

Chapter 5 Helminth occurrence in dogs from resource-limited communities in Jericho, North-West Province, and Zuurbekom and Mamelodi, Gauteng Province

**5.1 Background:**

Jericho:

Jericho is a rural community and consists of mainly small-scale communal farmers. The community was situated on deep sandy soil, with quartzite and granite kopjes breaking the even landscape. The veld type was mixed bushveld (Acocks, 1975), with dense, fairly tall growth, with open tufted grazing. The grass was coarse and wiry. An average annual rainfall of 450 - 550 mm and a maximum average summer temperature of 31°C and minimum of 1°C in winter characterised this area.

Except for Jericho itself, there were smaller villages in the area that developed around agricultural practices (Figs. 5.1 and 5.2). There was a tribal social structure and the people maintained the traditional heritage and values. There was a strong commitment to the tribal system of a chief and headmen. Setswana is spoken in the area.

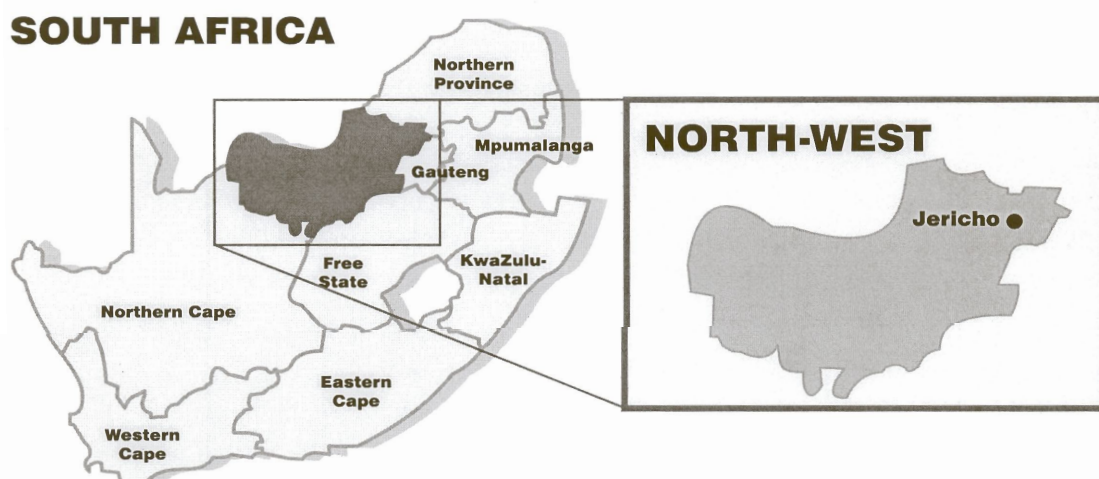


Fig. 5.1 The geographic locality of Jericho in North-West Province

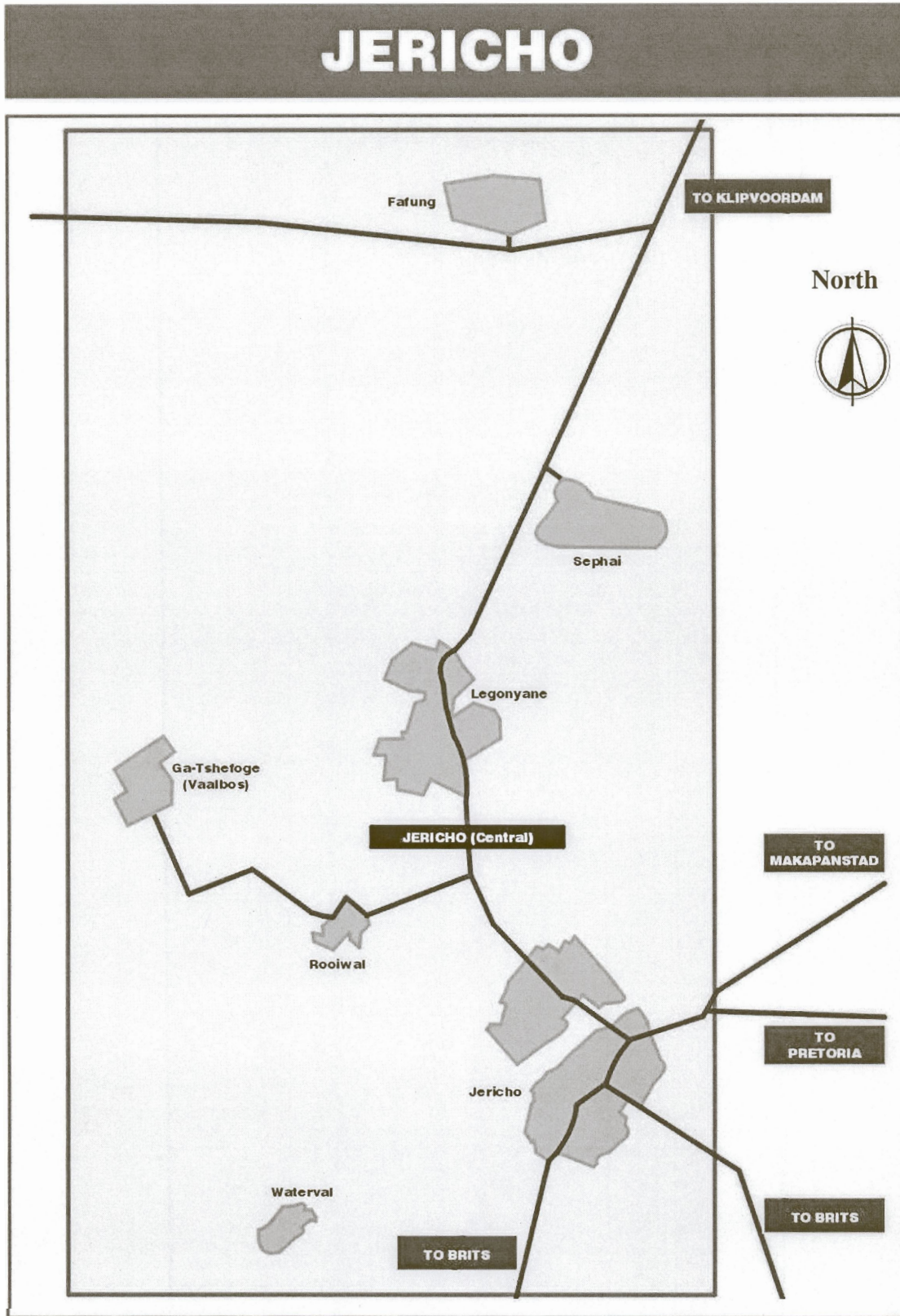


Fig. 5.2 Area map of Jericho

Most of the animal owners were either unemployed or pensioners, and they made a living from their livestock. Some were employed elsewhere in cities such as Brits and Pretoria, and the women or elderly family members were responsible for the livestock. The livestock was kept in a communal system with no boundaries separating individually owned animals. The owners themselves mostly slaughtered small stock, whereas cattle were sold to speculators from outside the community, or to the three butchers *via* the two slaughter facilities in the area.

The villages included in the study were Fafung, Sephai, Legonyane, Vaalbos, Rooiwal, Jericho Central and Waterval.

Zuurbekom:

Zuurbekom is situated at 27°45'E; 26°18'S, south-east of the South Western Township (Soweto) in the Gauteng highveld (Figs. 5.3 and 5.4). The veld type is the sparser, more tufted northern variation of *Cymbopogon - Themeda* veld, which is sour grassland (Acocks, 1975) on sandy soil. The underlying rock formation is dolomite, with a high sinkhole risk and therefore drilling for water in the area is prohibited. Average annual rainfall is 640 mm, and the winters are frosty.

Zuurbekom is a formal settlement area. It consisted of 29 000 ha that was in the process of being divided into smaller lots and distributed to 800 emerging farmers under the Gauteng Provincial Government's Farmer Settlement Programme (July 1997).



## SOUTH AFRICA

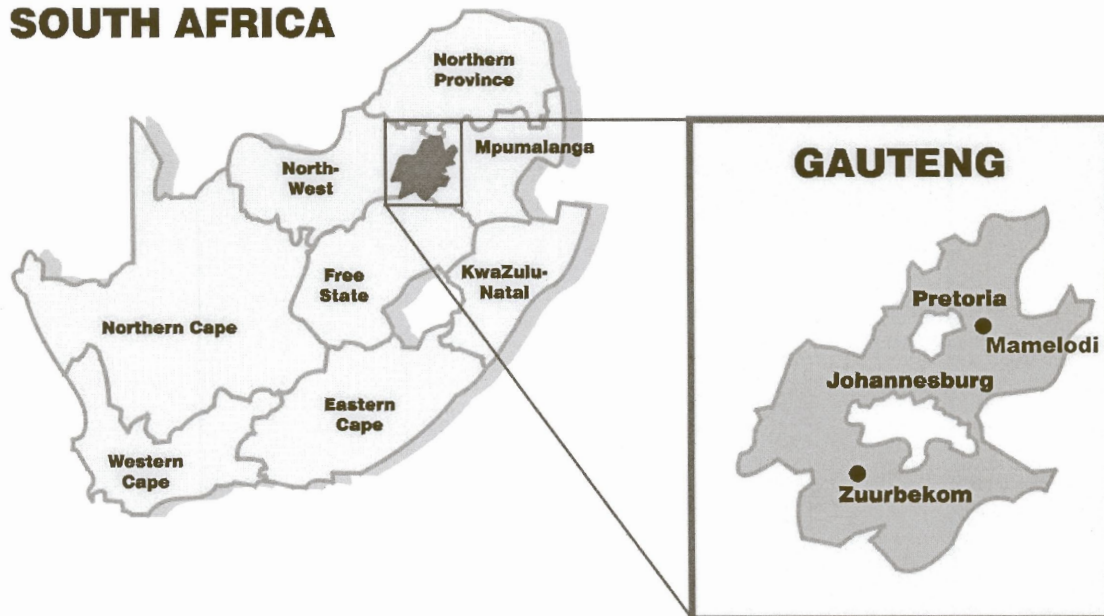


Fig. 5.3 The geographic locality of Zuurbekom and Mamelodi in Gauteng Province

The community was made up of various ethnic groups of people and the languages spoken were Zulu, Setswana, Sesotho and Sepedi. Three farming systems were observed, ranging from traditional communal grazing systems to small-scale emerging farming systems to more modern speculating and fattening systems.

This community is close to the densely populated urban townships of Soweto, Lenasia and Sharpeville, which are situated east, south-east and south of Zuurbekom, respectively. The advantage of being close to the townships was easy market access.

There is no traditional leader system governing the Zuurbekom area due to the ethnic diversity of the recently settled community. The Zuurbekom Farmer's Association assists with the collective decision-making process. The community is hard working, and the VNA teams were told that whatever little crime occurred in the area was merely spillover from the neighbouring townships.

# ZUURBEKOM

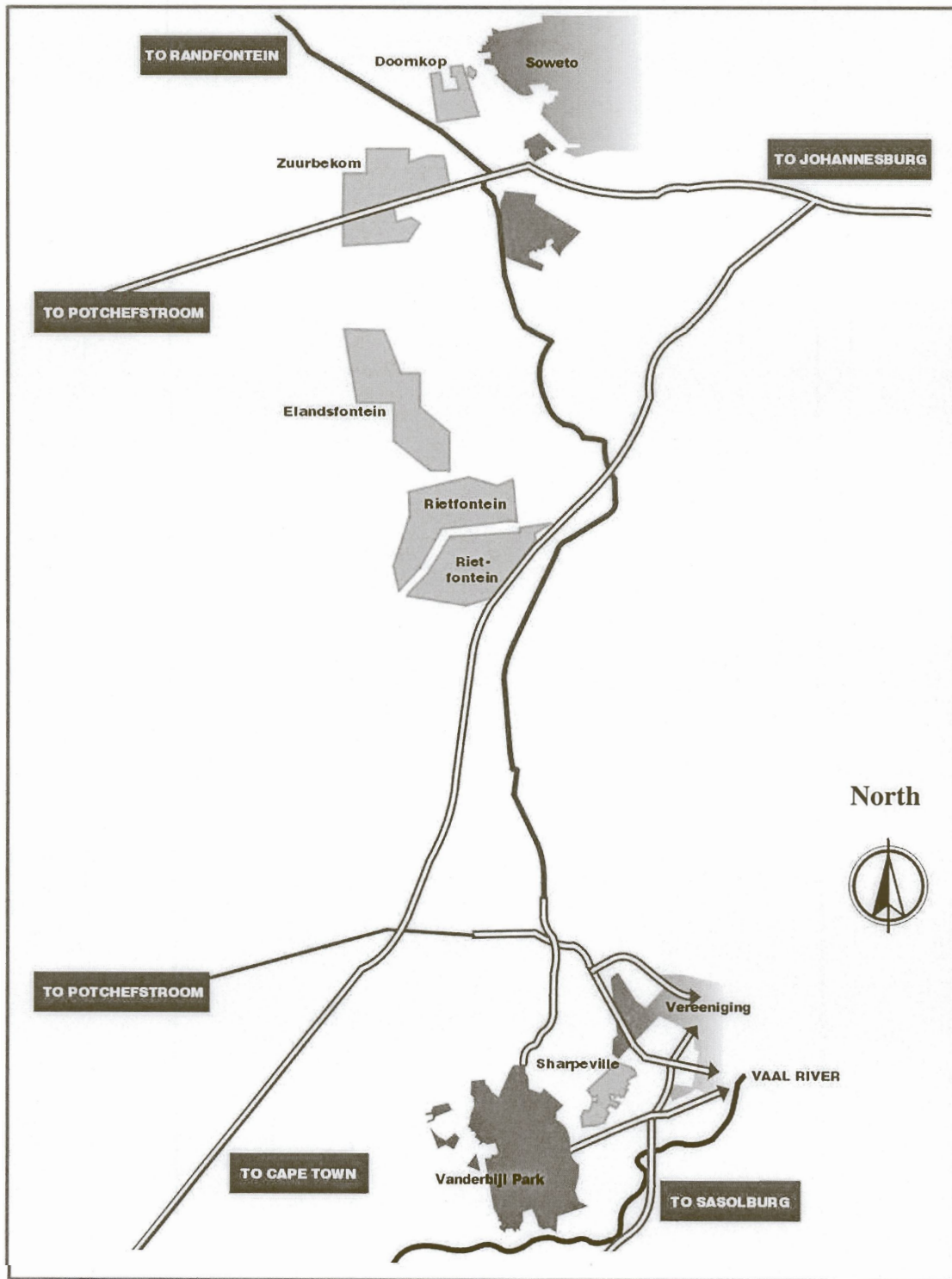


Fig. 5.4 Area map of Zuurbekom

The villages included in the study were Doornkop, Zuurbekom, Elandsfontein, Rietfontein and Sharpeville.

#### Mamelodi:

The informal settlements of Mamelodi East were the focus of this study area. The township of Mamelodi East was situated at 28°22'E; 25°39'S. The veld type (Acocks, 1975) in Mamelodi is similar to that of the Boksburg study area. The central version of Bankenveld receives 700 - 750 mm rainfall annually, and the winters are frosty, although on average slightly warmer than Boksburg. The sour grass is found on stony to sandy soil, occasionally broken up by bushveld vegetation and surrounded by rocky hills of quartzite and dolomite formations.

McCrintle (1999) identified two types of informal settlement. These were, "spontaneous urban housing" which is a settlement process outside the framework of formal township and development, and "official site and service schemes", which is a planning framework that encompasses legal townships and offers tenure and basic services. Both types of settlement were present in the area.

Mamelodi is situated east of Pretoria (Figs. 5.3 and 5.5). Maps of the area showed it as agricultural land. Densely populated (urbanised) settlement areas, and towards the outskirts, farmland which is being used for communal livestock grazing and growing maize characterise the region.

The villages included in the study were Mandela Village (Phase 1), Mahube Village (Lusaka), Extension 5 (Stanza Bopape), Extension 6, Extension 2 and RDP.

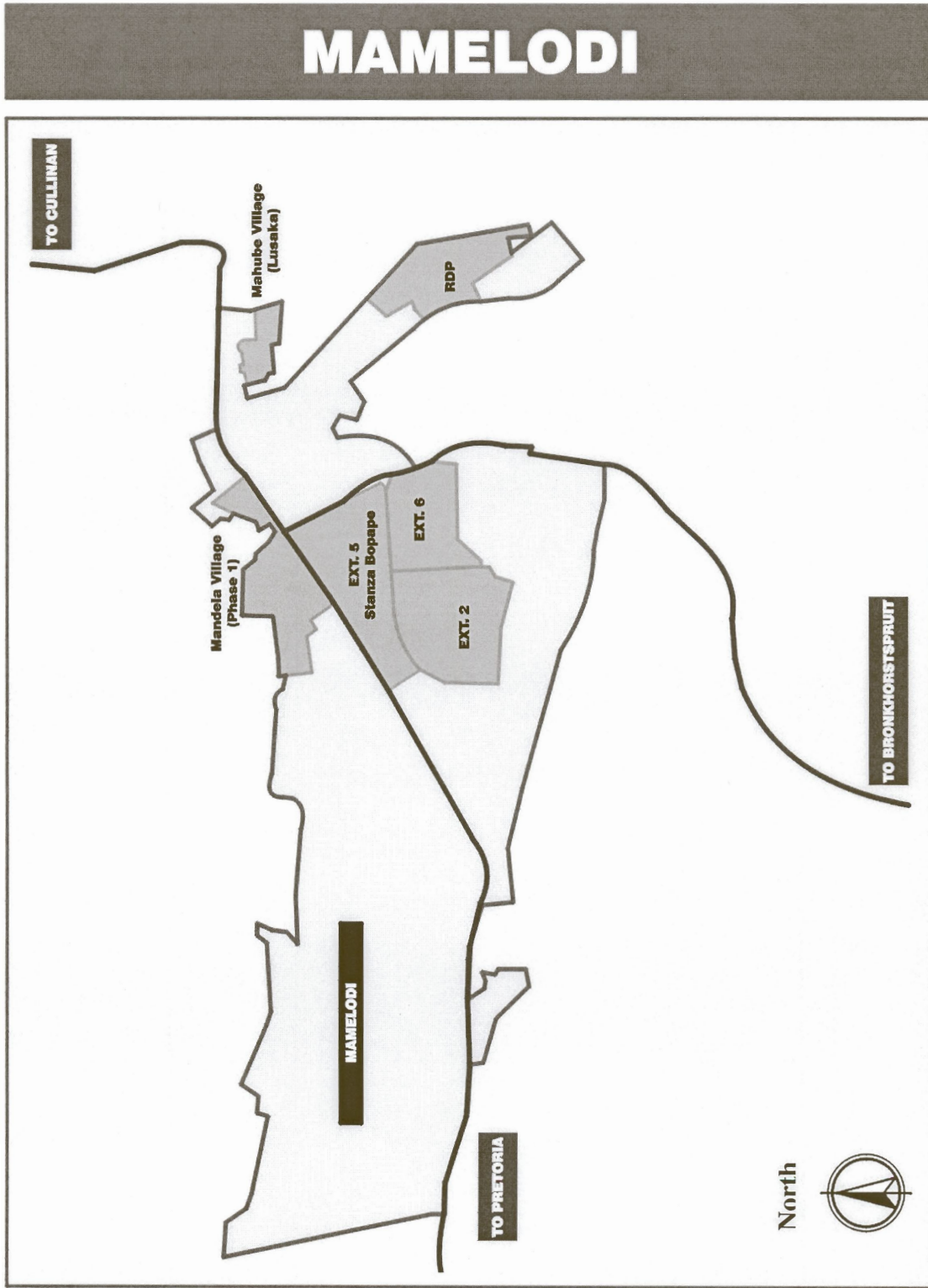


Fig. 5.5 Area map of Mamelodi



The community is mainly Zulu and Setswana speaking. Many people are unemployed or self-employed. The level of income is low, often substantially lower than the income of more permanently settled people living nearby. Informal government in the area often results in more efficient crime control than in other urban areas. Crime elements were still present because of local power struggles, forced evictions in the past, and confrontation with authorities such as the police.

**5.2 Materials and methods:** Semi-structured interviews guided by the standard questionnaires (Appendix A) for the VNAs were followed as described in Chapter 6. After completion of the questionnaire, the dogs were examined with the owner holding his or her own dogs. Special attention was given to any abnormalities and diseases encountered in these dogs. The examination consisted of observing the dog's posture and movements, the way it interacted with the owner, noting the body condition, amount of hair cover and condition of the coat, looking at the mucous membranes, eyes and perineal area, and examination for external parasites. The same procedures were followed during the examination of dogs and collection and processing of the samples as described in Chapter 2 (Fig. 5.6).

A workshop to plan the Jericho VNA, held at the Medical University of Southern Africa (MEDUNSA) two weeks before the VNA, included leaders from the community. The workshop addressed the analysis of the problem, objectives and strategies implemented to achieve the goals set for the VNA in Jericho. Following the workshop, a meeting was held with the community prior to the actual appraisal to involve the farmer's association, to inform the community about the appraisal, and to



arrange for assistance with mediation, translation and guidance through the area with the community members during the VNA. The Jericho VNA was conducted during the period 11 - 14 March 1997.



**Fig. 5.6 Collecting a blood sample from a dog in Jericho**  
**(Courtesy R C Krecek)**

Following another workshop held at Onderstepoort, Zuurbekom was visited twice prior to the actual appraisal to involve the farmer's association during the planning stages, to inform the community about the appraisal. The Zuurbekom VNA was conducted during the period 19 - 23 January 1998.

After the customary planning workshop held at Onderstepoort, an initial community meeting was held on Sunday 24 January 1999 to introduce the concept to the community in Mamelodi, attended by residents of the informal settlement areas and

stockowners. The local authorities [i.e. councillors and the South African Civics Association (SANCA)] were also included in the meeting to involve all the stakeholders and role-players and to assist with translation. Members of the community acted as guides through the study area for the duration of the project, which occurred over the period 25 - 29 January 1999.

**5.3 Results:** The number of thin blood smears, thick blood smears, blood filters, adhesive tape swabs and faecal flotations for the three study areas are in Table 5.1.

**Table 5.1 Number of blood smears, blood filters, adhesive tape swabs and faecal specimens examined from dogs in Jericho, Zuurbekom and Mamelodi**

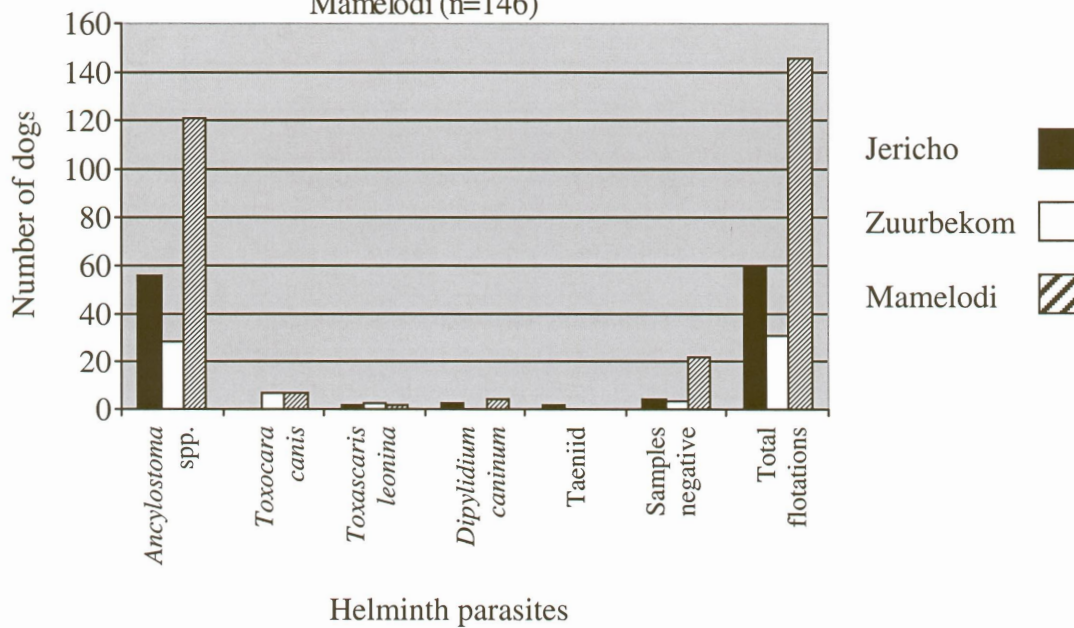
Study area	Jericho	Zuurbekom	Mamelodi
Thin blood smears	53	33	138
Thick blood smears	53	33	138
Blood filters	53	33	138
Adhesive tape swabs	67	38	173
Faecal specimens	60	31	146

*Babesia canis* was identified in one blood sample from Mamelodi, and taeniid eggs were identified in three adhesive tape swabs from Zuurbekom.

The results of the faecal examinations of dogs from Jericho, Zuurbekom and Mamelodi are shown in Fig. 5.7.

In the three study areas discussed in this chapter, the only significant statistical correlation found between the data categories was between the ESS of families that owned dogs in Mamelodi and dog condition score ( $P=0,0124$ ).

Fig. 5.7 Helminth parasites identified in faecal flotations of dogs from Jericho (n=60), Zuurbekom (n=31) and Mamelodi (n=146)



**5.4 Discussion:** Blood samples were not collected from clinically sick dogs with anaemia, and the blood samples collected were all venous blood, which could explain the low number of samples positive for *Babesia*. With the exception of the one blood sample that contained *B. canis* (which represents 0.4 %), none of the of the 224 blood samples revealed haemoprotozoa or microfilariae.

The high incidence (93%) of *Ancylostoma* spp. using the faecal flotation technique indicated that hookworm was widespread in the Jericho area. The number of dogs infected with hookworms may have even been higher because of the possibility of

false negatives as a result of small sample size, insufficient amount of faecal material obtained in some samples or delays in actual sample testing. This, however, could not be validated by actual comparison to necropsy intestinal samples, because few animals died during this study. A 93% *Ancylostoma* spp. infected dog population does pose a community health risk. Infective third-stage larvae, which develop from eggs, are a source of infection in this area. The larvae can penetrate human skin.

Comparatively *Ancylostoma* spp. eggs (93%) were the most common nematode of faecal samples in dogs from Zuurbekom. These high levels may be attributed to good rains during the two previous rainy seasons, and that most dogs roam the area due to unfenced properties. A common problem reported by the Zuurbekom residents was stray dogs that come from the surrounding urban areas. These dogs may contribute further to widespread transmission of *Ancylostoma*.

*A. caninum* eggs were found in 83% of faecal samples that were collected in Mamelodi. Most dogs seemed to be in a reasonably good condition, and the effects of parasitism from *A. caninum* were not clinically apparent.

*T. canis* eggs were found in (19%) of samples from Zuurbekom. The higher incidence of *T. canis* compared to its absence in the Jericho VNA is probably a result of the larger proportion of the dog population being pups or sub-adults. Holland et al. (1991) reported that young dogs are predisposed to infection with *T. canis*. Therefore, in this area close contact with dogs and poor personal hygiene may lead to visceral larva migrans.



The incidence of *T. canis* was lower in Mamelodi (4%) than in Zuurbekom (19%), although the majority of dogs were younger than three years old. Roaming dogs were quite common in the area, which could contribute to higher levels of infection. This is reflected by the high occurrence of *A. caninum* (83%) in Mamelodi.

Only one faecal sample from the 64 collected in Jericho contained ascarid eggs, viz. the eggs of *T. leonina*. Ascarid females are quite proficient egg producers, and the faecal flotation technique seems very efficient in demonstrating the presence of infection with ascarids. Their relatively low incidence, and the apparent absence of *T. canis* at this study area is a positive finding from a community health point of view.

Only two faecal samples from 31 from Zuurbekom showed the presence of *T. leonina* eggs. Unlike *Toxocara*, this parasite has no host age preference. *T. leonina* may also act as a zoonosis (Verster, 1986), and the 6% incidence of toxascariasis in the area may be significant. One faecal sample (1%) from Mamelodi contained eggs of *T. leonina*.

*D. caninum* eggs were present in only two faecal samples from Jericho although fleas (e.g., *C. canis*, *C. felis*), the intermediate host of this tapeworm, were not uncommon in the area. Considering the insensitivity of the faecal flotation and adhesive tape swab techniques in diagnosing infection with this parasite (as demonstrated under section 4.1.3), one can assume that a larger number of dogs was infected with *D. caninum*.

No *D. caninum* eggs were seen in faecal flotations of dogs from Zuurbekom.

Only four faecal samples from Mamelodi showed presence of *D. caninum* eggs, but they were absent in all the adhesive tape swabs. It seems that false negative tests in the live animal do occur, as excretion of ripe proglottids is an irregular event, depending on the number of tapeworms present in the intestine. Fleas were seen on dogs during examination and the number of dogs harbouring *D. caninum* should be higher than that diagnosed in this VNA.

Taeniid eggs were present in one faecal sample from Jericho. Interestingly, the adhesive tape swabs of the same dog tested negative, although the swab technique is regarded as more sensitive for diagnosing the presence of *Taenia* spp. in the live animal. None of the faecal samples of dogs from Zuurbekom and Mamelodi contained taeniid eggs.

Taeniid eggs were found on three of 21 adhesive tape swabs of dogs from Zuurbekom. This implies that one in every seven dogs was infected with tapeworms. As the eggs of *Taenia* spp. and *Echinococcus* spp. can not be differentiated microscopically (Reinecke, 1983), these three positive samples may have serious implications, should they be *Echinococcus* eggs. This small tapeworm of canids is an important zoonosis, and the eggs may infect humans even on contact with mucous membranes. The tissue cysts that develop from the eggs are very invasive and difficult to treat successfully. Advanced cystic echinococcosis (CE) is the type of infection diagnosed more commonly in Africa (Macpherson and Wachira, 1997; Reinecke, 1983), as opposed to alveolar echinococcosis (AE) in Europe and Asia, and is treated by surgical removal. This form of treatment is expensive, and the rupture of a viable cyst results in recurrence. The prevalence of *E. granulosus* in dogs is significantly

affected by local practices involving slaughter of livestock, and human behaviour in relation to the dog is a major factor influencing the intensity of transmission of CE to humans (Macpherson and Wachira, 1997). If these eggs were from *Taenia* spp., the infection of three of 21 dogs is not important, except if the dogs acquired the infection from beef or pork, which implies that the meat supply in the communities may be unfit for human consumption. This also means that the dogs may contaminate the grazing which would lead to cysticercosis in the livestock. The effect of these tapeworms on the dog's health is not significant, as they seldom show clinical disease. The current understanding of the prevalence of echinococcosis in South Africa is 1 - 2% in Pretoria (Macpherson and Wachira, 1997) and 0.9% in South Africa in general (Verster, 1979).

The significant correlation between the ESS of families that owned dogs in Mamelodi and dog condition score indicates that the owners who could afford it offered more and a better quality food to their dogs.

Recommendations for dog-owners in Jericho, Zuurbekom and Mamelodi:

Again the large number of dogs showing eggs of *Ancylostoma* spp. and *T. canis* in faecal flotations supports the urgency of regular removal of dog faeces from the environment as a cost-effective, practical method of worm control in these communities. Dogs, especially young pups, and pregnant and nursing bitches ought to be dewormed. The pups should be raised in an enclosed area with a concrete floor that must be cleaned thoroughly every day.

Perhaps public education in the communities of Jericho, Zuurbekom and Mamelodi could receive a higher profile to create an awareness of the effects of these helminths on their animals, and the implications they have on human health. An effort must be made to prevent all contact between human skin (especially children) and dog excreta or contaminated soil. Small children should not be allowed to play in areas where dogs defaecate, and prevented from eating soil. The people ought to make a habit of washing their hands and vegetables before eating, especially in Mamelodi, where the occurrence of *Toxocara* is higher compared to Jericho and Zuurbekom. For this reason, pest control (e.g., mice, flies, etc.) must also be practised particularly in Mamelodi.

Veterinary services are more accessible in Mamelodi and Zuurbekom than in Jericho. The Pretoria SPCA is involved in the Mamelodi area, and they too could become more engaged in the extension process regarding zoonoses as part of their services to the community. There are veterinarians in Silverton, Meyers Park and Lynnwood (i.e., 5 - 10 km outside Mamelodi). Most of the roads are tarred, and public telephone and transport systems enable the animal owners to have better access to information and veterinary services than in other areas.

The resettled farmers of Zuurbekom have a farmer's association with regular contact with the Agricultural Extension Services and State Veterinary Services in the area. They are also visited regularly by the Booyens SPCA, and there are private veterinary practices in Soweto and Lenasia to consult. The infrastructure is growing. The main access roads have tarred surfaces, and the dirt roads are graded frequently.



As a resettlement area, the residents also have access to various government and parastatal organisations already active in the area. These all provide opportunities for the education of animal owners and provision of veterinary services.

Jericho is a farming community, and the infrastructure of the surrounding villages is not well developed. An animal health technician, actively involved in the area, works closely with the local farmer's association and plays a leading role in extension and providing veterinary assistance in the community. The University of Pretoria also visits the area occasionally. The closest veterinary clinic, however, is at Maboloko, situated approximately 10 km south of Jericho. The main road through Jericho is tarred, and there are public telephones, and although veterinary services may not always be available, the residents of the community always have access to information.