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Perceptions and Practices relevant to the Transmission of Plague, Leptospirosis and Toxoplasmosis

Mapate, Thohoyandou,
Limpopo Province, South Africa June 2004



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Based on fieldwork carried out by Pfarelo Matshidze and Josephine Mudau of the University of Venda, and including some data from a questionnaire survey carried out under the direction of Malcolm Iles of NRI

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Mapate

INTRODUCTION

Mapate is a rural area consisting of a number of smaller hamlets, within two miles of the town of Thohoyandou in Limpopo province. It is within the peri-urban area surrounding the town, and there are regular buses connecting the village and the town.

What is now Limpopo province is an area which was a 'homeland' under the apartheid era. There was the expectation during apartheid that many of the men would go away to work in white-farmed areas, in white-dominated towns or in white-owned mines. Much of this work has now dried up. This has left the men with a sense that they have no proper occupation, since they had, for many decades, left agriculture to their womenfolk. They now consider themselves to be unemployed, even if their households have land, and most do not involve themselves much in cultivation of the fields. In the questionnaire survey carried out in Mapate, linked to this research (see below), 64% of households reported their male heads as being unemployed.

Poverty in Mapate, measured by the locally-relevant indicator of the number of animals owned, is high: very few households reported owning poultry, goats, pigs or cattle. Households in Mapate are linked into the cash economy, in other words; but they have little cash. They are also subsistence farmers, however, with agriculture being the responsibility of the female members of the household. Maize is the staple crop, with almost all questionnaire survey households reporting that they grow it. 83% of households also reported growing fruit. Only 39% of households reported growing vegetables, which may be related to the proximity of Venda and the possibility of buying vegetables there.

Mapate was chosen as a field site for the RATZOOMAN project because work had already been done there, and was still ongoing at the time of this study, in relation to another project focusing on ways of controlling rats.

In conjunction with the anthropological study which has provided the basis for this report, a linked questionnaire survey was carried out at around the same time. Some of the figures from this are included here.

METHODOLOGY

The fieldwork for this study was carried out by Ms. Pfarelo Matshidze and Ms. Josephine Mudau, both of the University of Venda. Ten households were chosen as key informant households for the study, with the assistance of the civic association chairperson for Mapate. These were chosen to be representative of the community both in terms of income levels and in relation to factors which might affect their exposure to leptospirosis, toxoplasmosis and plague (different sources of water, different types of house structure, relative proximity to 'bush' land, types of storage structure for crops and for water, presence of cats in the household, relative levels of hygiene [according to local perception]). A list of the key informant households is included as an appendix at the end of the report.

Participant observation methods together with direct interviews were used in the study. Each household was visited three times. The interviews were unstructured, with the researcher introducing the theme and encouraging informants to participate spontaneously. In each household both parents were interviewed as well as their children. What informants actually did in relation to relevant activities was also observed during visits, and their practices were documented.

The interviews were conducted in Tshivenda, and they were then translated to English. The main researcher, Pfarelo Matshidze, is a Tshivenda speaker, so no interpreter was needed. This also made participant observation straightforward.

Pfarelo Matshidze began the first visit by explaining to the informants that she and her co-researcher wanted to find out about the presence of rats in their community, as well as about the informants' attitudes and perceptions of rats.

The fact that rats can carry certain diseases was explained in broad terms. Informants were told that their identity would be concealed, and that they had the option of not participating in the research. All informants approached were willing to participate.

Because in Mapate there is no history of plague, the focus within this study has been on practices and perceptions which are relevant to the transmission of leptospirosis and toxoplasmosis. However, practices relating to the consumption of meat, investigated in relation to the transmission of toxoplasmosis, as well as attitudes to rats, are also potentially relevant to the transmission of plague.

HYGIENE: PRACTICES AND PERCEPTIONS

Hygiene practices in the kitchen relate to the likelihood that there will be food to attract rats and therefore the possibility of transmission of leptospirosis. Personal hygiene relates to the possibility that toxoplasmosis could be transmitted either through cat faeces or through handling contaminated meat and failing to wash one's hands afterwards; this latter also relates, potentially, to the transmission of plague, although this does not occur in Mapate. Personal hygiene also relates to the transmission of leptospirosis through rats being attracted to unwashed hands during the night.

Eight of the households were classed as having average levels of hygiene by the researcher, and two were classed as having good hygiene. This is relative to standards in the town of Thohoyandou as well as to local notions of hygiene, and these are not the same, although they do overlap with, standards of hygiene which would protect from transmission of disease. It should be noted that many informants said that those with a high income do not necessarily have better hygienic practices than those on low incomes. It depends, they said, on individuals. They said that women in some households that have low incomes keep a much cleaner household than other women in households with higher incomes.

Perceptions of hygiene vary according to the age of informants. While for older informants to be hygienic means to keep one's kitchen tidy and in good order, for the younger generation to be hygienic means washing one's body everyday and washing one's hands before one eats food. This probably relates both to the fact that young people are not yet focused on keeping a household themselves and to recent exposure to education. At school young people are taught to use the toilet and to use water that has been treated with bleach.

In relation to cleaning practices, nowadays the ideal, particularly among the young, is to buy and use chemical detergents such as Handy-Andy and Bleach to use as multi-purpose cleaners, and to use commercial polishes for the floor rather than using cow dung as is traditional. Those who have the money to buy these do so, according to informants and according to what was observed. However, informants pointed out that those with low incomes are unable to use these because they cannot afford them.

Many households in Mapate have toilets, according to informants. Those which do not tend, according to informants, to be recent arrivals. Some informants said that younger members of households without toilets use the bush, while older people will often ask to use a neighbour's toilet. However, some informants told us that certain elderly people prefer to use the bush even if their household has a toilet. One female informant said that men have a tendency to urinate 'just anywhere' rather than use the toilet. Not everyone washes their hands after going to the toilet; however a number of informants said that they did, and a few said that they knew that there were illnesses which could be transmitted if they did not. On the other hand, it was observed that informants often did not in fact wash their hands. Children in particular seemed unlikely to wash their hands after they had gone to the toilet.

Toilets are sometimes used as bathrooms. Some old women, however, were observed to wash behind the kitchen (*tsitanga*) after dark or very early in the morning around 4 a.m., to prevent people from seeing them.

Waste, particularly food waste, attracts rodents. Waste was found in the socio-economic survey to be disposed of through burning by half the households surveyed. The other half put rubbish in pits, often uncovered, near the house. It is likely that food waste is normally disposed of in this way by all households since it is not easy to burn wet waste.

NOTIONS OF DISEASE TRANSMISSION IN MAPATE

Opinion was divided among informants as to whether water can carry disease. Some informants believed that it does, others said that it does not. It seems likely that government health campaigns may have had some impact in increasing awareness among some informants of the potential for water-borne diseases. Some informants said that running, river water cannot carry disease because it is 'indigenous', implying perhaps that it is not contaminated by outside pollutants.

Water is normally drunk as it is, without treatment or boiling. Some informants were explicit about their belief that there is no need to boil water – that people in Mapate had been using water as it is for many years and it hasn't harmed them. However, one informant said that these days it is better to boil water because there isn't enough rain, and even when it rains water can carry diseases. Another informant said that she knows that water from the river should be boiled before drinking. Some informants said that people put bleach into drinking water if there is an outbreak of disease.

Informants questioned in the anthropological study were divided as to whether they believe that rats can carry disease; this fits with what was found to be the case in the questionnaire survey, when 43% of respondents said that rats could carry disease. Some informants in the anthropological study denied that rats carried disease, while others said that they carry diseases such as what is locally called *thuri* (a mental illness which is sent by witches). Because of this, these informants considered rats disgusting. A number of informants said that they believe that rats can be used to bewitch others, and to make them ill. Rats are very fast, and they are thought to use their speed to move from the perpetrator (the witch) to the victim.

RATS: PRACTICES AND PERCEPTIONS

There are many rats in Mapate. They come and go in most houses. Rats were said by most informants to be common in the village, although informants said that there are more rats in the fields than in houses. In the questionnaire survey, 91% of respondents had seen rats in their house or in the bush, though much fewer had seen rats in their fields. 15% of those who said they had seen rats had seen them once a day. There are said to be more rats around generally in October to January, when maize is growing in the fields. Despite the fact that most respondents to the questionnaire survey said that they had not seen rats in their own fields, most people questioned through the anthropological survey said that rats which come into houses come from the fields; they do not, respondents said, have nests in the houses themselves.

It seems likely that not having rats in your house is seen as a mark of being a 'good housewife'; some of the women in the key informant households asserted that they did not have any in their houses in a manner which suggested this. Thus there may be a higher incidence of rats in houses, and even of rat nests, than people say.

Households in Mapate almost always have more than one building, and may have a mix of thatched (round, one-room) and 'modern' (zinc or tile roofed, often containing more than one room) constructions. In terms of access by rats, thatched houses are not necessarily easier of access than modern houses. If a modern house is in the process of construction, which it may be over a protracted period of time in Mapate, presumably because funds for building come in gradually, it was observed that there are many potential entrances for rats. However, once a modern house is finished and if it is well-made with a well-fitting door and no gaps at the top of the walls under the eaves, it is harder for rats to gain access to than a thatched house.

Households normally have separate buildings for use as sleeping huts and as kitchens. Grain is often stored in the same room in which people sleep. In the questionnaire survey, it was found that 42% of households store their maize in

their sleeping room, normally in a bag in the corner of the room. Very few households have separate storage structures for grain, and they do not successfully protect stored grain from rats. Some informants said that it is households which have separate storage structures for their maize that have the biggest rat problem (perhaps because there are no people to shoo them away at night), and this may be one reason for the fact that households do not normally build these but store their maize in their sleeping huts. In the kitchen, leftover food attracts rats. If there is too much meat from kills of wild animals to be eaten immediately, informants said that it is made into biltong, which is stored in the kitchen, and which also attracts rats.

Rats are, as already discussed, believed by many people to carry disease through witchcraft, and are consequently feared as well as disliked. In the questionnaire survey, 84% of households said that they consider rats to be a problem. Rats are also disliked in Mapate because they damage crops and, if they come into the house, personal possessions. In addition, they bite people, especially at night. Informants said that they are often bitten by rats while they are asleep, particularly on the toes or fingers. One informant pointed out that it is generally those who have not washed their hands after eating maize porridge who get bitten on the hands. If the wound goes septic, informants said that they consult a traditional healer. Generally, though, rat bites are left, as are other wounds, to heal by themselves. They are not covered, so that they are potentially open to the transmission of leptospirosis via water.

Attempts are made by some households to control rats by using chemicals such as Rattex and rat traps locally called *zwilibana*. Households are, according to informants, more likely to use rat poison if they have a separate storage hut. This is probably because it is believed that separate storage huts mean more rats (see below).

LEPTOSPIROSIS: RISKY ACTIVITIES

Contact with river and pond water

All households in the community have access to piped water, through standpipes situated at key points in the village; however, informants said that these sometimes run dry and everyone then has to use river water. There are rivers on both the eastern and western sides of the village of Mapate. Of the ten households involved in the study, four said that they normally use piped water for all purposes. Five households said that they use both piped water and the river, and one household had a tank to store water itself.

Where bathing and washing takes place at the margin of the river, it is a risky activity, particularly if those bathing and washing clothes have cuts or sores. The rivers are near the bushes and mealie-fields where there are rats, and rats may urinate or defecate in the water.

A common pattern is for households to use water from standpipes for drinking water and to wash dishes, but to bathe and wash clothes in the river. Thus, the minimum amount of water has to be carried to the house. Households which are situated at a distance from a standpipe, or are near the river, are more likely to make use of the river for washing clothes, dishes and for bathing. Thus it is likely that they will be more exposed to the danger of catching leptospirosis. However all households use the river when the standpipes run dry.

Women are more in contact with river water than men because they wash clothes and dishes there. Most women go two or three times a week to wash clothes in the river, according to informants, although women from households near standpipes are more likely to use water from them for washing clothes.

Children and teenagers are much more likely to swim in the river, since for them this is a recreational activity, and they are therefore more regularly

exposed to the risk of leptospirosis. Apart from the two rivers, there are also small ponds where children go to play. It is likely that rats may urinate in these, and because of the relatively smaller body of water any leptospire in the urine would be more concentrated in such a pond. Informants agreed that it is quite likely that when young girls and boys swim or play in water, they may have wounds or cuts, and these would probably not be treated or covered. The community is poor so most people do not go to hospitals or clinics unless they suspect that they have a serious illness. Those with higher incomes may take their children to the doctor or clinic if they are wounded, in order to get medication. However, those who are from a low income bracket often do not go for treatment, and their sores may take a long time to heal. Thus the poorer members of the community, and particularly their children, are probably more likely to be exposed to the transmission of leptospirosis through untreated wounds being exposed to river margins where rats may have urinated.

Water storage

Informants said that water is usually collected for household use (mainly for drinking and cooking) three times a day. It is normally either women or children who collect water. Only one of the households had a storage tank for water. Normally, water is stored within the household or under a tree nearby to keep it cold, either in plastic containers or in big clay pots. These are emptied and refilled every two or three days. One informant said that it was important to empty and refill water containers to avoid the water smelling bad, but it is not clear that all households do this regularly. Containers are sometimes, but not always, washed with bleach or soap when they are emptied and before they are refilled. Usually, however, they are simply rinsed out with water and may be scrubbed.

Although some informants said that they knew that they should cover water containers to stop rats and cockroaches falling into the water, sometimes the containers were observed not to have lids or to have ill-fitting lids, and rats could therefore urinate in the water. Since water is not normally boiled before

drinking, this means that drinking water could be contaminated with leptospirosis.

Food preparation and storage

Local practices in relation to the storage of raw food and to the preparation and storage of cooked food present risks in relation to leptospirosis.

Because grain is often stored in sleeping huts, people are exposed to rats which wander around during the night while they are sleeping and may lick their fingers if there are traces of food on them and even urinate on them, thus exposing them to the danger of leptospirosis.

Vegetables are cooked before they are eaten, but fruit is eaten raw. Purchased fruit and vegetables were said by most informants to be washed before they are eaten by most informants, although one said that she did not always do so and another said that she believed that even if fruit and vegetables are not washed there is no problem. Wild fruit and vegetables picked from trees and bushes nearby are not washed before consumption. The water which is used for washing fruit and vegetables is untreated and may have been contaminated with rat urine. Meat is often left out in the open by most households since only a few well-off households have refrigerators, and rats may therefore have been in contact with it and urinated on it or near it.

Cooked food in most households is stored in the kitchen where it is prepared. Food such as *vhuswa* (porridge), vegetables (*muroho*) and meat are left out on a daily basis because some people regularly eat porridge for breakfast. Although some informants said that they knew they should cover leftover cooked food to avoid rats and cats eating it, food was in fact not infrequently left uncovered, according to informants and according to what researchers observed, and rats may walk on top of the food and may potentially urinate on it or near it. Some informants said that they had seen rat faeces on food, demonstrating that rats have been in contact with it.

Food is often shared with neighbours and relatives, particularly special dishes such as *tshidzimba* (a mixture of *samp* and beans and *thophi*). When one family does not have enough to eat, relatives or friends may assist with food in order to provide for the family. During feasts and weddings food may be shared among family members and relatives. If there are visitors food may be taken to their hosts' households. There is the potential that if the food has been left out and rats have urinated on or near it, leptospirosis could be passed to members of other households in this way.

TOXOPLASMOSIS: RISKY ACTIVITIES

Consumption of potentially contaminated meat

Most households rarely buy meat. The very well-off may buy meat twice a week, but the least well-off would buy meat once every couple of weeks or less often than that. Meat is most often bought on pay-day, for those who are employed. Beef is infrequently bought; most households buy chicken, which is cheaper.

However, wild meat appears to be regularly consumed. Although only two of the ten households studied are classed as living close to the bush, all households are relatively close. Eight of the ten households in the study said that people in the community regularly eat wild meat, either hunted by a male household member or by neighbours or relatives and given to other households, although it was not possible to ascertain definitely how many of the households studied regularly eat wild meat themselves. Hunting appears to be common, and hunters go out from the village almost every day, according to some informants. It probably provides a significant proportion of the meat eaten in the village by most households, particularly the majority which are not well-off enough to buy meat often. It is possible that eating wild meat may be seen as a marker of poverty, although this was not ascertained definitely, and this may veil the actual incidence of consumption of wild meat.

The animal most often hunted was said by informants to be an animal locally called *tshedzi*, a pole-cat like animal, which was said to be found particularly in the summer when it comes to eat the crops. Another prey animal which was mentioned by one informant is called *ndovhi* locally. It was not possible to identify these species by their scientific names, so as to be able to tell whether any of the animals hunted are rodents. It is possible that the animals hunted could carry toxoplasmosis – or even plague.

Informants said that meat is sometimes (possibly even quite regularly) cooked directly over the fire rather than boiled. Although informants said that it is thoroughly cooked, it was not possible to verify whether meat is cooked until there is no blood present, and therefore whether there is a risk of transmission of toxoplasmosis (or plague, potentially). As already mentioned, special dishes – particularly meat – may be shared with neighbours and relatives, so toxoplasmosis may be passed to members of other households. It is not known whether excess hunted meat made into biltong could carry toxoplasmosis (or plague).

Contact with cats

Cats are found in many households, although of the key informant households studied only two owned cats. Cats do not restrict themselves to the household which technically owns them, and their presence in other households is likely to be welcomed because they control rats. Cats were said by some informants to be kept specifically to control rats, but they were also said by many households to be treated as pets.

In this context, there are various means via which people may come into contact with cat faeces and hence with toxoplasmosis, either directly or on cats' coats. Firstly, since cats are treated as pets they are petted and cuddled by their owners, and particularly by children. It was observed to be unusual for people to wash their hands after they have handled such pets, although some informants said that they did wash their hands. Some informants specifically said that they did not believe that you needed to wash your hands

after you have come in contact with cat faeces. Secondly, cats may sometimes defecate near food, although cat faeces are said by informants to be removed if they see them inside the house. It is possible that even if there is no cat in the household, cats from other households may come, attracted by meat, and walk over it if it is not covered properly, and they could have traces of their own faces on their paws which would then be passed to the meat.

SUMMARY AND CONCLUSIONS

There is no plague recorded in Mapate. Leptospirosis and toxoplasmosis are not diseases of which villagers are aware, but they will be present, since the symptoms of these diseases could occur without the cause being known. While villagers may have had one or the other, they would not know this. Since they do not know of the diseases, they also do not know how they are transmitted. They cannot, therefore, specifically take measures to prevent transmission. However, local views and beliefs about good hygiene and disease in general, and attitudes to rats, exist in the community which are relevant to the transmission of the two diseases, both in preventing transmission and in encouraging it. A look at human habits, in particular food preparation, reveals various practices which could facilitate transmission. This report has focused on examining these views, beliefs and habits.

Although there is a general dislike for rats only about half of the people questioned believed that they carry disease. They are seen more as a nuisance, and as disgusting, than a threat to health in themselves. There is a belief that they are used by witches to bewitch people, and their ability to transmit disease is to a large extent believed to be related to this. Although attempts are made to keep their numbers down, they are seen as more or less impossible to eradicate; given current house-building practices in Mapate, which rarely keep out rats effectively, this is probably an accurate assessment at the moment. Rats are seen by the people of Mapate as something you have to live with.

Although government health campaigns and education have had an impact on perceptions of hygiene and on practices which relate to susceptibility to the transmission of rat-borne diseases, they do not seem to be fully effective. Thus, for example, perceptions of the potential for water to carry disease are confused and many people believe that it is polluted water that carries disease, and do not realize that local water sources can carry disease of other kinds. Therefore, local water is not normally boiled, although some informants do know that all drinking water should be boiled.

Outline of risky behaviour in relation to leptospirosis and toxoplasmosis in Mapate

Leptospirosis

Potential exposure to leptospirosis in Mapate is likely via the following routes:

- Drinking water from rivers without boiling
- Exposure to river water through washing clothes (women) and through swimming (young people and children)
- Drinking or using for food preparation river or well water which has been stored not fully covered, accessible to rats
- Leaving raw and cooked food in the open, uncovered, accessible to rats
- Having one's hands bitten and/or licked by rats while sleeping, due to storage of grain in sleeping huts and the fact that people do not always wash their hands after eating
- Sharing food which may be contaminated with other households

Toxoplasmosis

Potential exposure to toxoplasmosis in Mapate is via the following routes;

- Eating meat from wild animals which is cooked over a fire and may not be thoroughly cooked
- Handling and cuddling cats
- Leaving raw or cooked meat in the open, uncovered, accessible to cats and in potential contact with cat faeces either directly or via cats' paws

APPENDIX: DETAILS OF KEY INFORMANT HOUSEHOLDS

N.B. Standard of hygiene and income level are as assessed by the researchers.

Household 1

Members of household	:	Husband and wife (36 and 32) and 4 children
Employment details	:	Unemployed
Where born	:	Duthuni
Crops planted	:	Maize meal, vegetables
Storage structure for maize:	:	None
Storage structure for water:	:	None
Sources of water	:	Standpipe, river
Relative proximity to bush areas:	:	Far away from bush
Type of house structure	:	Thatched (4 buildings)
Cats	:	No cats
Standard of hygiene	:	Average
Income level	:	Low

Household 2

Household members	:	Husband and wife (32 and 36) and 3 children
Employment details	:	Unemployed
Where born	:	Mapate
Crops planted	:	Maize meal, vegetables
Storage structure for maize:	:	None
Storage structure for water:	:	None
Sources of water	:	Standpipe, river
Relative proximity to bush areas:	:	Near the bush
Type of house structure	:	Thatched

Cats : Cats owned
Standard of hygiene : Average
Income level : Low

Household 3

Household members : Husband and wife (26 and 24) and 2 children
Employment details : Employed
Where born : Tshisahulu
Crops planted : Maize meal, vegetables
Storage structure for maize: None
Storage structure for water: None
Sources of water : Tank, standpipe, river
Relative proximity to bush areas: Far away from the bush
Type of house structure : Modern house
Cats : No cats owned
Standard of hygiene : Good
Income level : High

Household 4

Household members : Husband and wife (31 and 25) and 4 children
Employment details : Employed
Where born : Mapate
Crops planted : Maize, vegetables
Storage structure for maize: None
Storage structure for water: None
Sources of water : Standpipe, river
Relative proximity to bush areas: Near the bush
Type of house structure : Thatched
Cats : Cats owned
Standard of hygiene : Average

Income level : Medium

Household 5

Household members : Husband and wife (60 and 64) and 4 children

Employment details : Employed

Where born : Tshakhuma

Crops planted : Maize, vegetables

Storage structure for maize: None

Storage structure for water: None

Sources of water : Standpipe, river

Relative proximity to bush areas: Far away from the bush

Type of house structure : Modern

Cats : No cats owned

Standard of hygiene : Good

Income level : High

Household 6

Household members : Husband and wife (40 and 32) and 4 children

Employment details : Self employed

Where born : Mapate

Crops planted : Maize, groundnuts

Storage structure for maize: None

Storage structure for water: None

Sources of water : Standpipe

Relative proximity to bush areas: Far away from bush

Type of house structure : Modern

With and without cats : No cats owned

Standard of hygiene : Average

Income level : Low

Household 7

Household members	:	Husband and wife (39 and 30) and 5 children
Employment details	:	Unemployed
Where born	:	Lwamondo
Crops planted	:	Maize, groundnuts
Storage structure for maize:	:	None
Storage structure for water:	:	None
Sources of water	:	Standpipe
Proximity to bush areas	:	Far away from the bush
Type of house structure	:	Thatched houses
Cats	:	No cats owned
Standard of hygiene	:	Average
Income level	:	Low

Household 8

Household members	:	Husband and wife (38 and 34) and 3 children
Employment details	:	Self-employed
Where born	:	Mapate
Crops planted	:	Maize, fruits and groundnuts
Storage structure for maize:	:	None
Storage structure for water:	:	None
Sources of water	:	Standpipe
Proximity to bush areas	:	Far away from the bush
Type of house structure	:	Thatched
Cats	:	No cats owned
Standard of hygiene	:	Average
Income level	:	Low

Household 9

Household members : Husband and wife (37 and 33) and 4 children

Employment details : Unemployment

Where born : Mapate

Crops planted : Maize

Storage structure for maize: None

Storage structure for water: None

Sources of water : Standpipe

Proximity to bush areas : Far away from the bush

Type of house structure : Thatched and modern

Cats : No cats owned

Standard of hygiene : Average

Income level : Low

Household 10

Household members : Husband and wife (36 and 29) and 4 children

Employment details : Unemployed

Where born : Mapate

Crops planted : Maize

Storage structure for maize: None

Storage structure for water: None

Sources of water : Standpipe

Proximity to bush areas : Far away from the bush

Type of house structure : Modern

With and without cats : No cats owned

Standard of hygiene : Average

Income level : Low



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