9. DISCUSSION

9.1 Introduction

The usefulness of skeletal and dental characteristics to evaluate health, mortality and growth of past populations has been acknowledged in numerous studies (e.g., Brothwell 1981; Ubelaker 1989a). Different techniques of data collection from skeletal remains have been developed and their applications are easily accessible in the literature. Continued revisions of each technique have lead to higher accuracy and reliability. Limitations and shortcomings of making inferences on the basis of skeletons alone have been addressed (Buikstra and Cook 1980; Bocquet-Appel and Masset 1982; St Hoyme and İşcan 1989; Wood et al. 1992).

The methods used for data collection in this report are undoubtedly limited in terms of the scope of information they can yield. Macroscopic visual observation of bones for estimating age, sex and stature, assessment of bone pathology, dental pathology and biological distances, has left out some crucial information on the growth and health of the study sample. Lack of specialised methods like x-rays, stable isotope analysis etc. means that some of the skeletal characteristics of the study sample would remain unknown until such time that more methods are used. Not withstanding these limitations, viable inferences can still be made on the basis of the current results. Most importantly, an avenue for future research has been opened.

The main area of interest in population studies in Botswana has been on the living hunter-gatherer groups living in the desert (e.g., Van Reenen 1964a; 1964b; 1964c; 1978a; 1978b 1982; Kent and Dunn 1996). Like other case studies from various parts of the world e.g., Mapungubwe and K2 (Galloway 1937; 1959; Steyn 1994), Orange River sites (Morris 1984; 1992), Oakhurst (Patrick 1989), Sudanese Nubia (Armelagos et al. 1972; Martin et al. 1984; 1985; Ariaza 1993) and Teotihuacan (Storey 1992), human remains have been used to assess the biological characteristics of the Toutswe prehistoric population.

Attempts were made to establish the impact of environmental insults on Toutswe inhabitants from their skeletons. Once incidences of diseases were established, they were compared to data from K2 and Mapungubwe and other archaeological sites in South

Africa. The K2/Mapungubwe skeletons were used for comparison, firstly because they represent the best understood Iron Age skeletal population in the region and secondly because Toutswe, K2 and Mapungubwe peoples are known to have interacted with each other at some point in the past (Denbow 1983a; 1999; Huffman 1986; Reid 1998; Segobye 1998). However, K2 and Mapungubwe occupation postdate the rise and fall of the Toutswe communities.

The cultural homogeneity of the Toutswe communities, based on ceramic typologies, has been elucidated by archaeologists (Denbow 1982; 1983a; 1984a; 1986; Segobye 1987; Kiyaga-Mulindwa 1993; Reid and Segobwe 1997; Reid 1998). The spatial distribution of the Toutswe sites clearly suggests that they had differential access to food resources and possibly different modes of subsistence within their environs (Denbow 1982; 1983a; 1984a; 1984b; 1986; 1990; Kiyaga-Mulindwa 1993; Plug 1996; Reid and Segobye 1997; Reid 1998). For example, the northern frontiers of the Toutswe complex include sites like Mosu 1, 2 and 3 and Kaitshe, all of which are scattered along the edges of a saltpan (Reid and Segobye 1997; Reid 1998). The faunal and floral populations of these environs were different to those from Toutswemogala Hill. Pooling skeletal remains from these different sites was justified by small sample sizes and cultural homogeneity and therefore results obtained are an average of various subsistence modes and environmental insults. The distribution of pathogens may have also varied from place to place and time to time.

The analyses of faunal and floral remains from some sites indicate that the Toutswe people explored a variety of resources from far and near them (Denbow 1984a; 1984b; 1999; Denbow and Wilmsen 1986; Plug 1996; Reid 1998). Cattle, sheep and goats were the main source of protein through all the phases of occupation. The samples of domestic animal bones and cow dung deposits from various sites indicate, without doubt, that like other southern African prehistoric populations, the Toutswe communities were self-sustained. The protein from domesticated animals was supplemented with meat of wild animals as well as seasonal water resources (Welbourne 1975; Denbow 1983a; 1984a; 1984b; Thy et al. 1995; Plug 1996; Reid 1998). There is strong evidence that the people traded with inhabitants of the far west as indicated by the presence of species of animals that were exploited in the west. Floral remains do not preserve well in the archaeological record and therefore it has been difficult to assess the plants and

vegetables used by the Toutswe people. However, scanty evidence recovered from sites like Thatswane where carbonised beans and sorghum grains were found are a testimony of some of the plant foods utilised (Denbow 1982; Reid 1998).

The description of burial styles was deemed important enough to be included in the current study. Burial practices of prehistoric populations in Botswana are a neglected aspect in archaeological texts (Segobye 1998). Occasionally, general statements are made about specific burials but there has never been a specific publication that describes past burial practices. The ritualistic interpretations of burial styles are beyond the scope of this report and therefore would not be attempted.

9.2 Problems and limitations of the study

Without consistent and detailed reference data on the burials on which to base the current research, the study was limited in many ways. Theoretical and methodological problems and limitations have been described in detail at all specific areas of skeletal analysis. To avoid repetition such problems would not be discussed in this chapter. Only those problems specific to the current sample are discussed here.

Fundamental to any skeletal study is the identification of individual skeletons. Mixing of bones at sites and during storage hindered identification of some individual skeletons. The most affected of these were the skeletons from Toutswemogala, excavated by Lepionka in the 1970s. Most of them had been stored together in the same boxes without separating one individual from the other. In some cases skulls of different individuals had been put together with mandibles mixed in other boxes. Attempts were made to identify as many of them as possible, using the scanty descriptions given by De Villiers (1976) and Lepionka (1977; 1978). The following captions from Lepionka (1978) demonstrate how the material was treated.

> 'It was usually necessary, for lack of space, to divide up each skeleton among two or more containers, each appropriately labeled – most often with the skull separate from the rest of the skeleton' (Lepionka 1978: p 372)

> 'All human bones and any other macroscopic objects within the outline of the burial pit at the level of the skeleton were then collected, being packed into whatever quantity of containers necessary. The skull, if whole, was usually packed separately' (Lepionka 1978: p 373-374).

Pitifully the labels attached to the skeletons were written on paper and stuck with tape, which after sometime fell from the bones and were consequently useless. In any case it is evident that only skulls were labeled while postcranial bones were not. None of the skulls had an attached site label. Unfortunately the total number of individuals from Toutswemogala and the number of isolated remains is unknown. Lepionka (1978) described 28 burials from the site but the author would like to propose that the total number of burials might have been more than reported on the following basis:

- When the remains were sent to De Villiers for analysis several years after excavation, there were more than 28 skeletons (De Villiers 1976). In some instances De Villiers identified more than one individual with the same label attached.
- Lepionka's report is based on skeletons analysed by De Villiers without reference to the actual number of burials he excavated, i.e. nowhere does he mention the total sample found.
- When Lepionka left Botswana he left behind one of his field assistants to excavate the west side of the site (Lepionka 1978: p 374) on his behalf, he did not account for the number of burials found at the time. This may possibly explain why Lepionka (1978) expressed some doubt on the sample when he realised that De Villiers (1976) had analysed two burials of isolated skulls. Lepionka had excavated only one such burial and it is possible that the second case was excavated in his absence.
- Welbourne identified some partially complete human skeletons (Welbourne 1975; Lepionka 1978) from the faunal assemblage sent to him for identification and analysis.

- Lepionka insists that there were only two adult burials found but the current study identified an adult female and two adult males and there is no doubt that they are all from Toutswemogala.
- What may have been regarded as incomplete burials not worth mentioning in the Lepionka's (1978) report may have been counted as individuals in the current study.

A minimum number of individuals from Toutswemogala were established on the basis of the mandibles and maxillae, since they allowed for a more precise age determination. The remaining commingled bones are listed in Appendix 3.

The BNMMAG and UB, where the skeletons were obtained for the study, currently do not have catalogues or even proper storage facilities for human remains and consequently some skeletons end up misplaced or commingled. Even labeling of boxes with skeletons is not proper at both institutions. To the best of the author's knowledge there should have been more individuals from sites like Kaitshe, Lechana, Maipetwane, Mosu 1, Phate Hill and possibly others but attempts to locate them were futile. Other skeletons reported from Thatswane (Denbow 1979b) are also missing. Only four of the original six skeletons excavated at Thatswane were available for this study. Therefore it is expected that future investigations would reveal other skeletons that were supposed to be included in the current sample. Having identified the problems associated with the skeletal collections stored at the BNMMAG and UB, the author has made recommendations (Appendix 4) geared towards minimising problems in future.

The sample used was pooled from various sites as none of the sites produced a sufficient sample size on its own. The sites are known to have been of different socioeconomic statuses (Denbow 1983a) and therefore pooling the data meant that comparisons between sites were not possible. Moreover, it was not possible to evaluate any differences in the health problems encountered at different phases of occupation. Pooling of sexes meant that intra-population differences in life expectancy, skeletal growth and health could not be assessed. No attempts were made to determine sex of immature individuals who make up more than 50% of the sample and the adult sample of 30 individuals is too small to depict sex differences in the distribution of lesions.

Differential diagnosis of diseases on some of the members of the sample was not possible. This was because individual skeletons affected were incomplete and therefore distribution of lesions, which is often useful in differential diagnosis, was unknown.

Preservation of individual skeletons varies within sites and across sites. Animal disturbance was evident at places like Kgaswe B-55, Taukome and Thatswane. For example, Taukome Burial 6 comprises of a nearly complete left side of the maxilla that was found on the surface next to an animal burrow pit. The shaft of the right humerus of Kgaswe B-55 Burial 16, the left femur and both tibiae of Thatswane Burial 6 and the mandible of Bosutswe Burial 8 all have animal gnaw marks. On Kgaswe B-55 Burial 7(1) teeth crowns have marks of possible animal gnawing.

Soil chemicals were also involved in the preservation, or lack thereof, of some bones. At Bosutswe all bones coming from below the cow dung deposits had turned dark brown. Some of these bones had become brittle, possibly as a consequence of chemicals acting on them (Denbow: personal communication). Bone discolouration had hindered assessment of some dental pathology on individuals affected. Bones affected by soil chemicals were not only restricted to Bosutswe as a few others were observed at Toutswemogala.

The skull of Swaneng Hill Burial 1 may have been exposed to direct sun, as suggested by whitening of the bone surrounding the fragmented part of the skull. If indeed the skull had been exposed, then it is possible that the grave was shallow or that rapid erosion on the site had removed soil from the grave. Erosion at Mosu 3 had almost resulted in exposure of the burial. The skeleton was found approximately 20 cm below the surface. Individual skeletons represented vary from mandibles only to complete skeletons in good condition.

Excavations at Kgaswe B-55 were also destructive. The site was excavated by plant machinery (Denbow: personal communication) and resulted in destruction of some of the burials.

9.3 Burial practices

Prehistoric burials in southern Africa are usually accidental discoveries as no formal graveyards were established, e.g., at K2 and Mapungubwe (Galloway 1937; 1959; Inskeep 1986; Meyer 1998; Steyn 2003) and from the areas of the current study

(Lepionka 1971; 1977; 1978; Denbow 1979b; 1983a; Reid 1998). Once excavation units are dug, concentrations of stones found underneath the surface may indicate the presence of a burial, as was the case with some burials at Bosutswe. Features like hut floors and cattle kraals may also be associated with burials and therefore need to be excavated with caution. Kgaswe B-55 burials were distributed by sex and age in relation to the central kraal and huts surrounding the central kraal (Denbow 1986).

While lack of information on burial styles and provenance of some skeletons has been lamented in chapter four, a substantial portion of the sample has adequate information to make inferences from. Attempts by some archaeologists to describe burial styles needs to be appreciated as they became very useful sources of information. In most cases the descriptions are not well detailed but nevertheless contain essential information from which to make inferences. For example, a detailed plan of the features excavated at Kgaswe B-55 (Denbow 1986) was a useful indicator of the distribution of burials as well as burial styles.

The most commonly identified burial position was that in which individuals were laid in horizontally flexed positions (e.g., Kgaswe B-55 burials, Toutswemogala Burials 6 and 25, Bosutswe Burials 3, 5, 7 and 12). Some were laid on the left side while some were on the right side (Lepionka 1978; Denbow 1986). The sides on which the dead were laid are represented almost equally (Lepionka 1978; Denbow 1979b; 1983a). It appears that the sides on which individuals were laid were not restricted by either age or sex.

It seems that orientation of the head to the west as well as horizontal flexing had some ritual connotations as most of the burials were in this orientation. It appears that age had no role in determining the orientation of the head of the dead as individuals of all age groups were in this position. This is a fairly common burial practice in southern African archaeological populations (Inskeep 1986; Patrick 1989; Morris 1992; Steyn 1994; 1998) of different time periods.

A horizontally flexed position is noted from various parts of the study area, but there is one case where the head of the individual had been twisted backwards (Bosutswe Burial 6). There is no indication of animal disturbance to suggest that the vertebrae may have been moved after deposition. Upon inspection of the skeleton, no pathological lesions on the vertebrae were found.

Addition of burial goods is a common practice in both prehistoric and modern populations in different parts of the world (Lepionka 1978; Inskeep 1986; Patrick 1989; Morris 1992; Steyn 1994; 1998; Meyer 1998) and therefore findings of this nature were not a surprise. Burial goods included clay vessels as well as body ornaments in the form of ostrich eggshell bead necklaces and waistbands. Numerous burials with complete or fragmented clay vessels were found from various Toutswe sites. At Toutswemogala, seven burials were found with complete clay vessels (Lepionka 1978; p398). The actual burials with goods are currently unknown because Lepionka's (1978) labeling system is yet to be decoded. At Bosutswe Burials 8 and 13 had vessels and at Mosu 3 the individual was buried with three clay vessels. One infant from Toutswemogala was found in association with a vessel containing hematite (Lepionka 1977; 1977).

Individuals buried with ostrich eggshell ornaments were found at different sites, but the best preserved of these were found on Mosu 3 Burial 1 (Reid and Segobye 1997; 2000) (17-20 year old male) and Bosutswe Burial 7 (1.5-2 years old). While scatters of ostrich eggshells were recovered on some graves, it is evident that these two individuals were definitely wearing the ornaments at the time of deposition. Toutswemogala Burials 7 and 9 were found with metal objects. The individuals are aged 3-5 and 7-9 years respectively. The objects are not reported in the literature and their relationships to the burials are currently unknown. They were found from the same boxes from which the skeletons had been kept. They are unfortunately rusted and fragmented and reconstruction was not possible. It is possible that these were iron bracelets or anklets or even totally different objects. A complete copper bead was identified on Toutswemogala Burial 9. The iron bracelet described by Lepionka (1978) was found in association with an adult but the individuals being referred to here are both immature. Four dark blue cane glass beads were retrieved from the grave fill of Taukome Burial 2, a 40-60 year old male.

Some possible ritual burials were excavated by Lepionka at Toutswemogala (Lepionka 1971; 1977; 1978; De Villiers 1976). These are Burials 4 and 16 in the current study. Toutswemogala Burial 4 is a young child of between six and eight years, while Toutswemogala Burial 16 is a slightly older child of 10 to 12 years old. In both cases the individuals are represented by skulls, which were found buried in isolation. No such burials have been reported on other Toutswe sites. Similar cases were reported from the

Mapungubwe complex of sites (Steyn 1995; Steyn et al. 1998). The contextual information of these burials is not fully known.

Infants buried inside clay pots were found at Toutswemogala (Burial 1 and incomplete burial 11), Kgaswe B-55 (Burial 18) and at Taukome (Burial 3). One newborn baby at Toutswemogala was found inside a pot on top of a pile of stones. A complete clay vessel containing hematite was found next to the burial pot (Lepionka1977; 1978). Unfortunately, it is not clear which of the two pot burials has been labeled Toutswemogala Burial 1 in the current study. Taukome Burial 3 and Kgaswe B-55 Burial 18 are aged between zero and six months old and Toutswemogala Burial 1 is a newborn/fetus. Skeletal remains of humans have been found in clay vessels on other sites (Inskeep 1986; Steyn 1995) and therefore are not unique to the Toutswe sites. In the case of infants, complete skeletons may be found inside vessels while adults may be represented by selected parts of the skeleton (Meyer 1998; Steyn 1995; 1998; Steyn et al. 1998) or teeth (Van Reenen 1978).

At Bosutswe, some of the burials were found with stones placed directly above or surrounding the skeletons. The number of burials with stones, seven out of 13, was enough to suggest that this was a fairly common practice amongst the Bosutswe inhabitants. At least one burial each from Taukome and Toutswemogala were also found with gravestones (Lepionka 1978; 1977; Denbow 1979b; 1983a).

During the excavation of Bosutswe Burial 12 it was noted that the edges of undamaged compact floor material were very close to the remains. Evidently the burial pit had been dug through a pre-existing house floor. This burial gives the impression that some, if not all of the graves, were dug only big enough to fit the body without much space between the body and the grave wall.

Further investigations from the point of cultural archaeology and anthropology are needed to address the aspect of burial practices of the Toutswe people focusing on issues like significance and implications of burial positions, goods location etc. The present brief assessments has revealed that burial practices of the Toutswe people are similar to those practiced by Iron Age inhabitants of southern Africa.

9.4 Health and adaptation

The sample used in this study is small and has been pooled from several sites. It is proposed that the sample is representative of a once living population as individuals of all age groups are represented. However, it has been noted that at sites like Toutswemogala (Lepionka 1971; 1978) and Bosutswe the number of infants and juveniles exceeded the adult samples by significant margins. Of the 31 individuals from Toutswemogala, only three are adults while the remaining 28 are infants, juveniles and adolescents. Differential disposal of individuals of different ages may be the reason for this (Lepionka 1978). Fertility and growth rates of this population were not estimated but are expected to have been relatively high as has been observed in most prehistoric agricultural populations (Henneberg 1976; Bocquet-Appel and Masset 1982; Buikstra et al. 1986)

The demographic profile of the Toutswe people shows characteristics similar to many other archaeological samples for example, Oakhurst (Patrick 1989), Ossuary II in Maryland (Ubelaker 1989a) and K2/Mapungubwe (Henneberg and Steyn 1994). There is high infant mortality with approximately 50% of the total individuals dying before the age of 15 years. Life expectancy at birth was approximating 20 years but once an individual survived to adolescence, he/she could expect to live to be over 60 years. The expectancy of life at birth was low and thereby suggesting that many newborn babies died before participating in child-bearing processes.

Death rates during adolescence were low, suggesting that during the first few years of life individuals were more prone to diseases and environmental hardships. This is consistent with the evaluation of ages of formation of enamel hypoplasias. Most hypoplastic lesions were formed between two and half and four years, a period associated with weaning (Ward and Weiss 1976; Goodman et al. 1980; 1984a; 1984b; Martin et al. 1985; Goodman and Rose 1990; 1991; Lanphear 1990).

There are 30 adults aged between 17 and 75 years old. Of the 30 adults found, 17 are males, seven are females and in the remaining six, sex could not be determined. While the sample is small, it shows a male dominant population. Males and females are almost equally represented in the old age categories, i.e. between 60 and 75 years old.

The high infant mortality rate could be associated with acute childhood diseases, which resulted in death before bony reaction was elicited. However, further studies involving x-rays and other techniques as well as increase in sample size are needed to

detect arrested growth during developmental years and to further elucidate the current hypothesis.

The health of an individual or a population depends on a combination of intrinsic and extrinsic factors. The physical, mental, nutritional and environmental factors all contribute to the general health status of the members of a population. The presence or absence of diseases as reflected by skeletal lesions is only a component of the health status of a population. Through palaeopathology, attempts are made to identify diseases and their prompting environmental insults as well as pathogens (Brothwell and Sandison 1967; Steinbock 1976; Ortner and Putschar 1981; Haneveld and Perizonius 1982; Cohen and Armelagos 1984; Ortner and Aufderheide 1991; Roberts and Manchester 1995; Aufderheide and Rodriguez-Martin 1998).

Infectious diseases are known to have been fairly common in prehistoric populations from all parts of the world (Brothwell and Sandison 1967; Steinbock 1976; Ortner and Putschar 1981; Haneveld and Perizonius 1982; Ortner and Aufderheide 1991; Ortner 1991; Roberts and Manchester 1995; Aufderheide and Rodriguez-Martin 1998). For example, Steyn and Henneberg (1995b) reported a possible case of treponemal disease at K2. From their study area they also identified several individuals with subperiosteal bone growth, associated with infectious diseases (Steyn and Henneberg 1995a). From the analysis of Toutswe skeletons, no lesions associated with specific infectious diseases were found. Bearing in mind the arguments raised by Buikstra and Cook (1980) and Wood et al. (1992), caution needs to be taken in interpreting this. Lack of specific infectious lesions does not necessarily equate to a population free of infections. It is possible that affected individuals may not have been found during excavations or that pathogens involved may have been virulent and thereby causing death prior to bony response. Although no specific infectious diseases were identified, the presence of cribra orbitalia and porotic hyperostosis (albeit low) could be linked to chronic infection.

Vertebral osteophytes are some of the common degenerative lesions in prehistoric and modern populations and are commonly associated with osteoarthritis (Roberts and Manchester 1995; Aufderheide and Rodriguez-Martin 1998). Several individuals had suffered from vertebral osteophytosis and major weight bearing joints were involved in some individuals. The knee and hip were the most commonly affected and the one

individual showed involvement of the foot. These individuals were aged between 35 and 75 years old. Bone spurs are fairly common on the patellae and calcanei.

While Bosutswe Burial 12 presents the first possible case of DISH in the southern African Iron Age, not much can be inferred from it unless other individuals with the same condition are found. DISH is a condition of old age which, when found occurring on a substantial number of individuals of the same population, may be an indication of high life expectancy of that population (Ariaza et al. 1993; Jankauskas 2003). DISH has been reported from other parts of the world (Rodgers 1982; Ariaza et al. 1993; Jankauskas 2003). From a sample of skeletons from Lithuania representing different socioeconomic classes, it was found that DISH occurred most frequently on the wealthy members of the community who had access to foods rich in calories (Jankauskas 2003).

Three cases of congenital defects were found. In all individuals, partial spina bifida occulta was identified, two on the sacra (Bosutswe Burials 5 and 11) and one on the axis (Toutswemogala Burial 6). The frequency of these defects is within limits of quoted figures for most prehistoric populations (Ferembach 1963; Roberts and Manchester 1995; Aufderheide and Rodriguez-Martin 1998). The defects are minimal and would not have caused any problems to the individuals involved (Ortner and Putschar 1981; Barnes 1994; Roberts and Manchester 1995).

In so far as trauma is concerned, types and distribution of lesions identified demonstrate a peaceful population. No individual has signs of violent death. Although one adult male aged between 35 and 45 years (Toutswemogala 19) had been burnt, it is not clear whether or not he was burnt at the time of or after death. The presence of animal bones in association with this skeleton is difficult to interpret. It has been suggested that it could have resulted from bush fires after deposition. The results are generally similar to those from K2/Mapungubwe where no indications of violent death were recorded.

There are six cases of cribra orbitalia. Two individuals with cribra orbitalia also had porotic hyperostosis while three had porotic hyperostosis only, bringing the total in the population to nine. Of the nine individuals with these nonspecific lesions, three of them had no teeth preserved (Kgaswe B-55 Burial 15, Toutswemogala Burials 8 and 13) and of the six with teeth, three had enamel hypoplasia and three had no hypoplastic lesions. A total of 14 individuals had enamel hypoplastic lesions and two of them also

had cribra orbitalia (Toutswemogala Burials 3 and 9) and one had porotic hyperostosis (Thatswane Burial 3). Thatswane Burial 3 had porotic hyperostosis and no enamel hypoplasia and orbits of this individual were not preserved. In summary, nonspecific markers of stress on teeth and bone were identified on 15 of the 84 (17.9%) individuals in the study. The lesions are generally mild to moderate and therefore it can be argued that environmental hardships experienced were not severe enough to cause drastic health effects.

Ages of formation of enamel hypoplastic lesions in the 14 individuals affected vary from just below one year (0.88) to six and a half (6.5) years old. On average the lesions were created between the end of the third year and beginning of the fourth year. The averages for pooled teeth (3.7) and canines (3.9) are only slightly different. On rare instances multiple lesions on the same tooth were found indicating recurrences of environmental insults and diseases affecting the same individual. A mandibular left canine of Bosutswe Burial 5 shows formation of lesions at approximately two and half years, about three years and approximately five years.

An analysis of skeletal growth indicates a population whose subadults grew normally. The results obtained for each of the long bones included in the study of skeletal growth are consistent with other prehistoric results e.g., Sudanese Nubia (Armelagos et al. 1972), Indian Knoll (Sundick 1978) and the Libben sample (Lovejoy et al. 1990), K2 (Steyn and Henneberg 1996). Growth of immature individuals appears to have been normal. This was an expected result for two main reasons, (1) because there are no indications of subperiosteal bone reaction indicating chronic infections and (2) the incidences of enamel hypoplasis, cribra orbitalia and porotic hyperostosis are low.

9.5 Dental health and diet

From a total of 84 individuals, dental health and characteristics could be examined on 46 individuals only. Of the 38 individuals who could not be examined, 30 had lost all their teeth postmortem and seven were newborn babies with poorly preserved incomplete crowns (Toutswemogala Burials 6, 23, 27, Taukome Burial 3, Kgaswe B-55 Burial 20, Bosutswe Burial 2001/1 and Dikalate Burial 1). An additional one older child's teeth (Toutswemogala Burial 30) had been broken into small fragments and were also excluded. At least 26 of the 84 individuals are aged between 20 and 75 years and are

expected to have had complete permanent dentition at the time of death. Of these, only 12 had either complete or partially complete sets of teeth. Kgaswe Burial 16, Thataganyane Hill Burial 1, Bosutswe Burials 3 and 5 all had 32 permanent teeth. Kgaswe Burial 2, Bosutswe Burials 11, 12 and 13, Taukome Burial 1, Mosu 3 Burial 1, Toutswemogala Burials 14, 16, 25 and 30 had teeth ranging in number between 25 and 31. Although the sample itself is not very large, it is sufficient to give us a glimpse of the possible general dental health of the Toutswe people.

The 46 individuals included here were aged between six months and 75 years. Twenty-two individuals had permanent teeth only, five had deciduous teeth only and the remaining 19 had mixed dentition. A total of 804 teeth was examined, 611 permanent and 193 deciduous. Seven permanent teeth had been lost antemortem, these included five first molars, one second molar and one third molar. The number of teeth recovered per individual ranged between four teeth (e.g. Kgaswe B-55 Burial 15 and Taukome Burial 6) to a complete set (e.g. Bosutswe Burials 3 and 5).

The dental caries frequency of 21.7% appears to be relatively low for this population. A caries intensity of 3.4% (20 out of 587 permanent teeth affected) is also low by comparison to other archaeological populations in southern Africa. An adjustment for antemortem tooth loss does not increase the caries incidence by any significant amount. The assumption can be made that dental caries was not a regular pathological condition in this group. In most cases identified, the lesions are small to moderate with only a very small number at advanced levels. Calculus deposits are small to moderate and only 12 individuals are affected. None of the deposits were large enough to have been a health problem. It can be concluded on the basis of dental pathology that the diet of the Toutswe people was generally non-cariogenic and unrefined causing small caries intensities and a fair amount of dental wear. It appears also that underwater fluoride content was within normal limits as reflected by the general state of dental health.

9.6 Biological distance

Teeth were used to determine biological distances between the study population and other prehistoric and modern populations from different places by way of a matrix of Penrose shape distances. Crania were not used for this purpose because only a small number of adult crania were measurable. The results indicate that in archaeological

populations, the Toutswe were biologically closer to K2 occupants than they were to Mapungubwe. This was an expected result given the fact that the teeth of the Mapungubwe people have been shown to be very different from other archaeological groups in Africa (Steyn and Henneberg 1997b). Among modern populations, the Toutswe people show closest relationship with South African blacks, followed by the Australian aborigines and the Kalahari San. On both maxillary and mandibular teeth, the Toutswe people are closest to the South African blacks, Australian aborigines and K2 people respectively. The Mapungubwe people are closer to the Toutswe people than the San are when using maxillary teeth but when using the mandubilar teeth, the San are closer than the Mapungubwe are to the Toutswe people.

Given the geographic distance between the Australian aborigines and the Toutswe communities it was thought that the two would show the largest biological distance through dental measurements. Surprisingly the Australian aborigines are the second closest to the Toutswe following the South African blacks. This can not be explained but it is possible that differences in sample size between these two populations may have had an effect on the results.

Archaeologists have argued on the basis of cultural artifacts that there were economic and social interactions between the Toutswe communities and K2/Mapungubwe people and also with the San hunter-gatherers (Denbow 1982; 1999; Maggs 1984; Huffman 1986; Hall 1987). These groups exchanged ideas, goods, and most possibly had some level of interbreeding. It is therefore possible that the results obtained in this study are a reflection of the gene exchange that may have taken place during the Iron Age in the Shashe-Limpopo area. It is important to note that this interpretation is suggestive but not conclusive and more studies would be required to test the validity of this idea.

9.7 Conclusion

A plethora of skeletal and dental lesions has been identified and described from a sample of 84 individuals. These are in essence residues of diseases experienced at some point during life (Rothschild 1992) and were used to make inferences on the health of the Toutswe people. However, some of the lesions identified are of no clinical significance and therefore are not ideal indicators of health of the individuals (Buikstra and Cook

1980; Wood et al. 1992). Lesions associated with partial spina bifida occulta are an example.

The Toutswe people appear to have been fairly healthy. There are no indications of chronic infectious diseases and degenerative diseases found are within normal incidences reported in other archaeological populations (Morris 1992; Steyn and Henneberg 1995b; Steyn 2003). Skeletal lesions resulting from nonspecific environmental insults are generally low. Similar to other prehistoric population, the Toutswe palaeodemography depicts a high infant mortality but once an individual survived the first 15 years of life, he could expect to live a fairly long life.

In general, life expectancy, frequency of skeletal and dental lesions and skeletal growth rates are similar to what has been reported from other sites. However, it is possible that selective burial practices may have influenced the results. Signs of stress and diseases were few, e.g., cribra orbitalia and enamel hypoplasia were much lower than at other sites and in addition there is was no subperiosteal bone growth on the Toutswe people. Therefore, it can be concluded that those who died within the first few years of life probably died of acute diseases (e.g., pneumonia and diarrhea). Chronic diseases would have resulted in more specific and nonspecific skeletal lesions. Therefore this population was probably not plagued by many chronic diseases, for example there are no signs of treponemal diseases.

A high incidence of cribra orbitalia, enamel hypoplasia and other nonspecific lesions, may be, to some extent, reflective of social change and disruptions with development of social complexity. At Toutswe sites, however, the social environment may have been more stable, as reflected by the low indices of these indicators. The stratigraphic contexts of these sites indicate long occupation, except at small sites (Denbow 1982; 1983a; 1999) where the length of occupation was less than a hundred years. Traumatic lesions found on the Toutswe people do not in anyway suggest that communities were violent.

Although more is known about the health of the K2 and Mapungubwe people than is known of the Toutswe people, the current results tend to favour the idea that the Toutswe people may have been healthier than the K2 and Mapungubwe people. The inclusion of radiological techniques in the analysis of the K2 and Mapungubwe skeletons has enabled researchers to reach a much more informed conclusion on the health status of

these people (Steyn and Henneberg 1995a; 1995b). It is hoped that future research on the Toutswe skeletons would employ specialised techniques for data collection so as to make a more holistic rather than limited comparison between these two population samples.