Environmental problems among low income urban residents: an empirical analysis of old Naledi-Gaborone, Botswana

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Abstract

This study investigates the profile, dynamics and dimensions of environmental problems at Old Naledi, a low income urban neighbourhood in Gaborone, the capital city of Botswana. It is based on documentary and field research.

The field research has a participatory component involving meetings, discussions and open- ended interviews with the interested and affected persons. It also involves the administration of a structured survey questionnaire to 171 resident respondents. The main findings of the study are that residents have made great efforts in improving the availability of the housing stock. However, in the process they have failed to abide by the stipulated Development Control code and Urban Development Standards. This essentially reflects the increasing non-affordability of land and costs of construction materials to urban low income groups due to evolving state policy in the provisioning of shelter. The direct result has been a congested, overcrowded settlement. Because of this, and a rapidly increasing population, there has been underservicing and the emergence of life-threatening home and neighbourhood environmental problems.

1. Conceptual benchmarks for a sustainable urban residential environment

Since the early 1990s, the notion of sustainable development has emerged as a useful albeit controversial conceptual and organizational framework for the assessment of the relationship between human populations and the environments in which they live. In its original conceptualization, sustainability had an ecological thrust by seeking to meet the needs of the

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present without compromising the ability of future generations to meet their own needs (United Nations, 1992, p. 43).

From that perspective, sustainability was correctly interpreted as being a parochial and restrictive constraint against achieving the broad sociopolitical and socioeconomic goals of development (Marcuse, 1998). It tended to reinforce the status quo in which the haves and have-nots would simply maintain their respective positions. The current idea of sustainability is underpinned by the principles of ecological, economic and equity efficiency. The first principle involves the maintenance of genetic diversity and the maximization of the productivity of the habitat. The second relates to efficiency in the supply of basic needs and the improvement in technologies involved in the production and delivery of goods and services. The last focuses on social systems and is concerned with the sustenance of institutions, the facilitation of equity and social justice and the promotion of public participation (Barrow, 1995, pp. 65, 67). It is the last two that are of relevance to this study. Marcuse remarks that a just, human, and environmentally sensitive world will in the long run be better for us all. He cautions, however, that achieving it will entail conflicts and controversies and issues of power sharing and the redistribution of wealth (Marcuse, 1998).

Principle 10 of the Rio Declaration on environment and development underscores two important points that are germane to any consideration for the sustainable development of human settlements. These involve the improvement of:

- their social, economic and environmental quality; and
- the living and working environment of all people, in particular the urban and rural poor (United Nations, 1992, p. 73).

Environmental improvements, which have relevance to this study include:

- providing adequate shelter for all;
- improving human settlement management;
- promoting sustainable land-use planning and management;
- promoting the integrated provision of environmental infrastructure in the form of water, sanitation, drainage and solid waste management; and
- meeting the urban health challenge.

A bottom-up approach to sustainable development has been articulated in the context of Primary Environmental Care (PEM), which ensures that local people are major agents of change. It aims to:

- satisfy basic needs;
- optimize the use and protection of the environment; and
- empowerment of groups and communities to enable them to secure and defend their basic rights and to manage their own affairs (Barrow, 1995, p. 70)

The above aims are vital in the case of Old Naledi where basic needs could be satisfied, under the optimal use of the environment, with the active participation of residents in self-improvement efforts.

During the mid-1990s, the United Nations Centre for Human Settlements (UNCHS/ HABITAT), and the United Nations Environmental Program (UNEP) established a joint sustainable cities program whose main aim is to enhance the environmental planning and capabilities of urban local authorities to plan and manage their environments (Habitat, 1996, p. 413). This was to be, as in the case with PEM, realized through bottom-up Environmental Planning Management (EPM).The mobilization activities of EPM were to ensure the full participation of all stakeholders in the identification and prioritization of environmental problems, formulation and implementation of environmental development strategies.

Decentralization and participation within the EPM framework tend to bring decision-making closer to the communities. As a result, urban residents adopt flexible levels of environmental infrastructure standards, promote local ownership and empowerment through the planning, selection of technology, implementation, operation and maintenance of projects. The last point is important in the case of a built-up environment such as exists in Old Naledi. An inflexible application of existing Urban Standards and Development Control codes in any rehabilitation/ relocation exercise would cause more harm than good in terms of destroying valuable housing stock and by disrupting the important existing social networks. Moreover, it is unlikely to be affordable for most households.

It is evident therefore from the preceding discussion that extensive urbanization-related literature has emerged on poverty alleviation, provision of basic needs, efficient urban management and positive economic growth since the 1990s. These components have nonetheless been seldom integrated into any conceptual discussion about urban sustainability (Drakakis-Smith, 1996). Drakakis-Smith identifies a number of prerequisites that the pursuit and management of sustainability in an urban context must satisfy (Drakakis-Smith, 2000, p. 8).

These include:

- equity in the distribution of the benefits of economic growth;
- access to adequate basic needs;
- social justice and human rights;
- environmental awareness and integrity; and
- awareness of linkages and representativeness over space and time.

He argued that sustainable urbanization must grasp and deal integratively with issues such as housing, traffic congestion or poverty (Drakakis-Smith, 1996, p. ix).He regards sustainable urbanization as not just being integrative in terms of meeting present needs but also in terms of not jeopardizing the future. He also cautions that sustainability must imply considerable change in the present in order to ensure that the present needs are met to an extent sufficient to produce something worth sustaining (Drakakis-Smith, 1997, p. 817).

Parnwell and Turner have expressed skepticism about the prospect of ever attaining sustainability in the urban context in developing countries. Using Southeast Asia as an example, they note that the underclass has responded actively, and sometimes quite constructively to the exigencies created by social, economic and environmental pressures and threats, although not necessarily in a manner conducive to long-term sustainable development (Parnwell & Turner, 1998). They maintain that urban society implicitly accepts, and operates within the status quo,

through survivalism and coping strategies, rather than seeking to confront deeper contextual causes in an effort to pursue a path towards both development and long term sustainability (Parnwell & Turner, 1998, p. 151). Such coping mechanisms are fundamentally sustaining the undesirable and the unsustainable socio-economic milieu in which urban societies find themselves. The existing half-hearted commitments by the state towards sustainability cannot adequately achieve the purported outcomes.

Ward, referring to Mexico, has attributed the failure of past approaches in social welfare provision to the poor due to their failure to address the underlying causes of the problem. He concludes that although some benefits may accrue to the poor, these are in the main partial, superficial and unsustained (Ward, 1986, p. 131).

What seems to emerge from the preceding discussion is a need for the conceptualization of urban sustainability that is underpinned by economic, ecological, and equity efficiencies. The realization of urban sustainability will require the democratic participation and informed decision-making by all the urban stakeholders in order to guarantee the attainment of a good life to all urban interest groups.

2. Theoretical basis of the urban residential environmental problems

Over the past decade, sub-Saharan Africa has experienced rapid urban population growth mainly due to rural-urban migration, and partly to natural increase (Habitat, 1996, p. 447). Because of the failure by municipal authorities to match demand with supply for the infrastructural and human needs of their growing populations, serious environmental problems are now threatening the sustainability of the major metropolitan areas, particularly their low-income neighbourhoods. Habitat (1996) has identified and classified three generic urban environmental problems on the basis of where they occur, namely; the home, the neighbourhood and the city region. Although the third category is evident in the present study area, the paper intends to focus more on the first two.

The urban home environment is intimately linked with the rest of the urban environment. The structural characteristics of dwelling units show that low-income residents either lack secure tenancy or that they are at various stages of urban consolidation. For example, the houses usually consist of temporary construction materials in the form of cardboard and old metal sheets. Those units which are constructed of durable materials are usually at various stages of completion. Most units in low-income residential neighbourhoods are normally small and soon become overcrowded. This is mainly because of a high incidence of renting, subletting and sharing. They also tend to be poorly ventilated and not well lit.

Low- income urban neighbourhoods lack adequate water and sanitation facilities. This may be due to the fact that authorities deny them legal status, or to inadequate financial and human resources for extending the requisite infrastructure and facilities to them, or the belief that it would not be cost-effective to avail them with the services. Poor availability of potable water is associated with poor standards of personal hygiene, skin diseases, eye and ear infections (Hardoy, Mitlin, & Satterthwaite, 1997, p. 43), food contamination, food poisoning, diarrhoea, dysentery, typhoid and intestinal parasites.

Due to overcrowding, the cleaning and maintenance of latrines in the low-income areas is so poor that the facilities have become a major health hazard which people avoid getting close to. Pit latrines also fill up rapidly, and due to inadequate facilities for their regular drainage, they overflow. Such overflowing also occurs when they fill up with water during the rainy season (Hardoy et al., 1997, p. 41). The removal and disposal of human waste in ways, which prevent human contact, is critical to the elimination of disease

The poor availability of facilities to collect both liquid and solid waste impinges equally on the home and neighbourhood environments. Almost all low-income urban neighbourhoods lack waterborne sewers and drains. Sewerage systems are inadequate to remove human waste and wastewater/sullage. Inadequate disposal of wastewater around the houses, due to the absence of sewerage drainage permits a large range of disease vectors such as houseflies and coackroaches to feed, breed and live around houses causing diarrhoearial diseases and hepatitis A (Hardoy et al., 1997, p. 60).

Low-income neighbourhoods also lack adequate facilities for the collection and disposal of solid waste. Municipal authorities lack sufficient human and infrastructural capacity to deal effectively and timeously with the garbage generated by households. Where informal settlements are not recognized as part of the legal city, they are not accorded the service (Conteh, 1997; Hagos, 1997; Mekonnen, 1997). Large volumes of organic wastes within the urban poor neighbourhoods in sub-Saharan Africa are dumped along lanes, public spaces, vacant plots or storm water drains. Such garbage causes bad odours, attracts and nurtures disease-transmitting vermin, block routes and storm drains (Songsore, 1997), reduces amenity (Gwebu, 1997) and can contaminate ground and surface water.

In an attempt to resolve urban environmental problems, municipal authorities in sub-Saharan Africa have adopted two types of solution strategies. First they have either: partially or totally relocated residents of such areas to site and service areas where secure tenure and loans for development are provided or; implemented rehabilitation, in situ, of the deteriorating neighbourhoods, through restructuring and provision of infrastructural services.

In recent years, two interrelated main problems have confronted these approaches (Datta & Jones, 2001). First, land and building materials have become increasingly expensive and thus inaccessible to the poor urban households. Secondly, the removal of government subsidies for urban service means that they are no longer affordable to the poor households. All this has caused a shortage in housing because of ineffective demand by the poor for land and construction material. This has led to densification in the occupancy of existing premises for purposes of rent generation and rent evasion. All these developments have tended to work contrary to the established urban development control codes and standards, and to consequently threaten sustainability.

3. Background to the study area

Old Naledi, a Self-Help Housing Authority (SHHA) residential neighbourhood, is situated on the southern part of the city of Gaborone. It covers an area of about 115 hectares and is bounded on the west, by the railway reserve and on the east, by the Old Lobatse road (see Map 1). The road serves as the main access route to the site-and-service settlement.

The origin of Old Naledi can be traced to the designation and construction of Gaborone as the national capital of Botswana in the early 1960s, coupled with a lack of forward planning for a rapidly growing population. The site, covering of about 10 percent of Gaborone then, had originally been zoned industrial. By 1971, it was estimated that 25 percent of Gaborone, or 1800 people, lived in Old Naledi (Nostrand, 1982).This occupation had been achieved through self-allocation of plots. In 1972 the figure had increased to 5000 or about a third of the town's total population (Ghanie, 1982), before reaching 6000 in 1973.

City Council made an attempt to relocate residents from the occupied site to New Naledi, across the Old Lobatse road. However, this was unsuccessful because the number of residents was large. Also, additional migrants were moving into Gaborone in search of employment. Those who did relocate from Old to New Naledi did not like the houses there and ended up returning to Old Naledi (Nostrand, 1982, p. 14).

In 1974, the Botswana Government undertook a social and economic survey of the three main peri-urban areas in the country, which included Old Naledi (Nostrand, 1982).

The most important results of the survey (Nostrand, 1982) were:

- each area accommodated a very high number of people;
- most residents desired improved housing; and
- most residents were employed and could afford paying for improved housing.

As a result of these findings, the then state President of Botswana announced the re-designation of the land in Old Naledi from industrial to residential. Initially, the occupied land would revert to state ownership, pending the issuance of land tenure certificates by the Department of Surveys and Lands. Each occupant became entitled to a temporary occupancy permit (TOP). The Permit did not grant the occupants right of tenure and could not be used to secure building material loans.

In 1976 the planning document for the upgrading of the Old Naledi squatter settlement was approved. The plan emphasized the need to combine the physical, social and economic planning processes in view of the pre-existence of over ten years of self-development by a population then estimated at 8000 (Nostrand, 1982, p. 18). It had four major objectives.

The first sought to provide security of land tenure by creating minimum plot sizes and issuing Certificates of Rights (COR) which entitled plot-holders to legally occupy their plots and pass them on to their heirs, as long as a small service charge was paid regularly. According to Mosha (1996, p. 58), the COR, which could be mortgaged with the Botswana Building Society, was designed as an easy method of providing secure tenure that did not involve the expense of legal fees or cadastral surveys. Subsequently, the owner could convert it to a more expensive capitalized lease of 99 years. This Fixed Period State Grant (FPSG) required conventional surveying and paying of fees.

The second objective was to provide monetary compensation for plot improvements made by plot-holders if displaced or otherwise affected; and to provide for building material loans to assist plot-holders to build their own homes.

The third involved supplying the community with basic infrastructure (roads, drainage, water, street lighting, sanitation) and social, community and commercial facilities (schools, clinics,
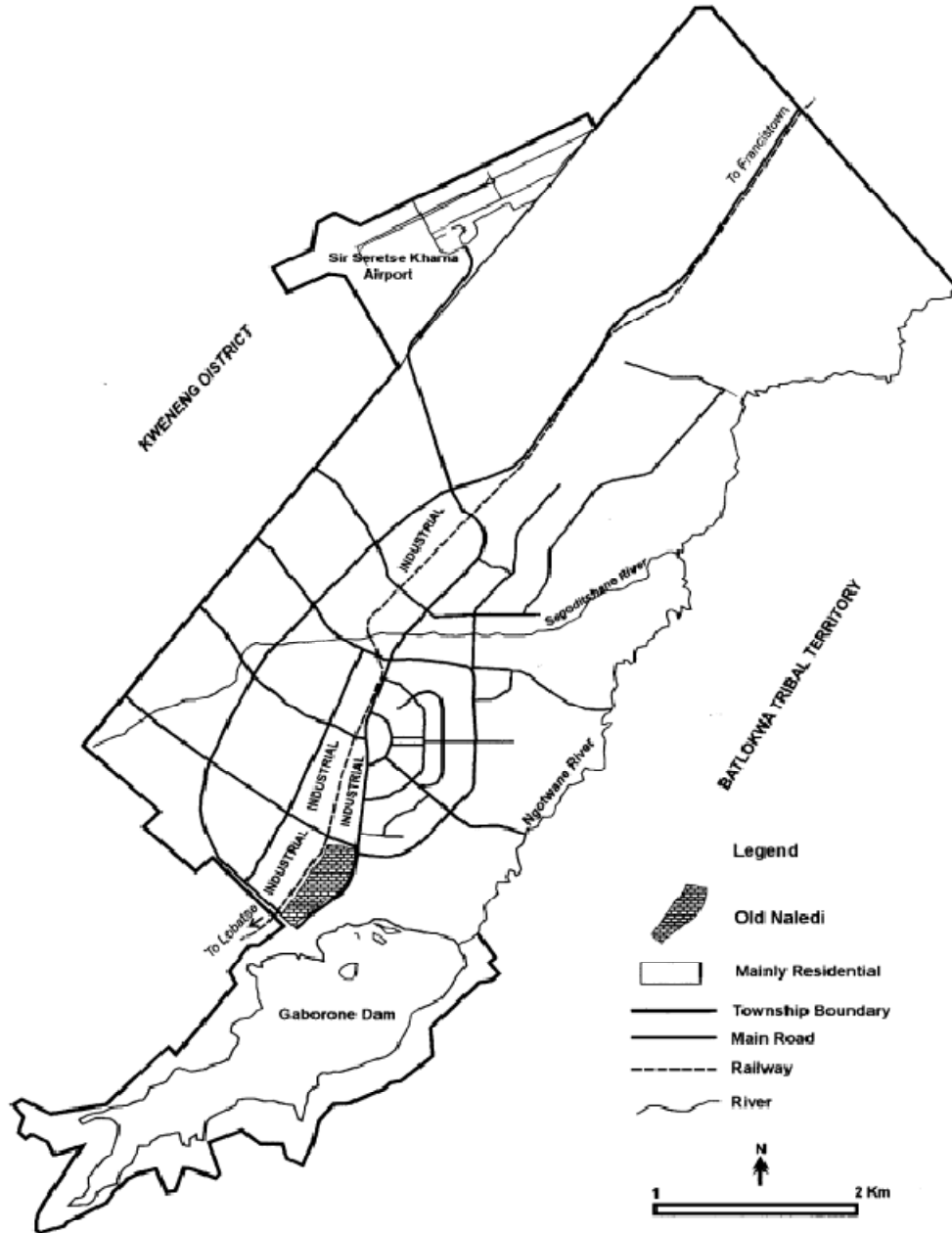
Map 1. Location of Old Naledi in Gaborone.

community center, shopping areas, refuse collection) so as to achieve affordable local standards, which corresponded closely with those of other site-and-services areas in Botswana.

The last was intended to ensure that the Project was carried out in ongoing consultation with the residents of Old Naledi.

Project implementation started in 1978. There were just over 10,000 people, or 2800 families, living on 2003 unregistered plots (Ghanie, 1982). With the rationalization of plot boundaries, a total of about 500 families were displaced, compensated and relocated in new self-help plots either in the Old Naledi resettlement area or in Broadhurst Stage II. Foot-paths were upgraded into a network of primary, secondary and tertiary roads. Storm water drains were constructed and a new water system comprising over 100 stands serving up to 20 families each were installed. Streetlights were installed along the central pedestrian lane. Two primary schools, a health clinic, a community meeting hall, the main *kgotla* (traditional court) and SHHA offices were opened between 1978 and 1979 while the main commercial shopping area and a market were established in 1982.

The installation of ventilated double-pit latrines was completed on the early registered plots in 1979. Town Council provided the toilet substructure and each plot-holder was responsible for completing the superstructure. All registered plot-holders were required to pay a monthly service levy to cover the costs of road maintenance, water supply, refuse collection, toilet emptying, secondary infrastructure and SHHA administration (Ghanie, 1982, p. 2). They were eligible to the building materials loan, for up to P800 (about US $135) worth of materials, payable over 15 years at 9 percent interest.

The upgrading process was viewed as being continuous with residents expected to keep their houses and premises clean. By 1982, the 2003 unregistered plots had been reduced to about 1700 with 8600 people, with all plot-holders having been issued with Certificates of Rights.

In 1988, Gaborone City Council initiated another upgrading program under which the four secondary access roads were upgraded to sealed road standard, a comprehensive network of storm drains was constructed, and there was connection of institutions to the sewer reticulation system. In 1995 all roads and pedestrian ways were provided with street lighting.

By 2001 the level of urbanization in Botswana had increased from 9 percent in 1971 to about 52 percent in 2000 (Republic of Botswana, 2001 Preliminary Results). Most of this growth has occurred in the capital city of Gaborone in which the Study Area of Old Naledi is located.

Results from the 1991 census show that among the urban districts, Gaborone, the national capital, had a 1981–1991 intercensal growth rate of 124 percent. Furthermore, census data show that whereas in 1981, approximately 50 percent of Botswana's population lived within a 200 km radius of Gaborone, by 1991, 50 percent of the national population was enumerated as living within 100 km of the City.

Results from the 2001 census however seem to indicate the population growth of central Gaborone has been slowing down recently. However, the expansion of its peripheral dormitory suburbs has been phenomenal. The 2001 Preliminary Results Brief states that this might be due to pull factors from nearby villages. In the case of Gaborone this is quite evident in the phenomenal growth of villages in the peripheral areas. For example, the populations of Mogoditshane, Gabane, Metsimothlabe, and Mmopane more than doubled over the period 1991–2001 (Republic of Botswana, 2001, p. 1).

These trends imply implosion through the inflow of the population from the lower order centres towards the national capital and fission through massive outward spatial translocation of people from Gaborone, in desperate search of affordable accommodation and cheaper land over a relatively very short space of time.

The rapid growth of Gaborone over a period of just over ten years has created unprecedented and severe social, economic, technical and administrative problems for the Gaborone City Council, particularly in the overpopulated low income neighbourhoods such as Old Naledi, where about one third of the City's residents live.

This has resulted in housing and related environmental problems mainly because of changing urban policies. Datta and Jones have remarked that until the early 1990s, the SHHA encouraged the expansion of home ownership to low income households through the provision of almost free land, subsidized building material loans and service charges and non-repossessions from loan repayment defaulters (Datta & Jones, 2001). The Accelerated Land Servicing Program was subsequently introduced to satisfy rapidly increasing demand for serviced urban land. Government policy change involving the removal of subsidization on urban living was however introduced around the same time (Datta, 1999). Even where such land was subsequently made available, as a result of the Accelerated Land Servicing Program, it now remains beyond the financial reach of its intended beneficiaries because plot prices, estimated at US$ 2458–2757, and building materials are not related to affordability assessments (Datta, 1999; Mosha, 1996).

Increased default re-payment rates have led to plot repossessions, further exacerbating the prevailing housing shortage. The mid–term review of National Development Plan 8 has acknowledged that the SHHA Programme is faced with problems of arrears of building material loans (BML) and service levy (ROB, 2000, pp. 104–107). As of the end of December 1999, the BML and service levy stood at P4.8 million and P9 million (US$0.8 million and US$1.5 million), respectively. The review notes that local authorities will now be applying extreme measures to compel defaulters to settle their arrears such as auctioning of property and intensifying the use of stop orders. Other problems include the deteriorating physical environment, within SHHA areas, and poor record keeping by various local authorities.

The inadequacy of financial loans for constructing housing, which meets the stipulated urban standards, has created other dimensions to the problem. The failure of formal public and private organizations to satisfy demand for home-ownership has, throughout the 1990s, led to a steady escalation in the demand for, and pressure on, alternative forms of tenure such as renting and sharing (Datta & Jones, 2001, p. 341). Landlordism and sharing have emerged as strategies for meeting the finance for housing consolidation and rent evasion. Landlords charge high rents and this encourages subletting and rent evasions involving the sharing of premises by too many tenants. Extended family members who have recently migrated to Gaborone have to share available accommodation with both landlords and tenants.

In the past, renting was regarded as a natural event in the spatial-cum-life cycle process of intra-urban mobility. New urban arrivals would rent or share accommodation before consolidating themselves firmly in the urban milieu socio-economically and acquiring accommodation of their own. Today this is no longer the case and, as a result, access to ownership is becoming harder and staying in rented accommodation before subsequently moving into owned housing could become

permanent rather than temporary (Datta & Jones, 2001). According to Datta and Jones, owners in Gaborone are increasingly reliant upon income from rent to consolidate housing, so that in a sense, their housing success is dependent upon the blocked tenure trajectory of others (Datta & Jones, 2001, p. 347).

The emerging picture in Old Naledi is that it will be difficult for renters to make the transition from bridgeheader to consolidator to middle-income dweller because of lack of security of tenure, unavailability of land, rapid price increases of construction materials, and the slow rate at which public agencies are currently providing services and infrastructure (Turner, 1969, 1972).

4. Research methodology

The investigation was a situational analysis of the residential environment in Old Naledi. The study area consists of three wards; the North, the Central and the South. The North was established in the 1960s whereas the South was built relatively recently in the 1980s. The South is the least congested of the three. Administratively, the study area has been partitioned into ten sub-areas. In order to obtain as complete a picture of the study area as possible, various types of information had to be obtained, using several approaches.

Documentary information was obtained from the Gaborone City Council, public utilities offices, Old Naledi Self Help Housing Authority Offices, the Community Center and the University Library. These sources provided the necessary background details about the study area.

Apart from secondary information, it was essential to obtain information on the perceptions, concerns and interpretations of events from the various affected and interested persons. This was done through participatory approaches involving public meetings with the residents. Such meetings were held in the Community Hall. Residents were encouraged to articulate their personal views about issues related to the adequacy of housing, socioeconomic services and infrastructure. Separate meetings were also held with key informants such as the chief, councilors, ward development committee secretaries, representatives of SHHA, non-governmental and community-based organizations. Apart from conveying their own impressions on Old Naledi, these sources provided useful recorded information about important aspects of the community. Additional information was also obtained from providers of public utilities, commercial, industrial and social services. This took the form of open-ended interviews with regard to their own evaluation of the settlement and the collection of data on the supply, demand and perceived adequacy and affordability of goods and services.

Housing and household characteristics information was obtained through the administration of formal interview schedules on households occupying each plot. In order to ensure an even coverage of the area, ten percent of the plots were randomly selected from each sub-zone (see Table 1).

Within each plot, the plot owner was targeted or his spouse. If neither was present any adult who could competently answer for the household was interviewed.

The existence of uses other than residential was also noted, as well as the quality of buildings and the rest of the environment.

Table 1
Selection of plots by wards

Ward plots	Subzones	Number of plots	Number of selected plots
North	08	160	16
	04	251	25
	05	135	14
	09	50	5
Central	07	279	28
	03	232	23
South	06	121	12
	02	150	15
	01	176	18
	10	150	15
Total		1704	171

Source: Gwebu, T.D. Socio-Economic Survey of Old Naledi, June–July 2001.

5. Empirical evidence from Old Naledi

Much has been done to try and improve Old Naledi. However, it still retains certain undesirable characteristics which set it apart from the other site-and-service areas such as excessively congested and irregular plot sizes, narrow and inconsistent road reserves and poor sanitation. This situation has to be understood in the light of the preceding theoretical and background discussion.

5.1. Congestion

Residents complain about congestion caused by too many people and too many structures. They note that it is because of this congestion that the provision of sanitation, water, security and other services, required for the development of their area, is difficult. Such severe congestion and overcrowding in the area is not conducive for the creation of a good living environment and impacts negatively on the quality of housing conditions.

The extent of congestion was investigated in terms of population density, the number of structures, and households on each plot. The expected population density for Old Naledi should be about 67 persons per hectare. However, with a current estimated population of 46,000 people, and an area of 114.07 hectares (Department of Town and Regional Planning (Gaborone City Development Plan, 1997–2021) 1997), the population density is about 403 persons per hectare. This is six times more than what it should be. The population density of Old Naledi is by far the highest in the city since it is twice that of Extension 32, Broadhurst, which had the second highest population density of about 193 persons per hectare in 1997.

According to the socio-economic study conducted in Old Naledi from June to July 2001, it is estimated that there are approximately 6307 structures on 1704 residential plots.

The existing residential development in Old Naledi does not in any way conform to the statutory Development Control Code. Most building activities in Old Naledi have been done without adhering to SHHA control regulations, especially the odd and additional buildings for rental that have been constructed after the first upgrading project. The housing stock has not been subjected to any consistent building control.

In terms of the Development Control Code, all residential plots in Old Naledi should have a maximum of 2 structures per plot, one being the main house and the other, a servant's quarters or an out building. But this does not apply in the case with about 87.5 percent of the residential plots in the study area. The most common number of residential structures constructed on 40 percent of the plots is 3. The next most common number is 4 structures per plot, representing 28 percent of all plots, followed by 5 structures per plot on 11 percent of plots. It is estimated that, overall, there are 6307 structures on the 1704 residential plots in Old Naledi, which average 4 structures per plot. The Development Control Code is intended to ensure safety, health, amenity, access and hygiene as well as that the land will maintain its value. Only after planning consent has been sought from and given by planning authorities can a plot be converted into multi-family use. However, none of the plots with more than two structures have been granted the required planning consent.

Overcrowding of structures is therefore a major problem to be resolved. Because of the requirements of the Development Control Code, it is technically not feasible to provide optimal services for over 1700 plots, each measuring 200–300 m^2, which accommodate a population of up to 46 000, in an area which was originally planned for 8500 persons. The level of congestion has a direct bearing on housing quality as high levels of congestion compromise the quality of housing. Residents hold the opinion that in order for their area to develop, there should be proper planning involving demarcation and restructuring of plots, sequential numbering of houses, relocation of certain households, and establishing clear passageways between properties. The pursuance and realization of the survivalist and coping strategies (Parnwell & Turner, 1998) however remains of questionable utility under present economic policies and financial constraints faced by most of these poor households.

There are on average 27 persons per plot. Such crowding is closely related to the unfavourable health situation of the neighbourhood. Clinic records indicate that the main health problems among infants and children are communicable ones, namely; respiratory infections, skin infections, diarrhoea and minor injuries. Because of malnutrition, the resistance of the victims to these ailments is greatly weakened. Among the adults, STDs and HIV-AIDS, tuberculosis and hypertension are common. Typically, these diseases are closely related to overcrowding. The contraction and spread of these diseases is further facilitated by lack of hygiene and widespread alcohol and drug abuse.

5.2. Housing quality

The quality of housing was assessed by using objective standards and subjective qualitative assessments from the residents' own perception.

Objectively, the quality of the structures was divided into three categories: high quality, medium quality and poor quality.

High Quality Structures include those that have been constructed in accordance with the Building Control Regulations. Some of the main characteristics of high quality housing are that:

● It should have a properly constructed roof, of either tiles or corrugated iron sheets.
● Its walls should be of appropriate height and built with bricks or blocks and cement mortar.
● Conventional windows and doors should be in the right positions.

The value of high quality structures is estimated to range between P800.00 and P1 200.00/m^2.

Medium quality structures meet some, but not all, of the characteristics of high quality structures. For example, a medium quality structure would be a house that, while meeting the conditions of the building control regulations in all other respects, does not have a properly constructed roof. The value of these structures ranges between P450.00 and P700.00/m^2.

Low-quality structures do not meet any of the conditions of the building control regulations. The common building materials for walls of these structures are mud, poles, and non-durable materials such as plastics. Low-quality structures do not have foundations, lack proper doors and windows with plastics and cardboard boxes frequently used for roofing. Low-quality structures are valued at P200.00–P400.00/m^2

Subjectively, respondents were asked to assess the condition of housing structures and rate them in terms of whether the structures were *excellent, good, satisfactory or poor*. In order to compare the results of the subjective survey with those of the objective housing quality survey, the subjective ratings were consolidated to conform with those of the objective housing quality survey as follows:

● *excellent quality* and *good quality* becomes *high quality*;
● *satisfactory quality* becomes *medium quality*;
● *low quality* remains the same.

A comparison of the results of the two surveys reveals a divergence of ratings, as shown in Table 2.

The findings from the objective housing quality survey are more positive about the existing housing quality in the study area than the subjective rating by residents. The difference between the views presented by the two surveys is more pronounced for the high quality and low quality categories. Whereas 35 percent of residents felt that the housing structures were of high quality,

Table 2
comparison of housing quality assessment surveys

Housing quality	Objective assessment (%)	Subjective assessment (%)	Difference (%)
High quality	74	35	39
Medium quality	14	29	12
Low quality	12	36	24
Total	100	100	

Source: Socio-economic and housing quality surveys for Old Naledi, June–July 2001.

the objective housing quality survey indicated that more than double that figure was of high quality. While the objective housing quality survey suggested that 12 percent of the structures were low quality structures, the residents indicated that low quality structures were three times this figure.

There are two possible reasons for the different findings of the two surveys:

- The environment that exists in Old Naledi in terms of inadequate infrastructure such as the lack of proper access roads, lack of open spaces and children's playgrounds, shortage of recreational facilities, poor sanitary conditions, lack of storm water drainage, overcrowding, over-development of plots and littering may have instilled a negative feeling in the residents towards the quality of their houses.
- As pointed out by one of the local politicians, some of the structures with a proper finishing may appear to be of good quality to an observer, whereas the reality is that the bricks/blocks used may be made from mud or any other non-durable material. The residents would be aware of this but an observer wouldn't be. This would account for the categorization of the majority of the housing structures as being high quality by the objective housing quality survey, which was based only on the observation of the researcher.

What this indicates fundamentally is that the residents are aware of the reality of the housing problem but, in Parnwell and Turner (1998) conceptualization, may be busy attempting to sustain the undesirable and unsustainable.

5.3. Access to water

The issue of accessing water certainly has a strong bearing on personal hygiene and living conditions. 93 percent of the households depend on communal standpipes. The rest are served by private connections. There are 172 standpipes. This translates to about one standpipe for every 10 plots. 21 percent of the households complain that water supply is irregular and/or inadequate and also unevenly distributed. The distance to standpipes is viewed as too long by certain households. Long distances imply that collection of water at night is dangerous, particularly for women and children. Residents support the idea of connecting each plot and/or house to the water main supply. By ensuring that each household is accountable for its consumption, water wastage will be minimized. Because the incomes of most of the residents are irregular, pre-paid meters should be installed.

Government now intends to provide urban services on a cost-recovery basis. The removal of subsidies could however mean that poor households will not have access to adequate water to meet their daily needs. The stepped tariffs will further mean that the larger households will either have to set aside a substantial portion of their earnings in order to access adequate water or dramatically reduce consumption to levels which can barely sustain them. This will pose serious health implications for such households.

Some of the standpipes have been vandalized while others have been locked indefinitely by City Council with the intention of phasing them out. Because Government has decided to phase out standpipes in urban areas on account of unsustainable water wastage, and removal of subsidies, the adequacy or otherwise of standpipes in Old Naledi is no longer a debatable issue.

Furthermore, the entire water reticulation network in the study area, which is antiquated, is to be dismantled and replaced by a modern and more efficient network. Nonetheless, water supply to Old Naledi still needs to be augmented and demand should be calculated on the basis of the current population estimates.

5.4. Access to sanitation facilities

Rapid population growth has resulted in rapid increases in the production of fecal matter and wastewater, and solid waste.

A sustainable urban environment should ensure suitable hygiene, adequate air circulation both in the house and on the plot, and free vehicle access for the emptying of pit latrines and septic tanks. Environmental sanitation and human health are closely related. In combination, they can lead to direct or indirect transmission of pathogens to humans. The environmental transmission of pathogens occurs through several different routes. These may be through: contact with human excreta; consumption of food products exposed to contaminated water or soil; by accidental ingestion of contaminated water during recreational activities.

5.4.1. Liquid waste disposal

Ninety-eight percent of the households in Old Naledi have access to private toilet facilities. Although a small proportion seem not to have toilet facilities, this apparently low percentage translates into 918 people, and given the proximity of the area to the city's water supply, the Gaborone Dam, this is an unacceptably high number.

About 93 percent of the residents have pit latrines. Considering that the site of the settlement is on a slope, underground seepage and gravity flow of toilet waste to the dam is a real possibility. This situation appears to be close to optimal as almost every residential plot has a toilet. However, in view of the severe congestion and overcrowding in the study area, the facilities are seriously inadequate. As a result, people are forced to relieve themselves through alternative but unhygienic ways. For example, the area west of the railway reserve, next to the industrial complex, is used extensively for indiscriminate defecation, with the flies, smells and open access posing all too obvious health hazards. The main organisms that pose a threat to health are a number of pathogenic bacteria, viruses, parasitic protozoa and helminthes that are excreted in large numbers from infected individuals or healthy carriers. Many of these organisms may infect a new host even if available in minute amounts.

Pit emptying is an operational expenditure, charged to residents in the form of a monthly service levy by City Council, for on-plot sanitation. Residents complain about pit latrines rapidly filling up due to the large numbers of users per plot. The emptying vehicles cannot cope with this. Moreover the congestion of illegal structures (*mukukus*) for rent renders some of the latrines to be inaccessible to the draining vehicles. Overflowing pit latrines are said to produce bad odours besides attracting flies, and thus posing a serious health hazard. During the rainy season feaces overflow the toilets and pollute the neighbourhood premises. The suggested solution by the residents is to sewer the area, introduce flush toilets which are currently available to only 7 percent of the residents, and completely phase out pit latrines. The affordability of these services to the poor households at market cost however remains questionable. Public sewered toilets, if well managed, could be a more affordable long-term alternative.

Presently, the study area has 3 public waterborne toilets that are evenly distributed in the area being located at the market, community hall and local shopping center. They are operational 24 h a day. Vandalism, poor maintenance and cleaning, however, remain their main problems.

Water runoff from leaking stand pipes and/or the failure of users to turn off these taps after use, creates localised problems, particularly where the water runs along pedestrian walkways. Some residents wash their clothing and/or utensils close to the standpipes. Because of inadequate soak away, pools of stagnant wastewater collect causing unpleasant odours and attract flies, cockroaches, and mosquitoes. Hopefully, the location of the taps within plots should minimize these problems.

Water pollution from Old Naledi can come from both rainfall-generated surface runoff and groundwater pollution from pit latrines. Given the local topography and soil conditions, runoff from the Old Naledi area is likely to infiltrate, while there may be storm water runoff from the land surface in wet weather. Such storm water which is often severely polluted may find its way to surface water bodies or into groundwater. Dry-weather runoff is most likely to have relatively high concentrations of nitrogen, phosphorus and fecal bacteria. Open sewage in drains along the Old Lobatse Road, especially at the Cresta Lodge traffic junction with Kudumatse Drive, pose an obvious health hazard to the residents. Drainage of sewage and surface runoff to this area causes localised flooding after heavy rains and needs to be dealt with properly. The provision of underground stormwater drainage and sewers is imperative and the Gaborone City Council needs, as a matter of top priority, to cover the open drains in its efforts to standardize covered drains in the city.

Some households in Old Naledi make use of domestic septic tank systems as well as pit latrines. The effluent from the septic tanks is usually discharged to a soak away or leach drains. However, one of the problems associated with the use of septic tanks where numbers of residents vary on a daily basis, is that the high variability in loading to the septic tank tends to cause inefficient digestion of the primary wastes. Hence the septic tank effluent from a system which is used only periodically may contain higher loads of pollutants than one which receives a constant input of domestic waste.

On-site sanitation, in the form of pit latrines and septic tanks, is likely to contribute pollutants to groundwater and to surface water bodies over a more extensive area than a formal water-borne sewerage. Even where secondary treatment of sewage is provided, if treatment works are not well managed and maintained, then the diffuse sources, typical of on-site sanitation, are simply transformed into a point source at the treatment works discharge. It is clearly unacceptable to accept the gross pollution of urban aquifers, by on-site systems particularly given the proximity of Old Naledi to Gaborone Dam—the capital city's main water supply.

Because of the extreme congestion of housing, condominium sewers, connecting a group of plots to a collector sewer, would be ideal.

5.4.2. Solid waste disposal

Ideally, City Council should collect domestic refuse from individual plots. However, this service is only rendered in the southern part of the study area because standard-sized road widths, which give refuse collection trucks ease of access to individual plots, are only available there. In the more congested northern and central areas, the Council has provided skips where residents can deliver

refuse for collection by the Council. These are generally located along main roads for ease of access. In all, there are 48 skips in Old Naledi, which yields a ratio of one skip for every 36 plots.

The refuse collection system for Old Naledi does not function well. More waste is generated than the system can clear off. Residents point out that City Council is slow and/or irregular in collecting garbage. Skips are generally overflowing, causing health hazards. Therefore the effectiveness of the garbage collection system, with respect to the number of skips as well as the frequency of collection, must be reviewed in order to provide a more feasible alternative system for Old Naledi.

Residents in the northern and central parts of Old Naledi are expected to find means of hauling their domestic refuse to the nearest skip. The common means of transporting the refuse to the skips is by wheelbarrow, while others carry the refuse in bags to the skips. However, there is evidence of refuse being dumped on some roads, open spaces and footpaths, resulting in an unsightly environment and potential health hazards. City health regulations need to be enforced, and public education on environmental health is required.

Small open areas, which children use for playgrounds, also serve as garbage collection sites. The skips located on such sites are normally overflowing with miscellaneous garbage. They contain rotting refuse, have offensive smells and attract flies and other vermin, all posing an obvious health hazard, particularly to small children and nearby residences, who are amongst the most vulnerable groups to such health risks.

There is a high default rate on the payment of service levies. Two reasons have been put forward to explain this. First, the residents are not satisfied with the quality of service. Second, politicians from the opposition party encourage non-payment in an attempt to gain political mileage. The immediate solution to the problem clearly lies in providing the quality of service of an acceptable standard to the community, involving, and sensitizing the residents on the importance of environmental hygiene through IEC programs.

6. Conclusions

This study was designed to investigate the profile, dynamics and dimensions of environmental problems in Old Naledi, a low-income urban neighbourhood. Botswana presents a different urbanization scenario from the rest of sub-Saharan Africa by having over half of its population now living in towns and cities. Population movement has mainly been to Gaborone, the national capital city. The rapid rate of population movement to Gaborone has created unprecedented residential environmental problems for municipal authorities.

Such problems have reflected, in part, weak enforcement of development control codes and urban development standards. They have also been partly due to a lack of adequate financial, human and technical expertise to deal with haphazard spatial development. However, the underlying and fundamental explanation of these problems lies in the radical shift of government policy towards providing urban services since the end of the 1980s.

Up to the early 1990s, the SHHA encouraged the expansion of home ownership to low income households through the provision of almost free land, subsidized building material loans and service charges, and non-repossessions from loan repayment defaulters. The Accelerated Land Servicing Program was subsequently introduced to satisfy rapidly increasing demand for serviced

urban land. With Government policy change however, involving the removal of subsidization on urban living; even where such land was subsequently made available, it remained beyond the financial reach of its intended beneficiaries because of unaffordable plot prices. Increased default re-payment rates led to plot repossessions, further exacerbating the prevailing housing shortage.

The unavailability of loans from formal financial institutions for constructing housing, which meets the stipulated urban standards, has compelled the poor to adopt other strategies to secure finance either for housing consolidation or to minimize cost of rental accommodation. Landlordism and sharing have emerged as strategies for meeting the required finances for housing consolidation by owners, and rent evasion by renters.

Landlords charge high rents and this encourages subletting and rent evasions, involving the utilization of premises by too many tenants. Also, family members who have recently migrated to Gaborone have had to share available accommodation with both landlords and tenants. These practices have generated a myriad of environmental problems which have been discussed above.

In the past renting was a natural adaptation event in the spatial-cum-life cycle process of intra-urban mobility in which new arrivals would temporarily rent or share accommodation before consolidating themselves firmly in the urban socio-economic milieu, through acquiring accommodation of their own. Today this is no longer the case. As a result, access to ownership is becoming harder and staying in rented accommodation before subsequently moving into owned housing could become a permanent rather than temporary practice. This is because owners in Gaborone, due to lack of access to capital from formal financial institutions, are increasingly becoming reliant upon income from rent to consolidate housing. In this way, their housing success could be seen as being dependent upon the blocked tenure trajectory of others towards ownership (Datta & Jones, 2001, p. 347).

Similar observations were made in Latin America two decades ago by Gilbert (1982). He noted that in most cities, many current owners were once renters, so that the presence of renters was interpreted positively: they too would one day become owners. Such an interpretation would seem plausible in those cities in which the proportion of renters to owners was declining. Conversely, where the proportion of renters was increasing the implication would be that renters were finding more difficulty in obtaining land and building houses. In that case, rather than renting being a temporary stage prior to home ownership, it would signify a permanent tenure state. Such a trend could also signify that consolidation had become more difficult for those with land and in such circumstances the only way for owners to consolidate would be to let out rooms (Gilbert, 1982, p. 94).

The Government has committed itself to a number of pronouncements regarding the creation of sustainable urban settlements in Botswana. For example, Botswana's Vision 2016, in its concern for a just and caring society, mentions:

- provision of good quality sanitation and an adequate supply of safe water;
- access to good quality basic shelter (Republic of Botswana, 1999, pp. 26–27).

With regard to sustainable urban development, Botswana's New Settlement Policy strategy is intended to:

- upgrade old neighbourhoods to bring them in line with the current development standards and make them safe and pleasant living environments for their inhabitants;

- provide a base for industrial and commercial development through delivery of land, housing and social infrastructure (Republic of Botswana, 1998, p. 84, Department of Town and Regional Planning (National Settlement Policy)).

The National Policy on Housing (NPH), as approved by Parliament in December 1999, aims to 'facilitate the provision of decent and affordable housing for all within a safe and sanitary environment.'

The SHHA programme, established in 1972 in Gaborone, was targeted at the homeless urban poor with viable sources of income but who could not afford the rentals of Botswana Housing Corporation (BHC) or those in the private housing market. Currently, only those earning between P4400 and P36,400 (US\$ 733.3 and US\$6 067) per annum qualify for the programme. Since households with an income of less than P4400 per year are excluded from the scheme, a substantial proportion of low-income urban households may not benefit from the SHHA programme.

The Destitute Scheme, a welfare scheme administered under the Department of Social and Community Development, is aimed primarily at providing food and clothing to the destitute—those who do not have any visible means of support. Although the scheme is not meant to provide housing, it provides free housing where the destitute individual has no recourse to any other alternative assistance. However, with increasing poverty and competition from other social welfare programs, the medium and long-term viability of this Scheme is now questionable.

The National Policy on Housing states that 'the urban and rural poor who are not covered by the SHHA Scheme or the Destitute Policy should be provided with housing assistance under the Integrated Poverty Alleviation and Housing Scheme as well as other special programmes such as perma-culture undertaken in partnership with NGOs and the private sector'.

This is a pilot scheme intended for low-income earners and the unemployed who do not qualify for the SHHA programme. It is based on the assumption that poverty is the underlying cause of homelessness; by addressing poverty, lack of housing would be solved. As a result, the scheme aims to provide assistance to the poor so as to improve their financial position so that they may qualify for the SHHA programme. The assumption is that once the intended beneficiary becomes self-supporting, he/she should be in a better financial position to afford a habitable house.

There are three main reasons which threaten the feasibility of the above programs and schemes as originally conceived and articulated. First, government concern with paying more attention to more pressing and financially demanding problems such as those associated with the AIDS scourge is increasing. Second is the shortage of finance, the human capacity with the requisite technical and managerial skills to bring the projects to fruition. Finally, there has been a change in government policy from being a generous provider towards being a shrewder facilitator with regard to service provisioning.

The way out of the unsustainable urbanization situation is the promotion of genuine economic empowerment of the resident population through functional education, skills training in the establishment and management of micro and medium scale economic enterprises. The government will need the cooperation of residents, non-governmental organizations, private and donor agencies to achieve this. Otherwise the environmental problems of Old Naledi will continue to deteriorate and the poor households will continue in their futile efforts to try and

sustain the undesirable an unsustainable urban environment (Parnwell & Turner, 1998; Ward, 1986).

These efforts should be complemented by equitable regional planning practices designed to influence population redistribution. The movement of the population from the lower order centers to one major urban destination of Gaborone signifies a lack of socioeconomic, employment and investment opportunities outside the capital city. The Major Village Upgrading Program should be pursued with vigour in order to provide the private sector with incentives such as suitable services, land and infrastructure in the lower order centers. Because of Botswana's vulnerability to drought, remunerative non-farming activities such as cottage industries, and services such as community based eco-tourism, should be promoted and supported to retain the rural population.

Acknowledgements

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