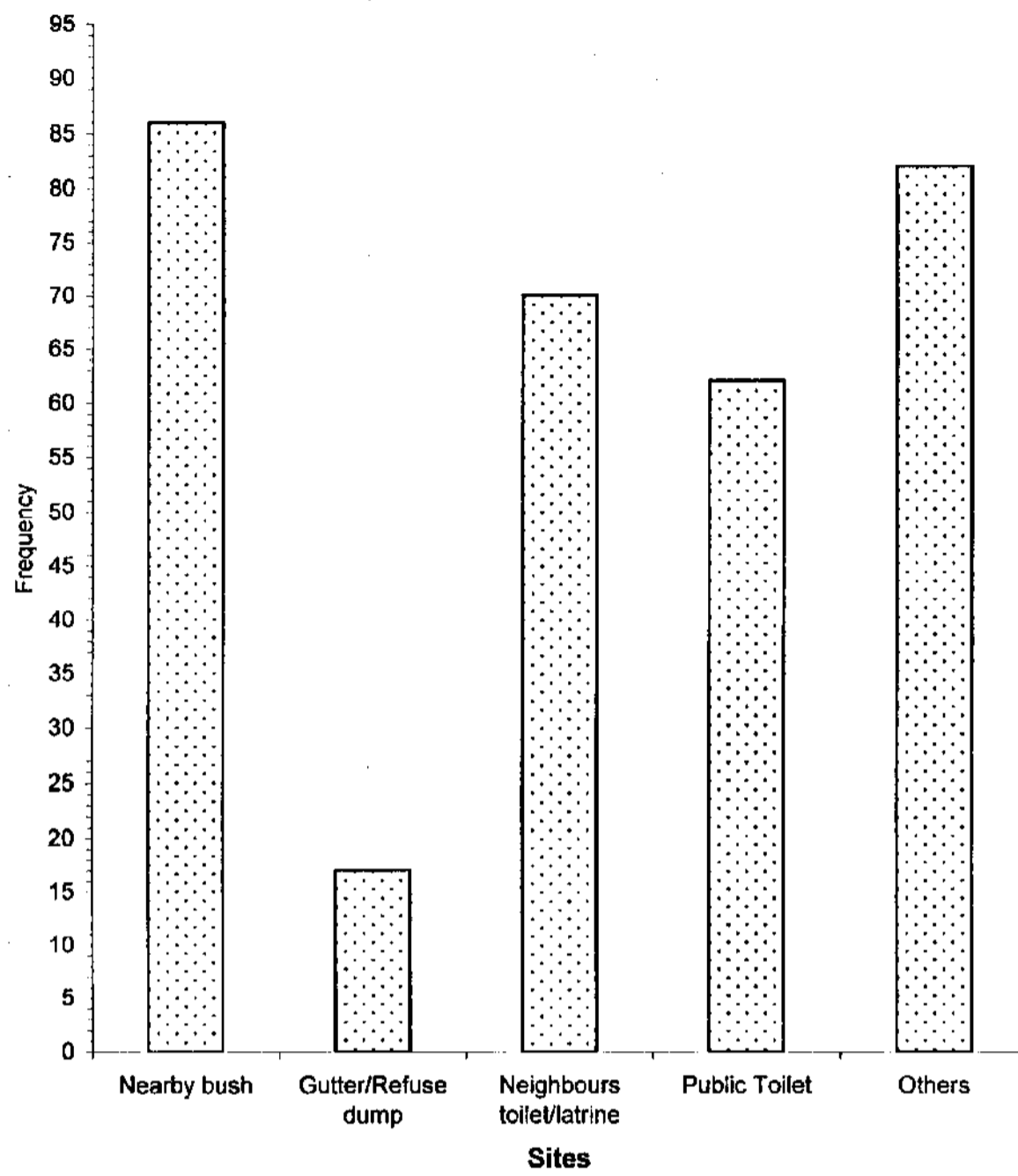


Fig. 4: Defaecation sites for respondents in premises without latrines

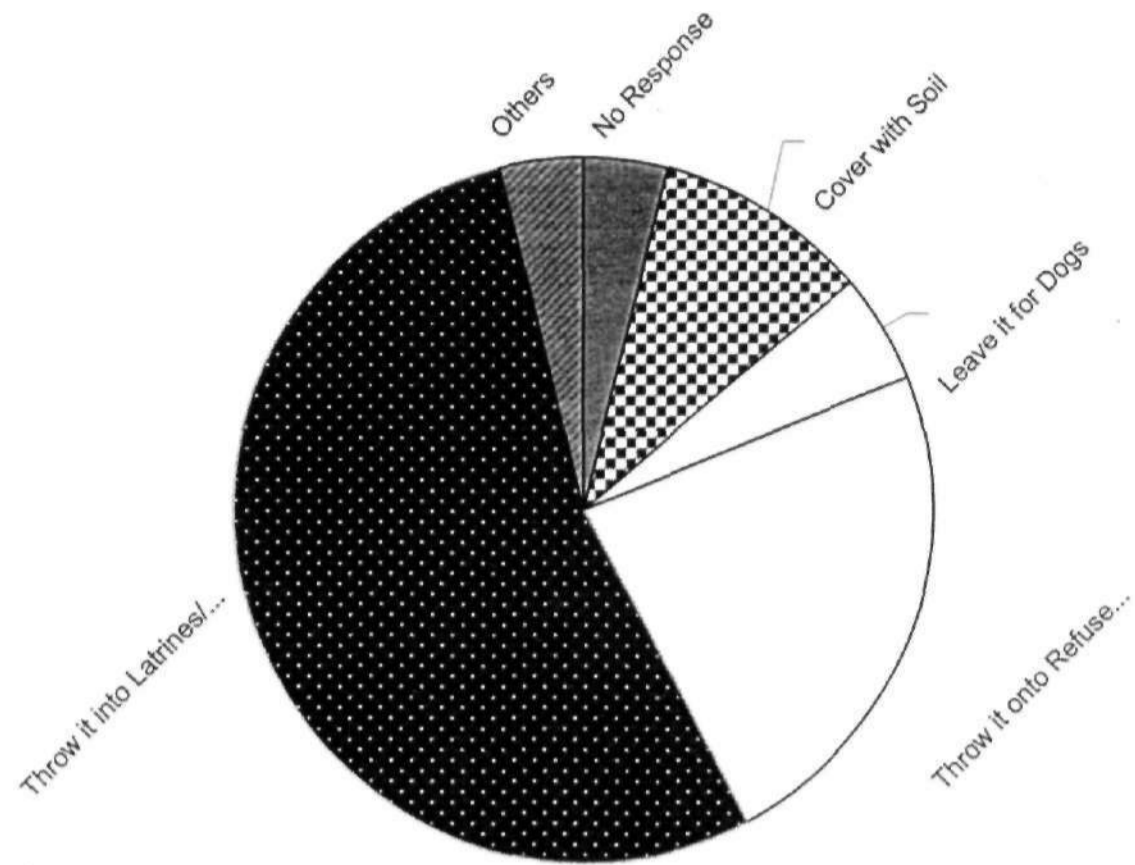


Fig. 5: Method of Infant/Child excreta disposal

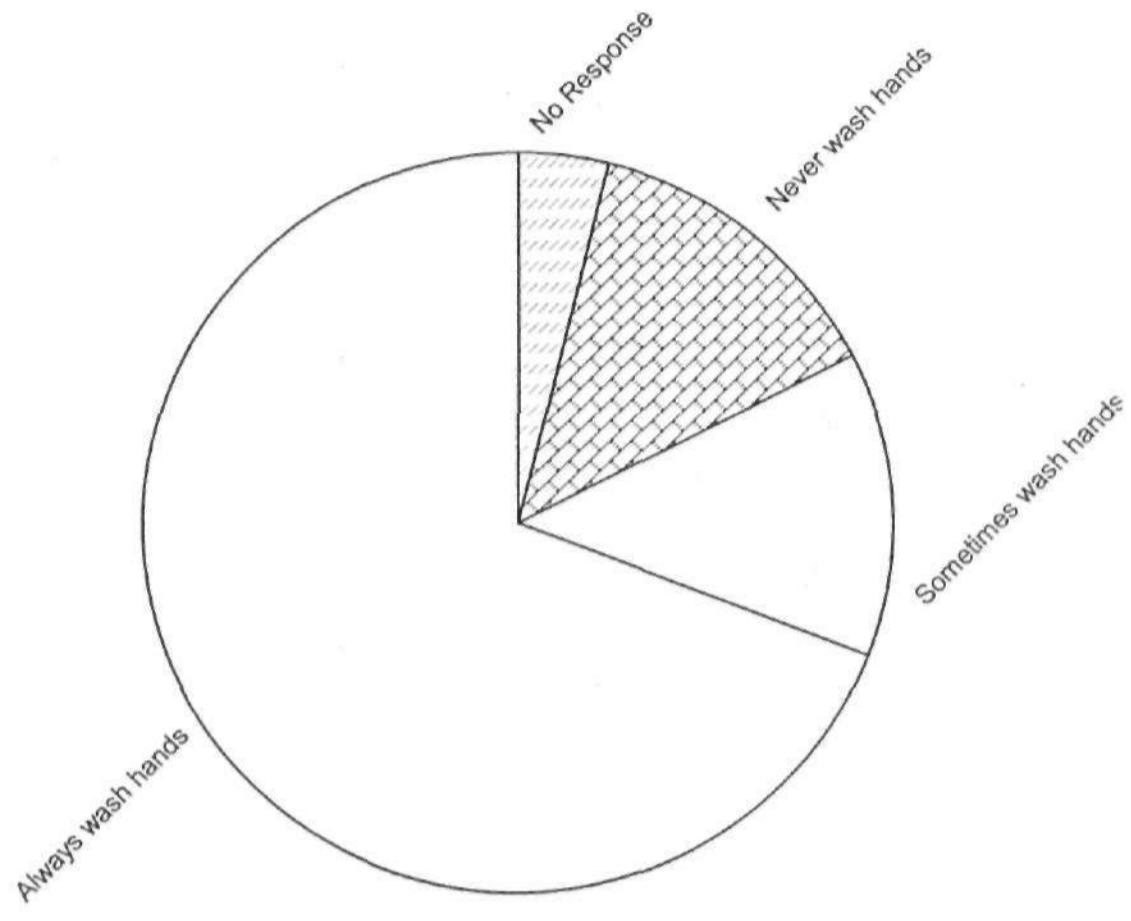


Fig. 6: Hand washing after defaecation

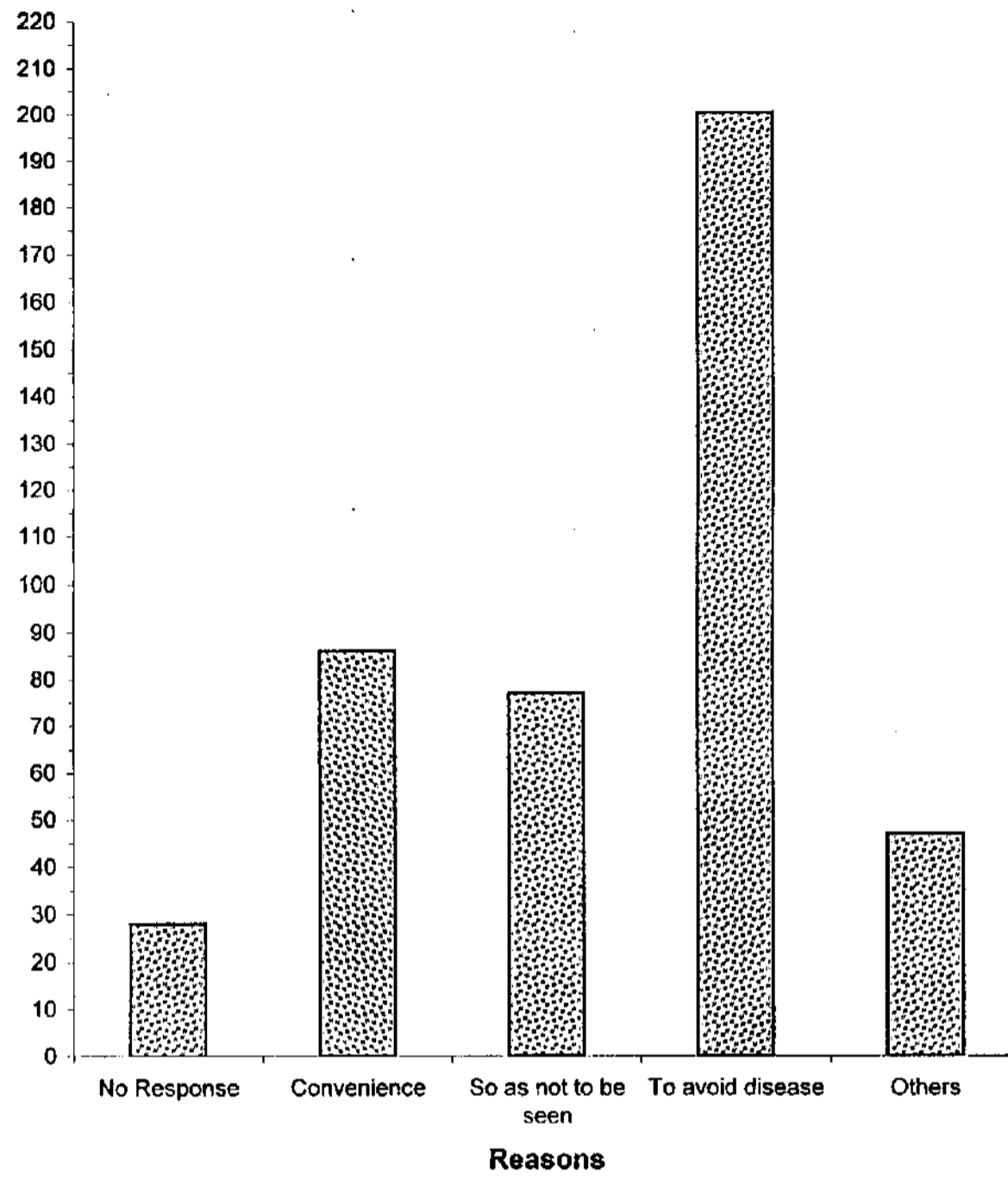


Fig. 7: Reasons for using latrine

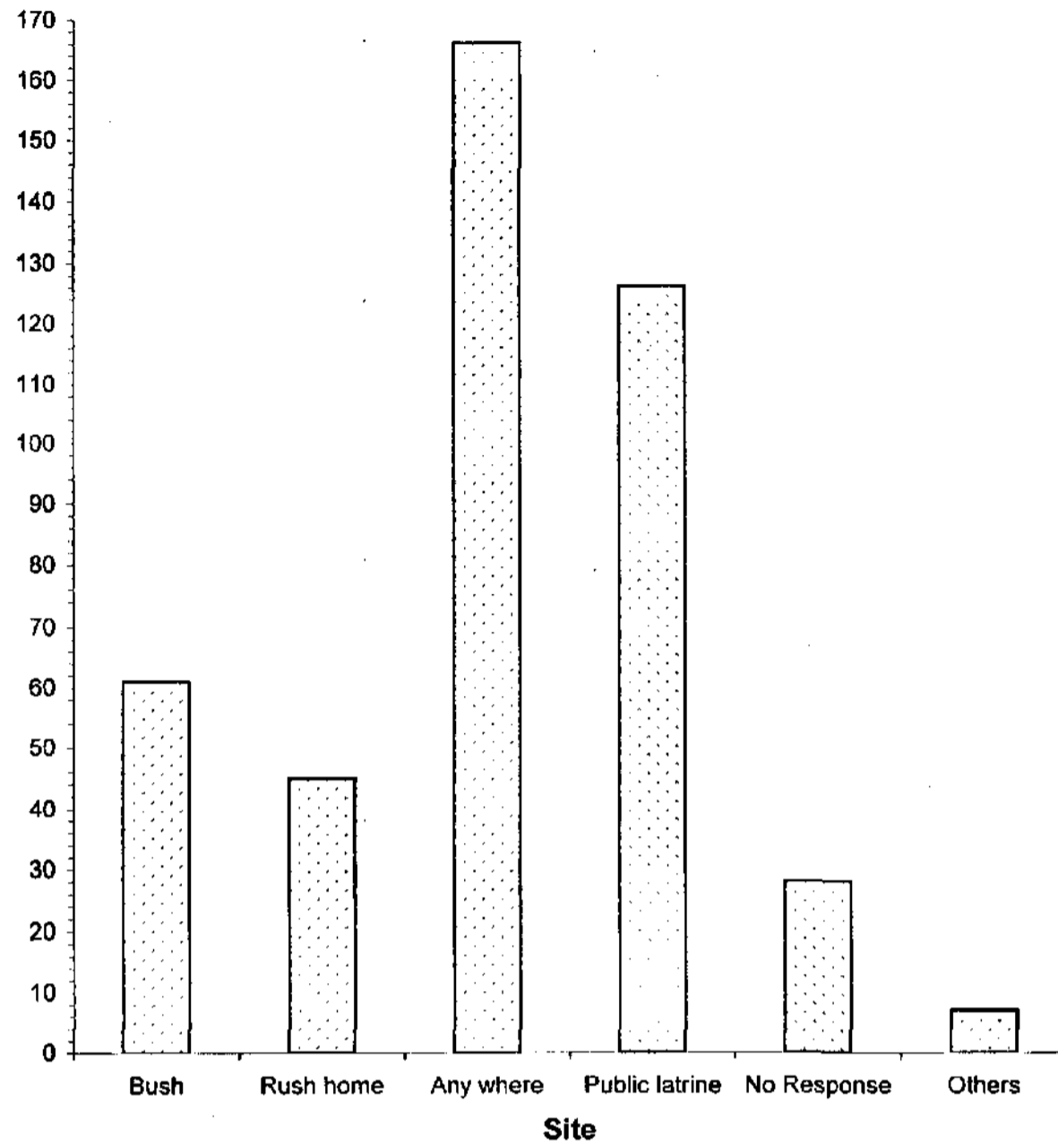


Fig. 8: Defaecation site options for respondents while away from residence

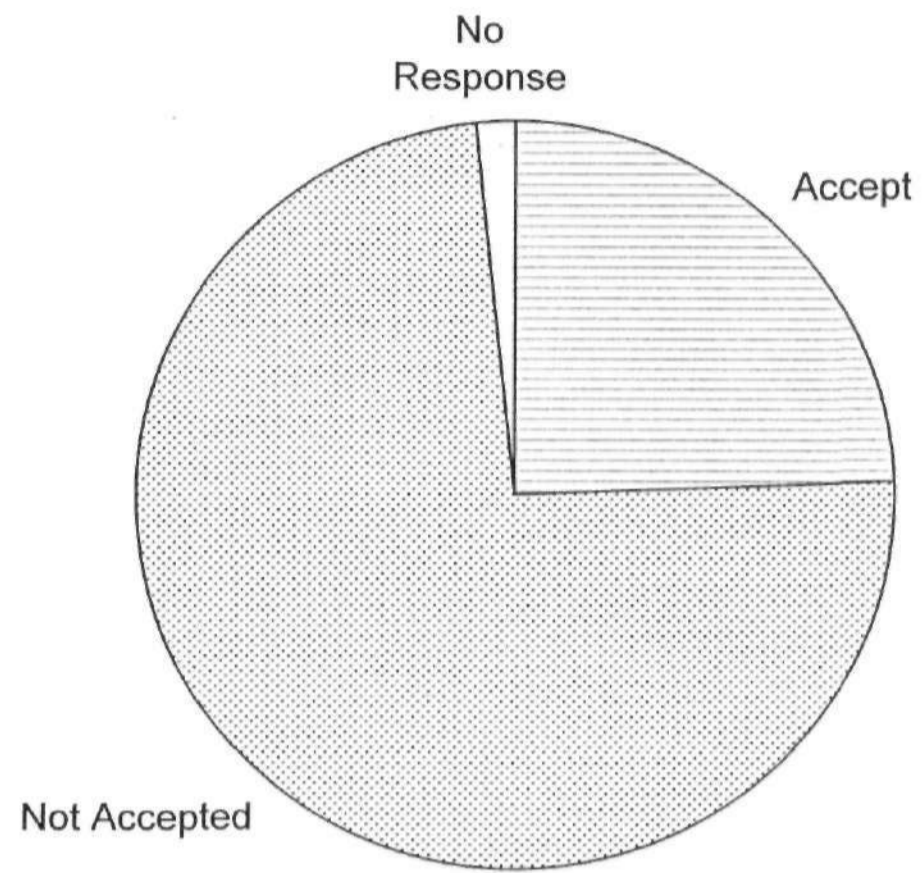


Fig. 9: Public latrine acceptability

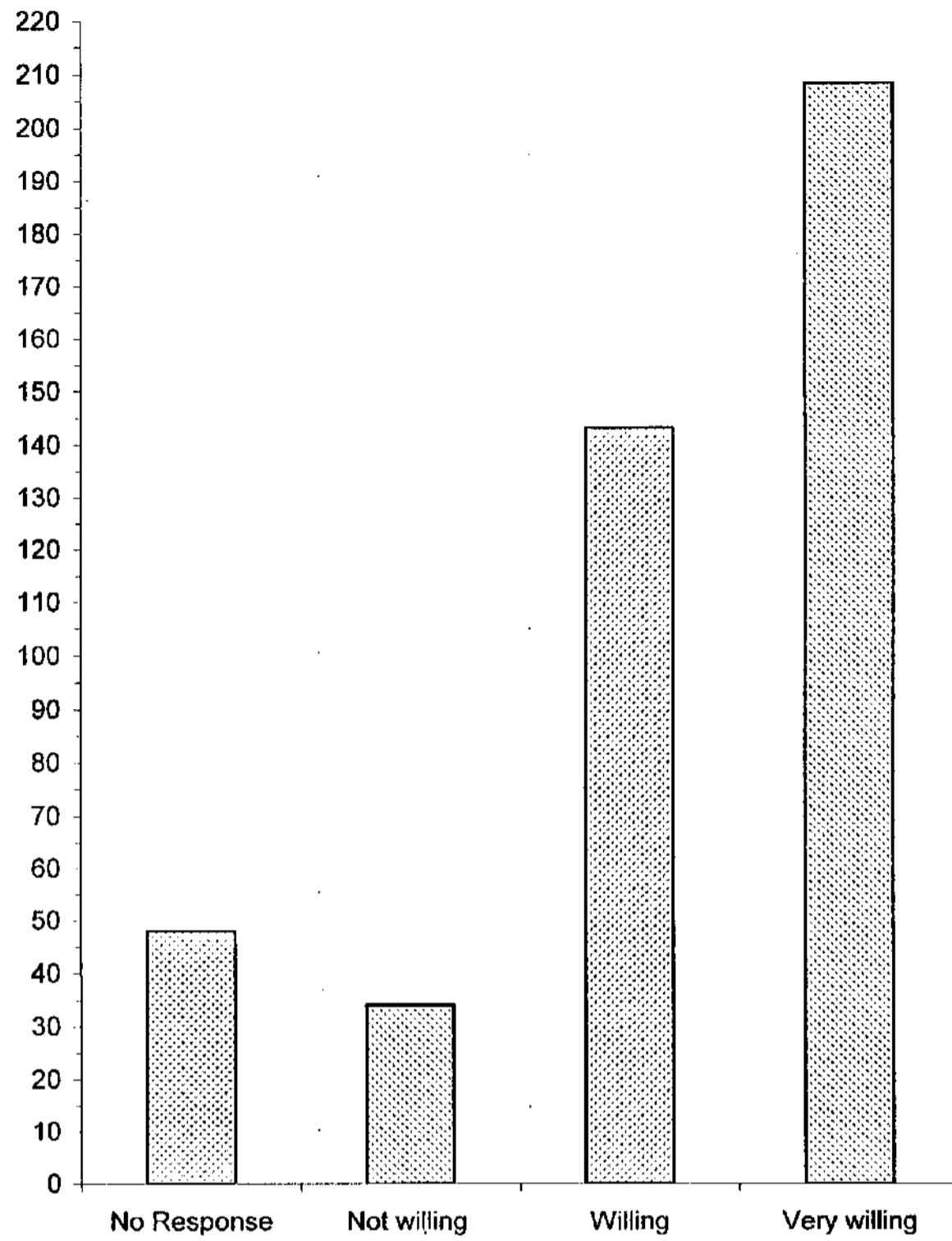


Fig. 10: Willingness to pay to use Public latrines that meet respondents standards

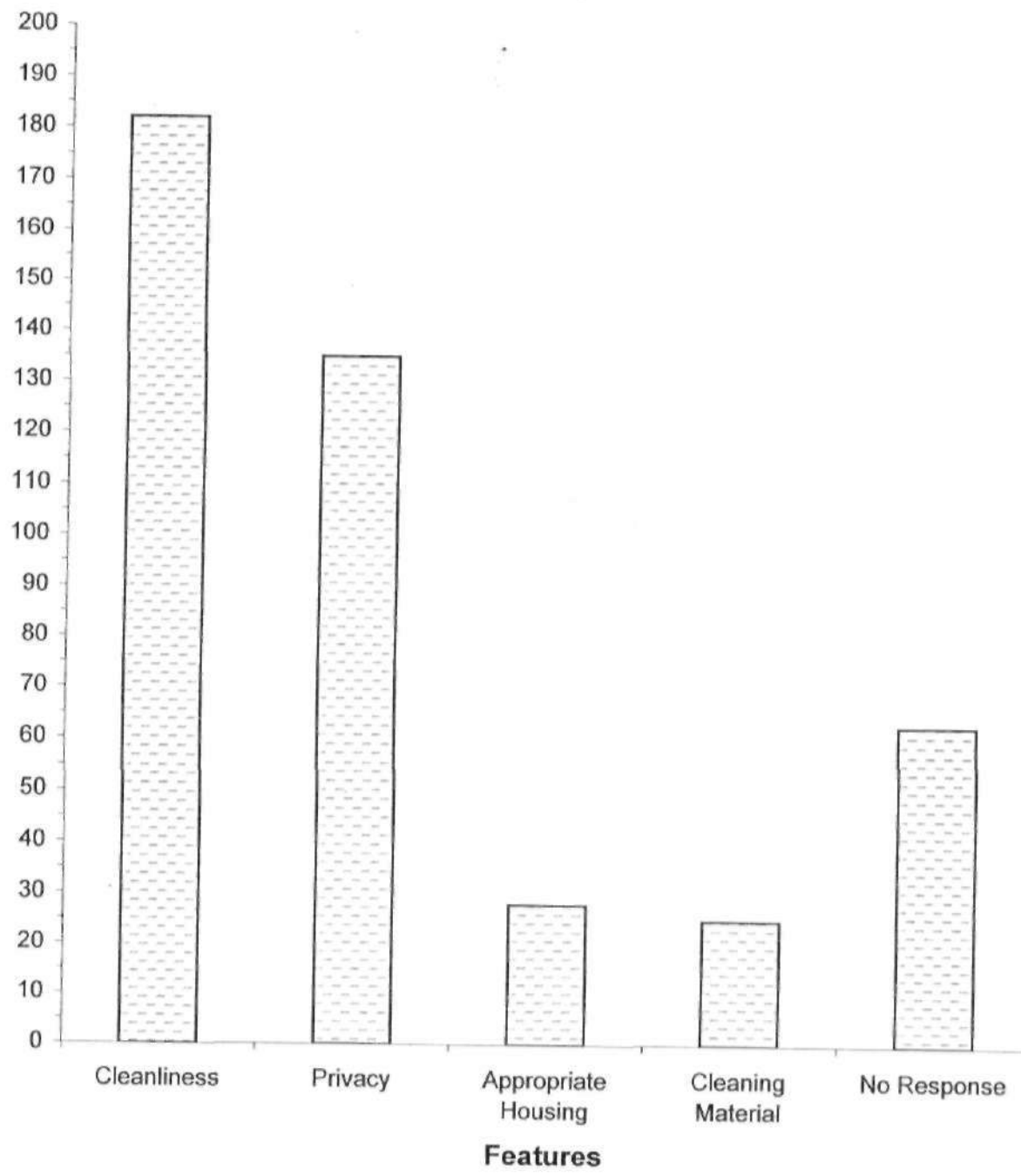


Fig. 11: Desirable features of public latrine

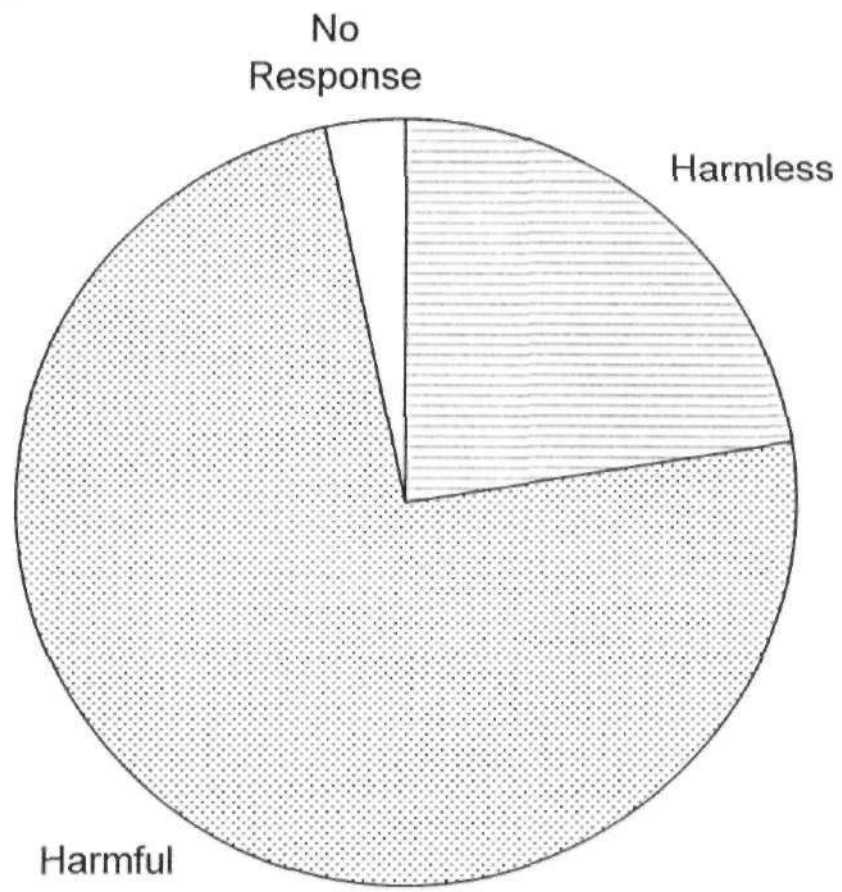


Fig. 12: Knowledge that child excreta is harmful

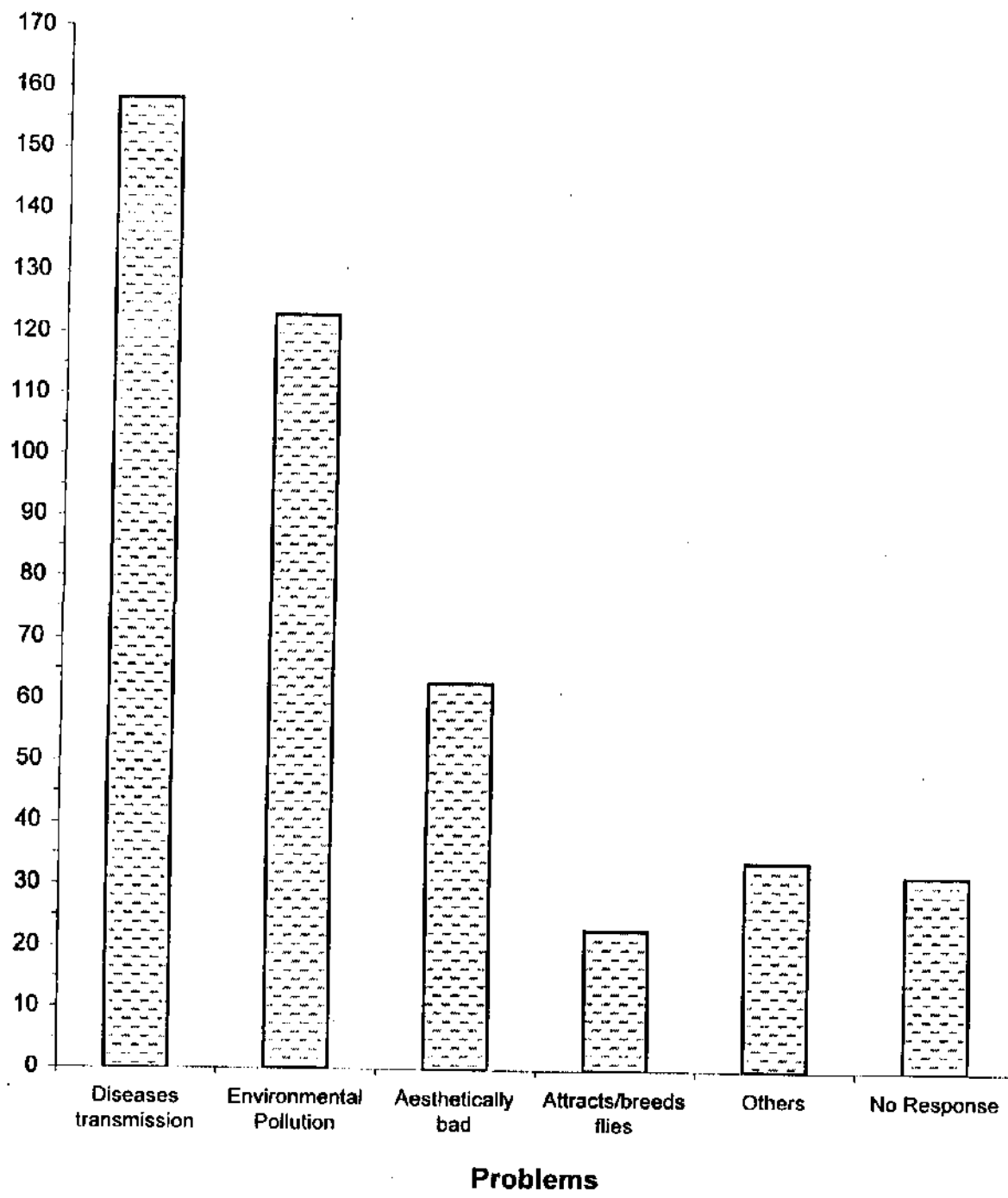


Fig. 13: Problems associated with human excreta

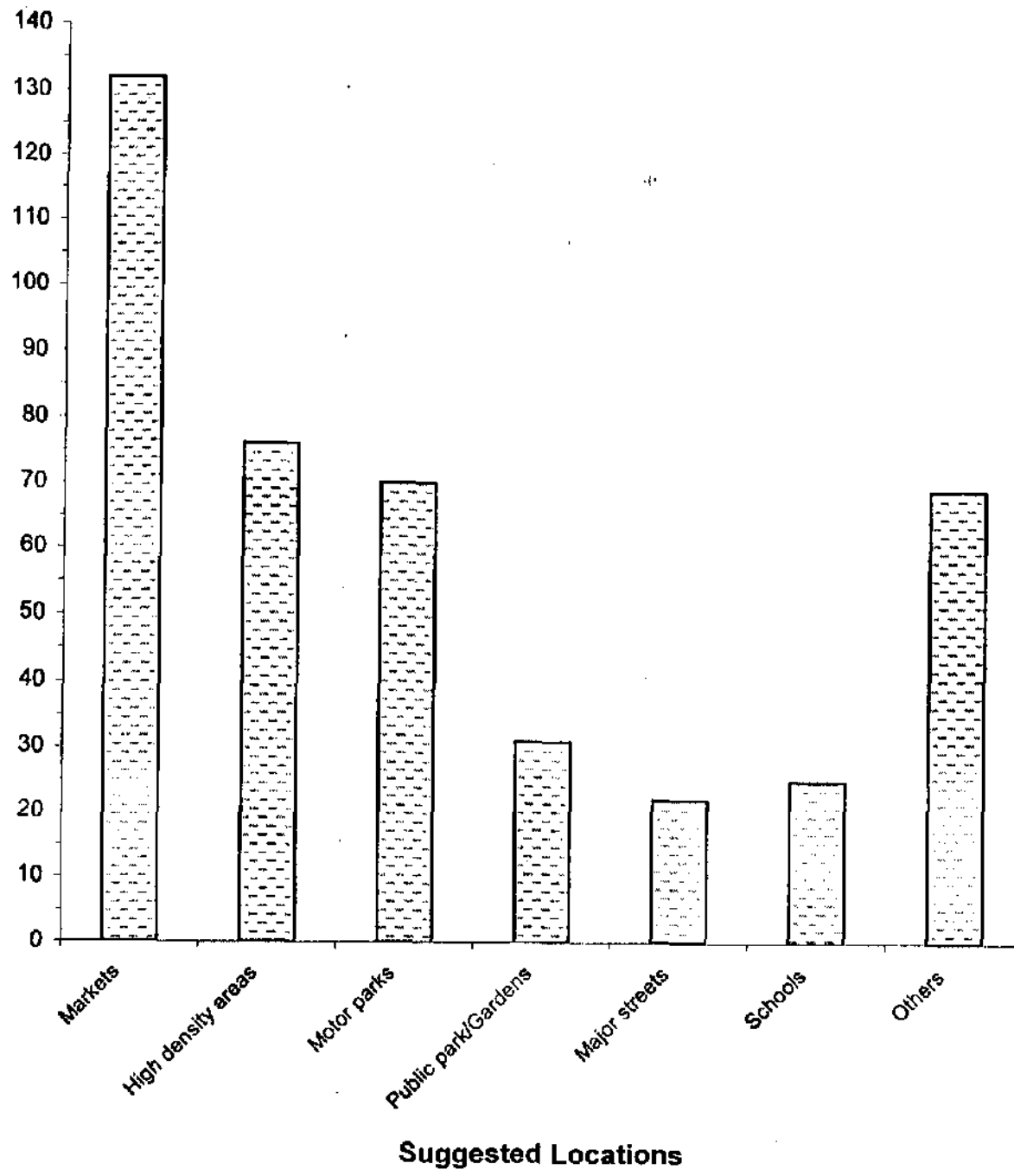


Fig. 14: Suggested Locations for Public latrines

Table 2: Latrine use by Educational Status of Respondents

Latrine Use	Educational Status					
	Status not stated	Illiterate	Primary	Secondary	Higher Education	Total
Use not stated	-	4	3	5	3	15
Never	1	9	19	24	18	71
sometimes	4	14	21	40	39	118
Always	5	41	46	75	89	229
Total	10	41	89	144	149	433

Table 2 compares latrine use with educational status of respondents. There is no significant difference in the level of latrine use between the respondents of the various educational status ($P > 0.05$).

Table 3: **The Practice of handwashing after defaecation by gender of respondents**

Hand Washing after Defaecation	Gender			
	Not Stated	Male	Female	Total
Not stated	1	6	10	17
Never	-	26	33	59
Sometimes	1	25	32	58
Always	7	120	172	299
Total	9	177	247	433

A review of Table 3 indicates that there is no significant difference in the practice of handwashing after defaecation between male and female respondents ($P > 0.05$).

Table 4: **Practice of handwashing after defaecation by educational status of respondents.**

Handwashing Practice	Educational Status					Total
	Status not stated	Illiterate	Primary	Post Primary	Higher Education	
Practice not stated	2	3	2	6	4	17
Never	1	12	9	18	19	59
sometimes	1	5	17	19	16	58
Always	6	21	61	101	110	299
Total	10	41	89	144	149	433

Significant difference exist in the practice of handwashing after defaecation between the different educational categories of respondents ($P < 0.05$). Thus, those with higher levels of education tend to practice handwashing after defaecation more than those with less education.

Table 5: Acceptability of public latrine by educational status of respondents.

Public Latrine Acceptability	Educational Status					Total
	Status not Stated	Illiterate	Primary	Post Primary	Higher Education	
No Response	1	1	2	2	2	7
Accepted	1	16	26	36	36	106
Not accepted	8	24	61	106	106	320
Total	10	41	89	144	144	433

There is significant difference in the acceptability of public latrines among the various educational categories of respondents ($P < 0.05$). Acceptability of Public latrines is more with respondents of lower educational status.

Table 6: Willingness to pay for a child to use public latrine by gender

Willingness to pay	Gender			
	Gender not Stated	Male	Female	Total
No response	4	19	33	56
Willing	1	94	138	233
Not willing	4	64	76	144
Total	9	177	247	433

There is significant difference between the willingness of male and female respondents to pay for a child to use a public latrine ($P < 0.05$). Thus, Females are more willing to pay for a child to use public latrine than their male counterparts.

Table 7: Respondents awareness of the availability of public latrines in Makurdi by residential/population density status.

Awareness of Public Latrine	Residential/Population Density Status					
	Not Stated	Woilomayo	Wudata	Kwararafa	HUDCO	Agboughul
No Response	-	18	5	5	4	14
Awareness	1	93	13	18	12	25
Not aware	-	118	26	27	28	26
Total	1	229	44	50	44	65

NB Woilomayo and Wudata market are high density areas

Kwararafa - Medium density area

HUDCO - Low density area

Agboughul - Traditional settlement area.

Awareness of the availability of public latrines in Makurdi is low irrespective of the residential and/or population density status of the respondents ($P > 0.05$).

Table 8: Intestinal parasitoses by gender

Intestinal Parasites	Gender		
	Male	Female	Total
Negative	4	14	18
Positive	20	27	47
Total	24	41	65
% Positivity	83.3	65.85	72.3

There is no statistically significant difference in the parasite rates between male and female (Fischers exact test value $P > 0.05$).

Table 9: **Intestinal parasitic infection rate by age group**

Intestinal Parasites	Age		
	1-15 Years	16 Years +	Total
Positive	15	32	47
Negative	1	17	18
Total	16	49	65
% Positivity	93.75	65.31	72.3

The rate of intestinal parasites observed among children under 15 years is significantly higher than those among clients aged ≥ 16 years (Fischer's exact test $P < 0.05$).

Table 10: Frequency of intestinal parasites isolates from 65 stool samples

Age	Parasites						
	Ascaris	E. histolytica	G. lamblia	Hookworm	S. strongyloides	Tapeworm	Total
< =15Yrs	-	7	4	12	-	1	24
>15 Yrs	4	25	-	25	2	1	57
Total	4	32	4	37	2	2	81
% of Positive Isolates	4.94	39.51	4.94	45.68	2.47	2.47	100.01

Hookworm has the highest occurrence 37 (45.68%), followed by Entamoeba histolytica 32 (39.51%) of the samples. The parasites with the least occurrence were Strongyloides stercoralis and tapeworm each occurred in only (2.47%) of the samples.



Plate No 1

Typical public latrine in Makurdi; floor wet and littered with excreta (in side polyethene bags) improvise foot rests (planks)



Plate No 2

A public latrine in Makurdi: Excreta disposal facility or death trap?

4.1 RESULTS FROM FOCUS GROUP DISCUSSIONS

Knowledge of the relationship between excreta disposal and health

Health is generally seen as absence of disease, peace of mind, ability to meet social and economic needs, good food and shelter.

The participants defaecate in the latrine/toilet, some do so on bushy undeveloped plots of land mainly at night. The older men group also observed that "children sometimes defaecate in and around the yard". This is often packed and thrown into the latrine or flushed in the toilet. Few persons agreed ever seen children excreta being thrown onto refuse dump or left for animals to feed upon.

When asked about health benefits of the various methods of excreta disposal, both health and aesthetic benefits were mentioned. These include elimination of the nuisance of flies, avoidance of snakebite in the bush, prevention of disease. The young women clearly emphasised this last point when they stated that "flies around the compound can contaminate food which when eaten, cause stomach ache and diarrhoea".

The heat from the pit latrine was however noted to cause dysentery" in someone who squats over it.

"Defaecating in the bush affords one some fresh air as well as shields one from odours of other peoples excreta which can cause one to be sick" (young men). On the other hand, it is risky as it is done mainly at night when one can easily be bitten by a snake."

"Defaecating in the bush (undeveloped plots of land) leads to smelly surroundings" (older men). It encourages the flies all over" and is difficult (inconvenient at night and when it is raining. The younger men also mentioned that "rain can wash the excreta into drinking water sources, contaminating the water".

Attitude towards exposure of human excreta/public latrine

All the participants abhor seen human excreta along the streets or walkways. This is amply demonstrated in the actions they take when they come across such excreta. Some change their route, others hold their breath until they pass the place cursing the offender, and still some stop taking the filthy route.

Asked what could be done to change this habits, participants were of the view that health education in schools be undertaken since most of the people who do defaecate indiscriminately are children and young adults.

Other suggested remedies include getting people (everybody) to learn that it is not good to defaecate in the bushy plots. The young men, added that "the problems can be prevented by (people) having latrines and using them, not drinking water from open sources, and boiling drinking water properly", "These problems can be prevented if every compound has its latrine/toilet" (older women).

Factors militating against the use of public latrines

Few are aware of public latrines in Makurdi town. No participant has ever used the public latrine because " they are very dirty and full of flies. One cannot get inside without stepping on excreta" (older women). Some claim their "structure does not befit our social status" (older men). Some say they do not use the public latrines because they do not know such exist.

Most participants would however welcome the idea of public latrines provided they are properly sited, well designed and maintained and they know where the latrines are located.

Suggested sites include markets, churches, schools, motor parks etc.

"Sanitary inspectors should be re-introduced to oversea the public latrines" (older men).

Users of the public latrines should be made to pay some money" otherwise they will underestimate its importance and hence misuse it. People value what they pay for more than free (awoof) things" (young men).

4.2 PUBLIC LATRINE INSPECTION

Location:- Makurdi Modern Market

Construction: The public toilets in the Makurdi Modern Market have strong walls, floor, roof and doors. The finishing is tastefully done including painting and lighting.

Maintenance: People have been employed by the market authority to look after the toilets. These ensure their cleanliness and also collect a token fee of five naira (N5.00) per user.

Patronage: This is relatively high judging from the amount collected each day per toilet, about one hundred and twenty naira (24 persons/toilet/day). Many users of the market however do not know of the availability of this facility.

Location: Woilomayo Market/Motorpark.

Construction: The walls have large cracks in some units giving the impression of abandonment Plate 2.

The floor is damp and collapsing in several of the units. Planks have been used to provide foot rests in some units (Plate 1). The roof is intact

The door are strong but not in correct position, probably due to the sagging supporting walls.

Maintenance

The surrounding looks rather unkempt with overgrown bushes at the back. The motorpark units are filthy all round.

Smell/odour - present more at the motorpark units.

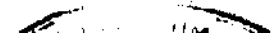
Flies/insects - the units at the motorpark are particularly filled with flies.

Anal cleaning material is provided at the market units only.

Here too, a fee of ten naira is charged per user. The amount is used to pay for daily cleaning of the latrines.

Patronage:

This could not be ascertained exactly for the motorpark units but the presence of fresh excreta in a polythene bag on the floor could be seen (see picture 2) as evidence of its improper use. About 4-6 persons use the latrines at the market units daily.



CHAPTER FIVE

DISCUSSION AND CONCLUSION

Females were over-represented in this survey with a female-male ratio of 247:177 (or 1:1.4). This could be due to the fact that the females stay at home more than male do, and are also more involved in buying and selling in the market hence more women were readily seen and interviewed. This, however is, a welcome development since women have a central role to play in all aspects of health either as wives, mothers, grand mothers and traditional practioners.⁴⁷

Their knowledge and practice of sanitation is therefore very vital to any sanitation intervention. Majority of the respondents are in the age group 20-29 years (fig.1).

On latrine availability on premises, (which may be taken to be access to sanitary means of excreta disposal) 19.2% confirmed the service (Table 6). This is lower than the national figure of 30% even for rural communities and a far cry from the 61% urban sanitation coverage.⁴⁸

This level is comparabile only to obtains in some urban slums and squatter areas in Mexico and Coatzacoalos⁴⁹. Further work may need to be done to establish reasons for this sordid state.

Latrine use on the other hand shows a relatively high percentage, higher than the percentage availability on premises (fig.2). While this may be attributable to the sharing of this facility with neighbours as indicated by some respondents (22.08%) whose premises lacked same (fig.4), the tendency to over report practices perceived to be 'good' as documented by Curtis *et al.* (1993)⁵⁰ should not be overlooked.

Educational status does not seem to have significant impact on the level of latrine use by respondents ($P > 0.05$). This may have to do with their absence on the living premises of the respondents.

It must also be noted that a high proportion of respondents never use latrines (16%), while 27% sometimes use them (fig.2). Reasons for their action include absence of the facility on their premises, uncleanliness of the latrines especially where they are shared by many tenants, filled up pits, as well as lack of water for flushing the toilets. It is, therefore, clear that the mere existence of latrines does not translate directly into their use and sanitary excreta disposal. Indeed latrines, improperly maintained and used, may portend more danger to the people.⁷

The use of the bush, gutter/refuse dumps as defaecation sites is quite high 23% (figure 3). This is worrisome, particularly in view of the fact that the "mini survey" in this project has confirmed that intestinal parasitoses rate is high in Makurdi (72%) Tables 8). The resulting high level of soil contamination with such faeces will definitely make avoidance of infestation very difficult.

Perhaps the "fresh air" appeal of bush defaecation may be countered if latrines that are clean and with little or no smell are constructed. This is more pertinent considering the risk of snakebite which respondents claim defaecating in the bush entails.

A closer look at respondents' defaecation habits (while away from their homes) reveals that over 52% of them either defecate in the bush or in any place away from public view, 29% use public latrines, while another 10% rush back home to defaecate (figure 9). This further confirms that there is heavy contamination of the soil with human excreta. This is not unexpected in an environment with abysmally low access to sanitary means of excreta disposal. It, however, has the potential to further worsen the health status of the people already burdened with the problem of inadequate potable water supply.

The importance of the latrine in preventing the spread of disease is however well known to the respondents. This can be deduced from the fact that over 46% of the respondents reasons for using the latrine is to avoid transmitting diarrheal diseases. This knowledge could be used as the foundation upon which the sanitation intervention programme could commence. The relationship between excreta disposal, water supply and intestinal (and other) parasites would form the focus of the health education project. Such an approach, with full participation of the community has been successful in Ayadaw, Burma.⁴⁵

A large proportion of respondents dispose infant/child excreta in unsanitary ways, 166 (38.3%) covering it with some soil, leaving it for dogs to feed on, or throwing it onto the refuse dump (fig.4). This compares favourably with the findings of Curtis et al (1993)⁵⁰.

Children's excreta is, no doubt, likely to contain more parasites or their ova than adult's excreta since they (children) also have higher prevalence rates of intestinal parasitoses,^{4,6,23,51,52} and as shown by the mini-survey in this project. Consequently unsanitary disposal of children's excreta as found is liable to so heavily contaminate the soil that avoiding infection becomes impossible. Infective stages of soil transmitted helminths have been reportedly observed in soil in children's park, vegetables, gari and even palmwine.^{23,33,53}

It is very important that these practices, which Ukoli¹⁴ aptly describes as contaminative, be changed if a headway is to be made in the control and prevention of intestinal parasites in Makurdi. Good enough, over 53% of the respondents already dispose infant excreta in the toilet (Fig 4). Could this be another case of over-reporting of a perceived "good" practice⁵⁰? Is it that all respondents who always use the latrine (52%) plus a few others, also dispose their children's excreta in the latrine? This and the place of disposal of washwater from napkins containing child's excreta may need further study.

Handwashing after defaecation is highly practiced. Sixty-nine percent of respondents always do this, while only 13.6% never wash their hands after defaecation. There is no significant gender difference in this practice ($P > 0.05$).

The practice of washing hands after defaecation however becomes more common with increasing level of education of respondents ($P < 0.05$) table 4. This may be explained by the fact that with increasing level (or status) of education, there is an accompanying increase in the knowledge of good hygiene practices. Hygiene behaviour changes are known to have great effect on enteropathogens transmitted via the faeco-oral route.⁵⁴

Though only 53% of the respondents dispose of infant/child excreta in a sanitary manner, over 74% are aware that children's excreta is harmful (Fig.2). There is no gender difference in this regard ($p > 0.05$) Table 6. It may, therefore, be necessary to further investigate reasons why over 38% of these people still choose unsanitary ways of disposing child excreta. Education of the 22% who believe that child excreta is harmless is also vital for a change of the unsanitary practice.

While over 74% of the respondents know that child's excreta is harmful, only 53.8% are willing to pay for a child to use public latrine. This may be attributed to the general non-acceptability of public latrines by the people. Consequently, seventy-three point nine percent (73.9%) do not accept public latrines (fig.9). This high rate of unacceptability stems from their being very filthy and full of flies as well as having structures that do not benefit human status.

Most of the respondents however, will accept public latrines that are properly sited, well designed and maintained. Infact, for such a latrine, over 80% of the respondents are willing to pay a fee for its use (fig.10)

Acceptability of public latrine system varied depending on educational status of respondents; the lower the educational status, the more readily acceptable the

public latrines ($P < 0.05$) Table 5. This may not be unconnected with the fact that the latrines are filthy as described, and so diminishingly acceptable to the educated ones who tend to be more hygiene conscious.

A significant difference exists between the willingness of female respondents and their male counterpart to pay for a child to use the public latrine ($P < 0.05$), with 59% and 40% of the respective gender willing to pay (Table 6). This may be due to the fact that females are culturally (and biologically) caregivers and so experience more embarrassing situations when a child suddenly defaecates in public. More females than males are also involved in petty trading which keeps them away from home for most of the day, hence stand the risk of having several of such embarrassments daily.

Respondents are aware that exposure of human excreta is not without problems. Over 36% of them linked it with transmission of diseases directly, another 38% linked excreta exposure with environmental pollution (Fig. 13). It may therefore not be too difficult to convince those engaged in the unwholesome practice of insanitary excreta disposal to change their behaviour.

Several suggestions were made for a change, including mass education of the populace generally and specifically targeting schools, since most of the culprits are youths and children.

Cleanliness, privacy, and appropriate superstructure (housing) were ranked as the first three most important features for acceptability of public latrines (Fig. 11). These were observed to be lacking in most of the inspected public latrines in Makaurdi. This further goes to explain some of the respondents' aversion to public latrines.

Majority of the respondents (51.96%) are unaware of any public latrine in Makurdi (Table 7), while apparently none of participants in the focus group

discussions (FGDs) admitted ever using a public latrine in the town.

Latrine inspection however showed public latrines that are in varying states of disrepair and misuse as in the Woilomayo area of Makurdi (Plates 1 & 2) the good ones in the Makaurdi modern market.

Sites suggested for location of public latrines include (in order of decreasing frequency): Markets, high density areas, and motorparks (fig.14). This is in agreement with what obtains in other parts of the world.

CONCLUSION

Intestinal parasitic infections are a major health problem in Makurdi. A combination of inadequate water supply, and insanitary excreta disposal practices has tended to account for this unfavourable state of affairs.

Knowledge of the relationship between excreta disposal and health is fairly good among the residents of the town. There is still room for improvement, particularly the link between the 'unseen' excreta in the 'bush' and the heminthic infections, and the need for both child and adult excreta to be disposed of in the latrine as both are harmful.

The continued patronage of public latrine, some of which are in delapidated state and fit only for reptiles, is an indication that, to some extent, people still find them useful. All that is needed is for the appropriate authority (the state Urban Development Board) to collaborate with relevant stakeholders such as the Ministry of Health, the Water Board, Ministry of Environment, Ministries of Information, Education, Works as well as the general public) to design, construct and promote the public latrines in Makurdi. These may also serve as models for individual families/households to copy from.

Such public latrines could be rented out to individuals or bodies that will see to their operation and maintenance. A token fee may be paid by users as is already being done in the Makurdi Modern Market, and to some extent the Woilomayo market.

To ensure patronage of these latrines and future adoption by households the people's knowledge of the harmful effects of poor hygiene and environmental sanitation, and the need for improvement, will have to be upgraded. This could be by campaigns, radio and television talks as well as seminars at which occasions the variables responsible for the high level of intestinal parasitoses in Makurdi and its effects can be shown. Possible solutions could then be preferred as shown from experiences of other communities. These health education activities may precede the actual latrine construction, and may indeed, improve mobilization.

Simple education/health messages such as the following may be useful:

- = > A latrine is necessary for every premises, have yours today - You will be glad you did.
- = > Avoid transmitting intestinal (parasitic) infections:- always wash your hands after visiting the latrine/toilet.
- = > Both child and adult excreta are harmful: dispose them safely - IN THE LATRINE.
- = > Open field (Bush) defaecation promotes intestinal parasitic infections - use the (PUBLIC) LATRINE.

It must be remembered however, that sanitation interventions must go hand in hand with water supply and health education for optimal impact. Fortunately efforts are in top gear to improve piped borne water supply to Makurdi.⁵⁵ It is therefore hoped that this intervention will have the rare privilege of sanitation,

water supply and health education working - synergistically to combat, not just intestinal parasitoses but other problems of public health as well.

As part of this intervention, a full scale prevalence survey of intestinal parasitic infections in the town is necessary in order to establish the baseline upon which impact of intervention strategy can be made.

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APPENDIX I

**AHMADU BELLO UNIVERSITY, ZARIA
DEPARTMENT OF COMMUNITY MEDICINE
MASTER OF PUBLIC HEALTH PROGRAMME**

QUESTIONNAIRE

Sex: Male () Female ()

Age: _____

Religion: Christianity () Islam () Traditional () Others ()

Education: Illiterate () Primary schools ()

Post primary school () Higher Education ()

Address (Community): _____

Please tick the appropriate reason:

1. Does your premise have latrine/toilet?

(a) Yes () No ()

2. How often do you use the toilet/latrine?

(a) Always () (b) Sometimes () (c) Never ()

3. Give reasons for your action in six (6) above:

4. Where do you defaecate?

(a) Nearby bush ()

(b) Gutter/refuse dump (at night ()

(c) Neighbour's toilet/latrine ()

(d) Public toilet/latrine ()

(e) Others (Specify): _____

5. How is infant/child excreta disposed?
- (a) Cover with soil ()
 - (b) Leave it for dogs to feed on ()
 - (c) Throw it onto a refuse dump ()
 - (d) Throw it into the toilet/latrine ()
 - (d) Others (specify) _____
6. How often do you wash your hands after defaecation?
- (a) Always ()
 - (b) Sometimes ()
 - (c) Never ()
7. Give one reason for your action in (6) above.
- _____
- _____
8. What material do you use for anal cleaning?
- (a) Water () (b) Paper () (c) Leaves ()
 - (d) Stick ()
9. My main reason for using the toilet/latrine is
- (a) For convenience ()
 - (b) So as not to be seen while defaecating ()
 - (c) To avoid transmitting diarrhoeal disease ()
 - (d) Others (specify) _____
- _____
10. When away from home where do you defaecate (if the need arises)?
- (a) The bush () (b) Rush back home ()
 - (c) Any available place away from public view ()
 - (d) Public latrine ()
 - (e) Others (specify) _____

11. Would you like the idea of a public latrine?
(a) Yes () (b) No ()
12. How willing are you to pay a token fee to use a public latrine that meets your standard?
(a) Very willing ()
(b) Willing ()
(c) Not willing ()
13. Children excreta is harmless?
(a) True () (b) False ()
14. Will you pay for your child to use the public latrine?
(a) Yes () (b) No ()
15. Number the following characteristics of a latrine in order of importance to you?
(a) Cleanliness () (b) Privacy ()
(c) Strong housing ()
(d) Availability of anal cleaning material ()
(e) Others (specify) _____

16. List problems associated with exposure of human excreta.

17. Are there any public latrines in Makurdi?
(a) Yes () (b) No ()

18. If public latrine were to be constructed in Makurdi, where would you suggest they be located (List only three (3) places)

(a) _____

(b) _____

(c) _____

APPENDIX II

**AHMADU BELLO UNIVERSITY, ZARIA
DEPARTMENT OF COMMUNITY MEDICINE
MPH PROGRAMME**

CHECKLIST FOR PUBLIC LATRINE INSPECTION

DATE: _____

ARE OF TOWN: _____

A: LOCATION i. Market ii. Motor park iii. Amusement park	
B: CONSTRUCTION i. Walls ii. Floor iii. Roof iv. Doors	
C: MAINTENANCE i. surroundings ii. Smell/odour iii. Flies/insects iv. Anal cleaning material(s)	
D: PATRONAGE (UTILIZATION) i. Is it being used (how many people do you observe going into it) ii. Was it used in the past? iii. Has never been used	

APPENDIX III

**AHMADU BELLO UNIVERSITY, ZARIA
DEPARTMENT OF COMMUNITY MEDICINE
GUIDE FOR CONDUCT OF FOCUS GROUP DISCUSSION (FGD)**

Commence by greeting every one and making all necessary introduction (Research team, purpose of meeting etc). Ask participants to do self introduction.

1. KNOWLEDGE OF THE RELATIONSHIP BETWEEN EXCRETA DISPOSAL AND HEALTH.

1.0 What does the community regard as health?

1.1 Where do people defaecate in the community?

1.2 Is this the same for everyone?

1.3 Are there any health benefits of this practice?

1.4 What are the health problems associated with this practice?

1.5 How could these problems be prevented? (how have other people handled this problem)?

2. PRACTICES AND BARRIERS MILITATING AGAINST UTILIZATION OF PUBLIC LATRINES.

2.0 Have you ever heard of public latrines?

2.1 Are they available in Makurdi town?

2.2 Have you ever used any public latrine in makurdi?

2.3 Give reasons for using (or not using) public latrines in Makurdi

2.4 Would it be a good idea to introduce or re-introduce public latrines in Makurdi?

2.5 How could people be encouraged to use them?