HUMAN SETTLEMENT INTERVENTIONS RELATED TO CROWDING AND HEALTH IN BISSAU, GUINEA-BISSAU

DRAFT

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Overcrowding in Victorian London

Every room in these rotten and reeking tenements houses a family, often two. In one cellar a sanitary inspector reports finding a father, mother, three children and four pigs! In another a missionary found a man ill with smallpox, his wife just recovering from her eighth confinement, and the children running about half nacked and covered with filth. Here are seven people living in one underground kitchen, and a little child lying dead in the same room. Everywhere is a poor widow, her three children, a child who has been dead thirteen days. Her husband, who was a cab driver, had shortly before committed suicide.

Mearns, A. (1883). "The Bitter City of Outcast London: An Inquiry into the Condition of the Abject Poor". London; James Clarke. Extracted from Hall, Peter (1988), Cities of Tomorrow, Blackwell Publishers, UK. Page 17.

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Rotterdam, July 1995.

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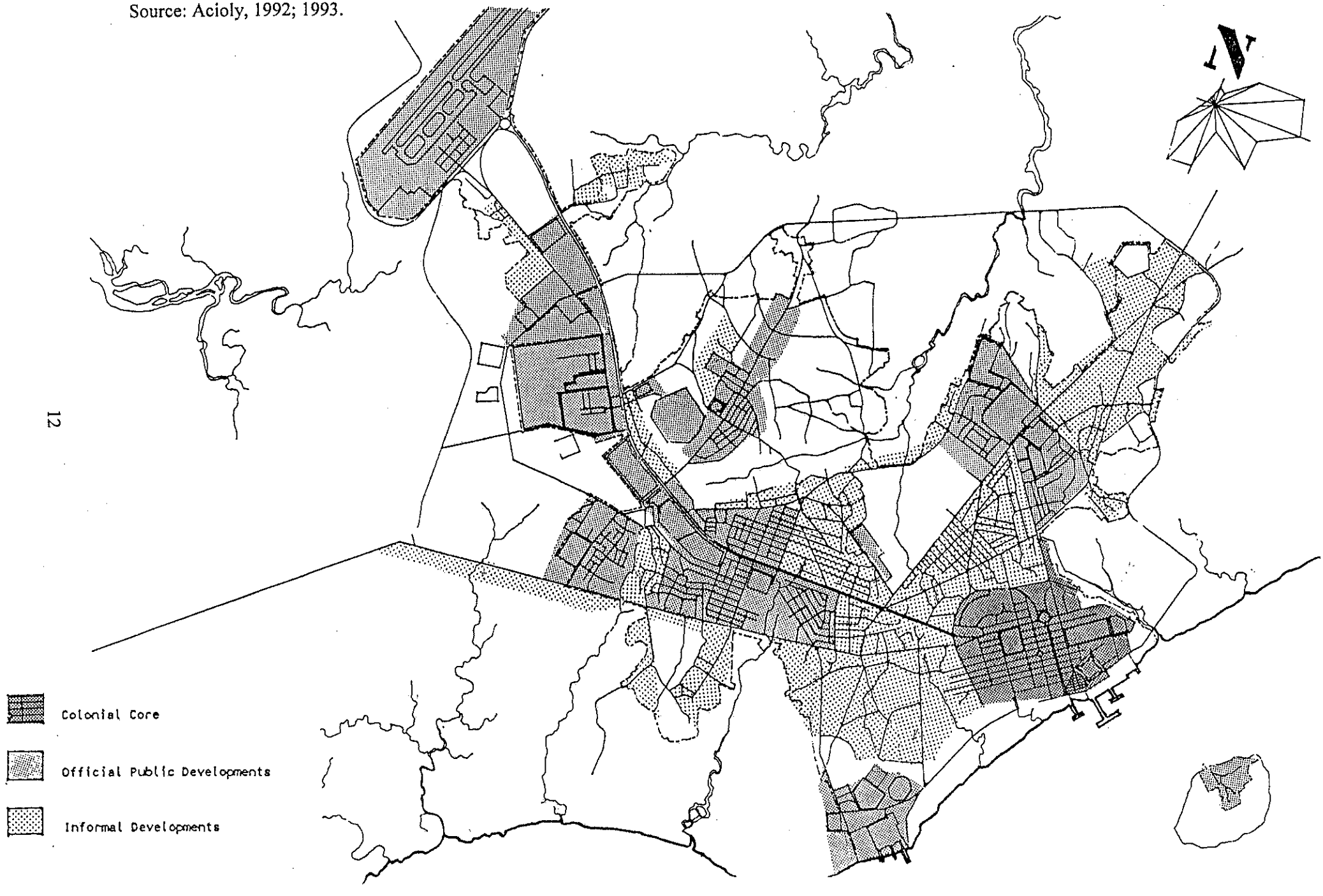

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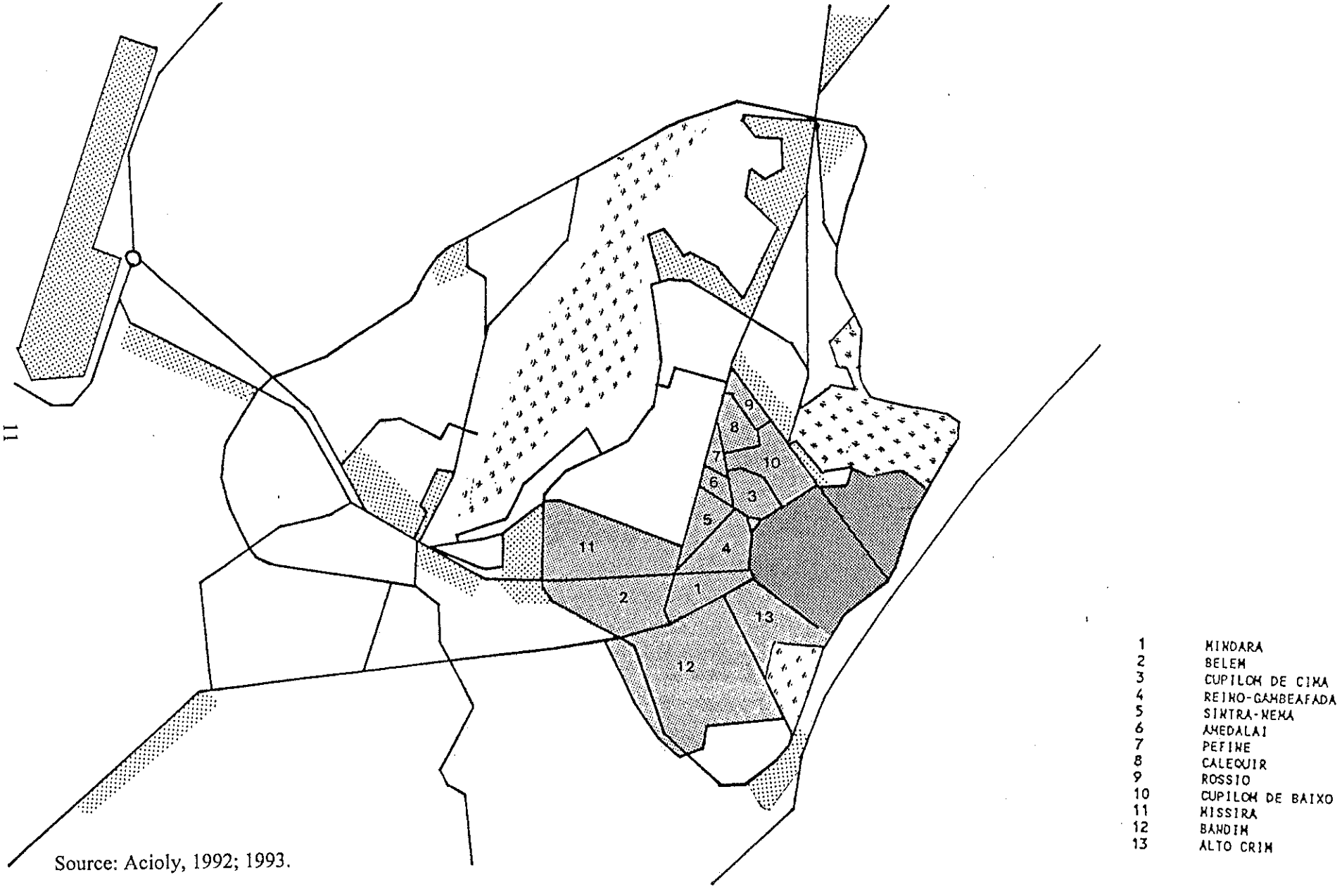

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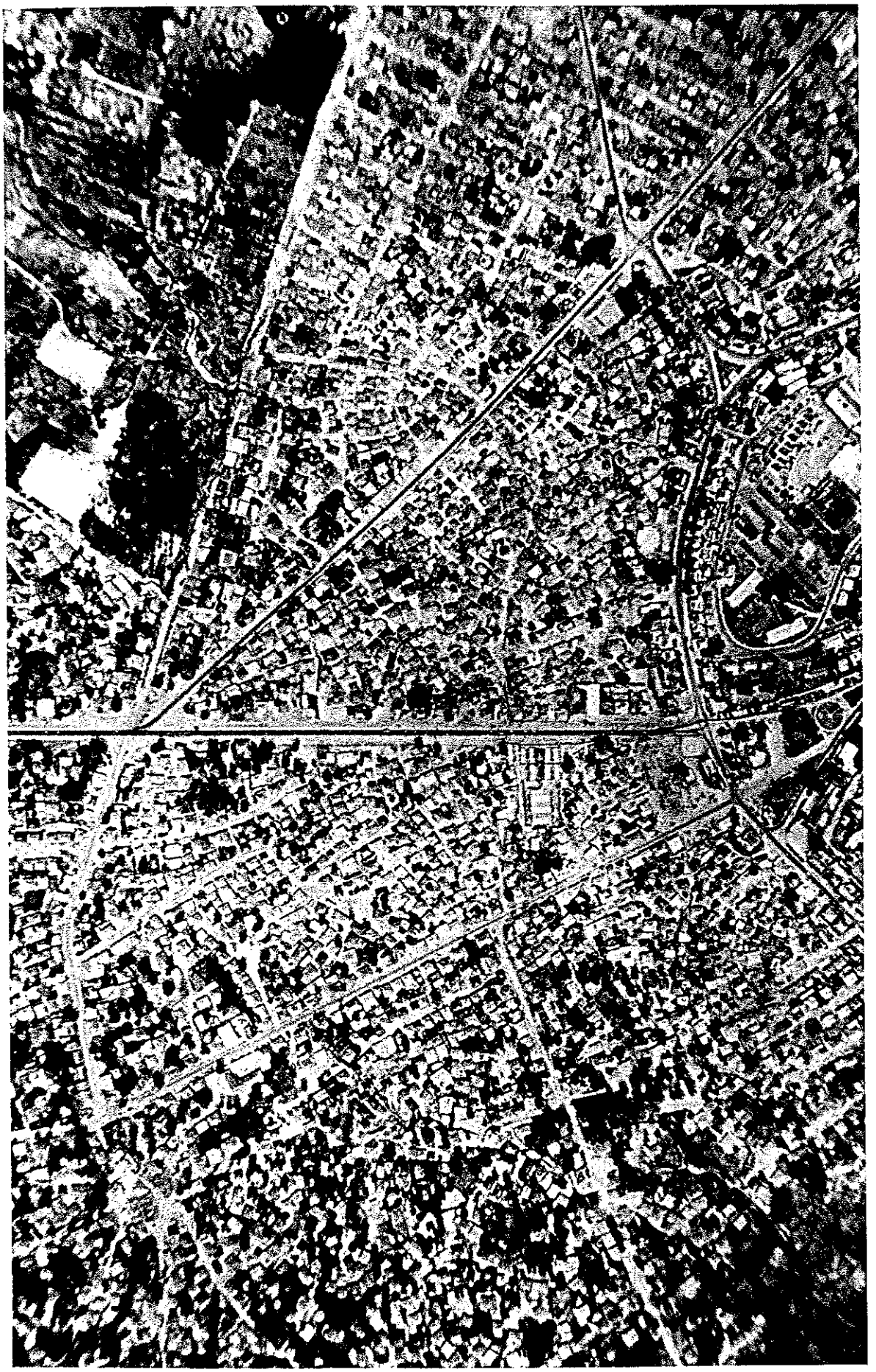


1. INTRODUCTION

This report describes the major causes and effects of crowding and health in low income settlements in Guinea-Bissau, West Africa. Based on empirical evidence drawn from Bissau, the capital city, it provides a basic understanding of a phenomenon that affects the lives of millions of people in cities in Developing Countries. Sponsored by the United Nations Centre for Human Settlements and DANIDA, the empirical data which covered three city neighbourhoods were collected during a one-year longitudinal study. The investigation results are targeted at planners, architects, engineers, policy makers and city managers with the intention of providing them with general recommendations for human settlement interventions that can produce positive impacts on crowding and alleviate its adverse health effects.

The report initially summarizes the development context of Guinea-Bissau and Bissau, in particular. It provides the reader with an understanding about the specific process of urbanization in a city that is similar to other large urban centres of Sub-Saharan Africa. It traces the emerge of informal settlements that are the major pattern of urbanization, which in turn, is accompanied by other consequences such as poverty, subletting of rooms, rented accommodation and overcrowding. It is argued in the report that these effects are only a few of the indicators of the inefficient performance of the housing sector in Bissau. By presenting this overview, the report is able to design a profile of the social, economic and physical environment of the affected population.

Voluminous empirical data were collected during the field surveys to underscore the notion that important external factors, poverty, ethnicity, number of children per household, etc. exacerbate the adverse effects of crowding. In addition, a series of human settlement indicators that are related to crowding have direct and indirect implications on health. The study in Bissau also shows that continuous exposure to crowding and its long-term epidemiological severely constrain human development.

The information generated by the survey was extremely important since it correlates crowding with morbidity, mortality, transmission of communicable diseases, airborne and respiratory infections and specific chronic and infectious diseases. There are also linkages with particular conditions found in households: domestic animals, dampness and interior smoke, poor ventilation and lighting, flies and vector transmitters, inadequate sanitation, poor building construction, to name the most prominent.

In highlighting the linkage between inadequate urban housing policies and overcrowding, the report argues that inefficient local government management in combination with inadequate regulatory, institutional and policy environments ultimately lead to continuing housing shortages. These factors are the principal causes of crowding in Bissau. In order to be more effective, housing policies and programmes should address the causes and effects of crowding in an integrated way.

1.2 Guinea-Bissau

Guinea-Bissau is a small (36,125 km^2) and flat country situated in the west coast of Africa. The country shares territorial borders with Senegal to the north and northeast and with Guinea-Conacry to the south. According to the 1991 census there are 979,203 people living in the country, of which 33% are urban citizens who live in the 33 urban centres. Twenty percent of the total population and 60% of the urban population, lives in Bissau, the capital city. Urban growth has registered 4% per year for the past years whereas the national population has been 2.5% per year, a rate that is earmarked by a adverse combination of high natality and mortality rates.

According to the Human Development Index, Guinea-Bissau ranks 164 in a list of 173 countries, with a GNP per capita around US$180 and life expectancy of 42.9 years (UNDP, 1994).

For 528 years, the country was dominated by the Portuguese. In 1959, the PAIGC-African Party of Independence in Guinea and Cape Verde, lead by the legendary Amilcar Cabral, started the war of independence that ended with the defeat of the Portuguese army in 1974.

During the first phase of independence, the country was ruled by a one-party system that leaned towards Marxism-Leninism with a centrally planned economy. In 1980, a coupe d'etat replaced the old regime and started a process of gradual liberalization. In 1991, a multiparty system was introduced and the first multiparty election took place in 1994, starting a new phase in the democratic consolidation of the country with an elected president and a new parliament.

In 1986, prior to elections, Guinea-Bissau embarked in a structural adjustment program under the auspices of the IMF and the World Bank. The SAP devaluated the Guinean Peso; established a process of privatization; instituted a new administrative structure to reinforce economic planning; introduced austerity in budgeting; reduced production of currency; and withdrew subsidies to consumer's prices (Acioly, 1994).

A series of fiscal and monetary policies were implemented in order to (1) accomplish a sustainable economic development; to (2) stabilize the finances of the State; and (3) diminish the rate of inflation. The apparatus of the State had to shrink, implying a severe control over salaries and large-scale dismissal of public servants. Commerce, formerly in the hands of the State, was liberalized, and many import restrictions were abolished. The most significant feature of the SAP in Guinea-Bissau was the decrease of the State's dominant role in trading and commerce and the increase of privatization.

A new development phase has been launched in which next to the government the emergent private sector and non governmental organizations will play a role in the transition to a market economy.

1.2 City of Bissau

The city of Bissau, founded by the Portuguese in 1687, became the capital and principal centre during the colonial period. In 1974, it was named as the national capital of independent Guinea-Bissau. According to the 1991 census, the city contains 195,389 inhabitants, a population that is growing at annual rate of 5%.

The city perimeter was relatively small at the beginning of this century, limited by to its essential core by a fort located close to the port and the Geba river. It was expanded in 1948 by the

Portuguese administrators who defined a physical structure based on a grid of geometric blocks and orthogonal roads. This area is known today as the colonial core.

Between 1948-1960, the city's annual population growth rate were low, but this increased rapidly in the subsequent period as the result of the escalating guerrilla war in the rural areas. Fifteen years of war displaced nearly 150,000 people, many migrating to Bissau. This in-migration marked the beginning of a process of rapid urban growth. Aerial photography for 1973, a year before independence, shows that the colonial core was already surrounded by 13 neighbourhoods. These neighbourhoods were basically formed by a process of informal urbanization which was tolerated by the colonial administration (see Figure 1.1).

Informal urbanization in fact, is responsible for the major growth in Bissau. Inventories carried out in the late 1980's indicate that the allocation of urban plots by the local authority represented a very small percentage of the then occupied area. Building permits have been decreasing every year while the housing stock has been continuously growing. The permits issued by the Municipality of Bissau in the period 1988-90 represent no more than 20 % of the total houses necessary to accomodate the growing population. (Acioly, 1992;1993). It is estimated that almost 80 % of the population of the city is actually living in informal human settlements, locally known as "bairros" or popular neighbourhoods where subletting of rooms, rented accommodation, crowding and house-sharing are common features (see Figure 1.2)

This urbanization process seems to be typical for the urban centres of Sub-Saharan Africa. Seventy-five per cent of the population of Dar-es-Salaam and 59% of Ouagadugo live in informal settlements (UNDP, 1990). In 1968, only 5 % of the population of Bamako was living in informal settlements, but, in 1983, more than 33% of its inhabitants were living in these settlements. During the late eighties, illegal occupation accounted for half of the urban growth of the city (NWR, 1987). In 1978, 38 % of the housing stock of Nairobi was situated in illegal settlements and in Lusaka, there is actually more than 250,000 people living in informal settlements.

1.3 A Profile of the "Bairros"

The urbanization pattern of Bissau is characterized by the emergence of informal human settlements, locally known as "bairros" or popular neighbourhoods, in which various features are common. To understand these features is a *sine qua non* condition to understanding the causes and effects of crowding in this city or its counterparts in elsewhere in Sub-Saharan Africa.

Inadequate Basic Infrastructure Provision

Most of the essential infrastructure services are insufficient. The roads are not always defined and the main accesses, which are rarely paved, make accessibility extremely difficult, especially during the rainy season. When and where available, electricity and water supply networks do not serve all the houses, making living conditions even more difficult. Shallow wells are the most common source of water supply for the majority of households, but they are usually polluted due to inadequate sanitary conditions and overflowing of pit latrines. Wells and latrines are usually shared by more than one house, aggravating the unhealthful conditions. A low level of education and awareness about basic hygienic also exacerbates the health risk for the population. Although the water and electricity company and a Dutch funded neighbourhood upgrading project have installed some public water standposts, financed double pit water lock latrines and carried out public awareness campaigns in order to change this situation, the existing demand for sustainable potable water still exceeds safe supply.

Poor Housing Conditions

A great part of the housing stock is in poor conditions. Most of the houses' walls are self-built, using traditional sun-dried adobe blocks or compacted mud walls. Mostly one storey high, the buildings rarely have ceilings. Because the houses lack a solid foundations, the walls crack, with the result that most of the building components are unstable and undurable. The covered area of the houses commonly reach 180 m^2 or more, with the standard room 4 m x 4 m in size. They are built with a traditional layout i.e. a rectangular form measuring 14 by 12 m which is subdivided into four or six rooms and sometimes eight, and surrounded by a veranda that is covered by large roof overhangs. The veranda is usually 1.6 m wide. The roof is four sided and is usually covered by thatched vegetal fibres or corrugated metal sheets. The number of houses covered by a tiled roof is very small. The roof overhang of the veranda protects the adobe walls from the rain and covers the space where cooking and resting usually occur. Toilets and kitchens are rarely built inside the house itself. The toilet is usually a dry pit latrine situated a few meters from the house and sometimes attached to the veranda. Whenever there is a kitchen, it is usually situated in a semi-open structure located at a certain distance of the house.

High Population Densities and Overcrowding

The population density is remarkably high considering the size of the houses and the area of a typical legal urban plot (500 m^2). The neighbourhoods usually have a density above 200 inhab./ha and the houses are often overcrowded. It is very common to find a household occupying 2 rooms of 16 m^2. One room is continuously used as a bedroom while the room facing the front yard of the house is used as the living room during day time and as a bedroom during the night time. A double bed is always present in the bedroom and sometimes it has an extra single bed attached to it. In the case of large households, people sleep on a mattress placed on the floor. The occupants have very little privacy during the night and it is quite common to see adults and children sharing the same bed at night. Consequently, it is not difficult to imagine that the inhabitants are exposed to high levels of distress, promiscuity, communicable diseases and airborne infections. This situation is aggravated by the common habit of keeping domestic animals such as pig, chicken, goats and ducks inside the houses during the night as a precaution against thefts.

In the neighbourhood of Reino-Gambeafada, there is an average housing density of 18.5 houses/ha, a density of 269 inhab/ha and 15.2 inhabitants per house. In the neighbourhoods of Mindará and Belém, the average of inhabitants per house is above 14 and in Cupilom de Cima, it increases from 16 to 22 in the southern part of the settlement (Acioly, 1992;1993). During a field survey carried out in Cupilom de Cima in 1991, the author found a large room with one door and no openings for ventilation or natural lighting which contained seven (7) double beds. According to the house owner, at least 3 persons slept in each bed, meaning that 21 persons were sleeping in one single room. The 1991 survey revealed an average of 11.7 m^2 of residential space per inhabitant in a range from 3.9 to 26.2 m^2 per person. Another more recent survey announced the figure of 3.2 m^2 per person as the floor area indicator for Bissau (UNCHS & COWIconsult, 1995). Housing spaces for cooking, washing, hygiene, and leisure in the neighbourhoods are constantly under high pressures because they are used by more than two households. High densities and crowding are sides of the same phenomenon found in the popular neighbourhoods of Bissau. The usual one household-two rooms ratio is gradually being replaced by the one family-one room ratio which materializes remarkable figures of overcrowding. For the location of the neighbourhoods, see Figure 1.1.

Informal Renting Practices and House Subletting

The pressure for accommodation in the centrally located neighbourhoods is increasing dramatically as a result of public inertia and the absence of a city housing and land delivery systems. In relation to other sites of the town, these locations are becoming very attractive for commercial activities as well due to its locational advantages. The relative easy access to public services and facilities like commerce, working places, hospitals and schools indirectly stimulates housing and land speculation. This is changing the patterns of ownership and house occupation in many neighbourhoods. Rented occupation and subletting of rooms are becoming very common practices.

In Reino-Gambeafada, 69 % of the housing stock is partially or totally occupied by tenants from which 16 % are houses with absent owners so that out of every ten houses seven are occupied by tenants and from those roughly two are from absent owners. In Mindará, there is a very similar figure, where almost half of the housing stock is partly or totally rented occupied, from which 17% refers to absent owners. In Cupilom de Cima, rented occupation reached 23 % in 1986 and the presence of room renters was registered in 28 % of the housing stock. Roughly one third of all houses have tenants (Acioly, 1992; 1993).

This phenomenon has some behaviourial consequences in terms of house and neighbourhood improvements. The tenants have minimal commitments to maintaining and repairing the house beyond the minimum level for living. They do not feel responsible for the maintenance of the public space and services surrounding the house. In this sense, the type of house occupation has a negative impact on the management of the existing housing stock and on the process of neighbourhood upgrading. Moreover, it direct affects the modes of in-house crowding.

Consequently, one finds that rooms are either informally rented or sublet under very speculative conditions and without any type of legal protection for the tenants. An attractive form of income generation, the practice has had a domino effect on crowding in the city and particularly in the centrally located neighbourhoods.

Housing and rent values are increasing to levels that exceed the incomes of those who are formally employed. In June 1995, a single room with cement floor, plastered walls, without ceiling or veranda, no electricity or other facility was rated PG 100,000, the equivalent to US$5.5 or 62% of the minimum monthly wage. (Recently the minimum monthly wage has been raised from PG 160,000 to PG 200,000 which is roughly US$10, and the government has announced an increase of the minimum wage to PG 450,000 for September 1995, an equivalent US$24 at the present exchange rate US$1 = PG 18,500.)

Traditional and Informal Land Subdivision

The great majority of the neighbourhoods is consolidated without any official urban plan, although the Municipality and the Ministry of Public Works both attempt to define directive plans for regularizing land occupation. The spatial configuration of the settlements resembles tribal layout, with several housing features that are found in the traditional rural settlements of the country, see aerial photo in Figure 1.3. For example, in two centrally located neighbourhoods, Reino-Gambeafada and Cupilom de Cima, 23 and 38 clan compounds respectively were discovered (Acioly,1993). These compounds, belonging to a typical African family, are usually formed by two or more houses, each with certain spatial relationship. The household head, one or more wives, sons and daughters, their families, and even a third generation occupy each compound. In Cupilom de Cima, a compound formed by 4 houses had almost 100 occupants, all belonging to one family group. The occupants of these compounds share the collective spaces and facilities such as latrine, cooking areas and

resting places. Neighbourhoods such as Cupilom de Cima were formed through a continuous process of land concession granted by the early customary owners of the ground.The land division process goes according to customary laws which are usually recognized by the local authority in land disputes.

In order to occupy a parcel of ground, the residents pay a yearly land occupation tax to the Municipality called "taxa de ocupação" which, in 1993, did not exceed US$ 3.00. The tax is assessed on the ground area where the houses stand since the majority of houses is built on land that is neither demarcated nor regularized by a legal property title. Land occupation in popular neighbourhoods is still based on customary or traditional laws. Informal subdivisions are becoming more frequent and illegal commercialization of land is reported in the city periphery.

Informal and Small Scale Businesses

The economy of these neighbourhoods is essentially informal and is characterized by the existence of small scale enterprises that operate on a subsistence basis. Tailors, vegetable and fruit shops, repair workshops, carpentry and furniture making, civil construction services, arts and crafts, small commerce, bars and restaurants are the typical businesses found there. An inventory that covered 605 enterprises operating in the city revealed that 70% of them was located in these neighbourhoods (Delgado,1990). They had a very low capitalization and two thirds of the enterprises were operating with capital below US$ 1,700. The owners' savings are the major source of capital. Lacking advanced technology and sufficient financing they are inadequately managed. Human labour is usually provided by the family who are paid low wages.

The presence of street vendors is also a familiar feature of these locations. People find a shade place to sell goods such as mangos, papayas and other seasonal fruits, cigarette, chewing gum, cooking fuel, etc. Important pedestrian routes are usually full of street vendors and seem to attract a flourishing informal market. The informal economy gained strength when the Structural Adjustment Programme (SAP) was imposed and the development process of the city and its neighbourhoods reflects this event as well. The dismissal of a large number of public servants, the strict control of salaries and public expenditures and the liberalization of trade seem to have pushed the population to informal ways of income generation. The rental market became profitable and attractive for extra income generation but only in-depth research will reveal whether there is any connection between the implementation of SAP, its effect and the phenomenon of in-house crowding.

Urban Poverty

Although it is very difficult to appraise the wages and monthly earnings of a household in Bissau, it is not difficult to confirm that the majority of the population is very poor. In fact, 70% of the families living in the city had necessary basic monthly expenditure above the minimum wage (EIU, 1992). Household surveys usually fail to reveal accurate information because respondents refuse to provide any income information. To do so is practically a social taboo. Wives are not even able to find out the exact income of their respective husbands.

Housing and living conditions indicate the level of poverty; however in Bissau this is not very reliable. Empirical evidence about the level of absolute poverty for a great part of the population exists, such as, the absence of the most elementary durable household consumer goods, the lack of the basic furniture for accommodating a household, and the lack of basic infrastructure found in most of the houses in the neighbourhoods. The inhabitants can hardly afford to pay for their basic nutrition needs since a 50 kg sack of rice usually costs more than the monthly minimum wage a household earns. In June 1995, a sack of rice was sold at the speculative price of PG 410,000 or the

equivalent of US$22 when the minimum wage was still rated at US$10. Perhaps this explains why a significant proportion of the population still maintains ties to the rural area, bringing rice and other basic products into the city. This food source can be considered as non-accountable income.

Certain data reveal that in 1984 almost 50 % of the inhabitants of Mindará were earning family incomes that of less than US$76. In Cupilom de Cima, 1986 surveys estimated that the average family income was US$67 (Mengers, 1986; Acioly, 1993).

A recent survey carried out in four of the neighbourhoods - including one neighbourhood in the city of Gabu - revealed that 60% of the population was employed, from which 25% was self-employed. In terms of income sources, 41% of the households had one income-earner, 23% had two income-earners and 23% had no fixed source of income. When inquired about the amount of income, the survey detected that 46% of the households did not provide any figure at all; 18% earned between US$9 and US$18; 14% between US$18.10 and US$36 and 12% above US$36 (Aquino, 1995). In the neighbourhoods Quelelé and Cuntum I, 25% and 30% of the households earned respectively between US$9 and US18. Missirá and Bandim II, 17% and 18% earned respectively between US$18.10 and US$36. In Bandim II, 17 % of the households earned less than US$9.

Urban poverty is not a Guinean phenomenon only: it is a serious problem in Africa. Although there only 11.2 % of the world's urban population live Africa, 41.6 % of its urban citizens live beneath the poverty line (ADB, 1991).

The major actors intervening in the city are the Municipality of Bissau and the Ministry of Public Works. However, until recently, most of the government policies and interventions neglected the structural problems of the neighbourhoods. In addition, most programmes and interventions have relied heavily on foreign assistance.

The Neighbourhood Upgrading Project of Bissau (PMBB), sponsored by the Dutch Government, is still the only intervention that is concerned with the problems of the popular neighbourhoods. A project that operates under the tutorship of the Municipality of Bissau, it concentrates on the improvement of living conditions and basic infrastructure in the centrally located neighbourhoods. The project has intervened in four neighbourhoods (Mindará, Belém, Cupilom de Cima and Reino Gambeafada, including a resettlement site) and had very positive impact in terms of circulation and accessibility, drainage and water supply. Settlement plans, land cadastre, community participation, community development and cost recovery have been emphasised in the actual implementation of the PMBB.

From 1989 onwards, two major World Bank-sponsored projects costing US$10.3 million were launched to rehabilitate social infrastructure in the cities; however, a significant part of these investments was spent in Bissau. The PASI-Social Infrastructure Relief Project and the PRI-Infrastructure Rehabilitation Project have sponsored the improvement of drainage, roads, schools, markets, hospitals as well as several studies and plans, including the Bissau master plan.

A sites and services project called Antula Bono was launched in 1991 as a continuation of PASI with the support of the UNDP, FENU and UNCHS. The project is now in its last phase. Around 2,700 people have been selected as candidates for the 700 plots to be delivered during late 95. Some of them have opened savings accounts in the banks where the deposits are continuously monitored by the project management team. The model houses are ready and the market building of the settlement is bound to be delivered to the municipality of Bissau in the end of August 95.

A recent programme sponsored with Japanese funds and coordinated by the World Bank promotes the development of water supply master plans for the cities of Bissau, Gabú and Bafatá. Expected to start in 1996, it must cover the improvement of water supply, waste and rain water drainage and solid waste collection. A project dealing with the water supply system in Bissau was supposed to be financed by the African Development Bank, but very litte development has taken place since 1989 due to financial problems between the Guinean Government and the Bank.

The fact that the city has an approved master plan does not mean that it has the means and instrument to fully implement it. Sustainable housing and urban policies are noticeably absent. Moreover, the absence of a responsive and enabling government is making the situation extremely critical. However, recent national elections have created a conducive environment for change by providing openings for the population to be involved in these changes. The planned elections for regional/provincial and local governments will hopefully set a good foundation for administrative and political reform at the local level, which is essential for sustainable urban development in Bissau.

Table 1.1: Profile of Four Centrally Located Popular Neighbourhoods of Bissau

	Mindara[1]	Belém[1]	Reino-Gambeafada[2]	Cupilom[1]
Area (ha)	31.00	42.27	26.2	14.50
Population (inhab)	8,600	> 10,569	7,000	> 5,808
Annual Population Growth	7.8 %	> 6.0 %	n.a.	5.5 %
Population Density	> 250 inhab/ha	> 204 inhab/ha	> 209 inhab/ha	< 400 inhab/ha
Number of Houses	445	617	447	264
Housing Density	14 houses/ha	>14 houses/ha	17 houses/ha	18 houses/ha
Occupants per House	10-15	14	15	16-22
Average Family Income (US$)	< US$ 120.00 (1984)	n. a.	< US$ 50.00	US$ 88.00 (1986)
Unemployment Rate	n. a.	n. a.	30 %	49.6 %
Major Ethnic Groups	Pepel, Mancanha (Animists)	Pepel, Mancanha (Animists)	Pepeis, Manjacos, Mancanha (Anim)	Mandinkas (47 % Muslims
Roofs with Metal Corrugated Sheets	73.22 % (1990)	n. a	71 %	72.4 % (1989)
Roofs with Thatched Fibres	16.39 % (1990)	n. a	16 %	13.6 % (1989)
Houses of Good Quality	26.19 % (1990)	37.11 % (1990)	n.a.	n. a.
Houses Partly Rented	30.6 % (1990)	30-45 % (1981)	42 % (1991)	28.5 % (1986)
Houses Rented Occupied	17.21 % (1990)	30.00 % (1981)	16.3 % (1991)	22.7 % (1986)
Individual Water Connection	7.65 % (1990)	19.12 % (1990)	9.6 % (1991)	12.6 % (1986)
Electricity Connection	30.5 % (1990)	55.43 % (1990)	39 % (1991)	49.6 % (1986)

n.a. = non available. / 1 Acioly, 1992; 1993. / 2 Acioly, 1991.

2. THE CROWDING PHENOMENON IN BISSAU, GUINEA-BISSAU

2.1 Crowding: A General Introduction

Increasingly, the phenomenon of crowding in human settlements is becoming an important subject of study. The magnitude of the problem represents a critical threat to labour productivity and human well being for millions living in the cities of Developing Countries. The Bissau research project, sponsored by the United Nations Centre for Human Settlements-UNCHS, brings new insights into the subject because it reveals hidden aspects of city neighbourhoods which were often ignored by public policies. Crowding urges for crucial and meaningful actions in distinct professional fields and levels of interventions.

In general, most studies in Bissau and elsewhere have emphasized the adverse effects of crowding on the people (Jain, 1987; Aaby, 1988; Abby et all, 1983;1984;1988; Turton and Chalmers, 1990; Pereira and Andrade, 1988). For a more comprehensive review of these studies, the UNCHS has published an annotated bibliography on the topic (UNCHS, 1991). However, many studies have not fostered an understanding about the causes of crowding despite the fact that it is a problem that harasses city governments throughout the developing world. Understanding these factors could lead to the formulation of effective and sustainable policies needed to cope with the phenomenon and to develop action plans required to alleviate the pressure on inhabitants and their residential spaces and services.

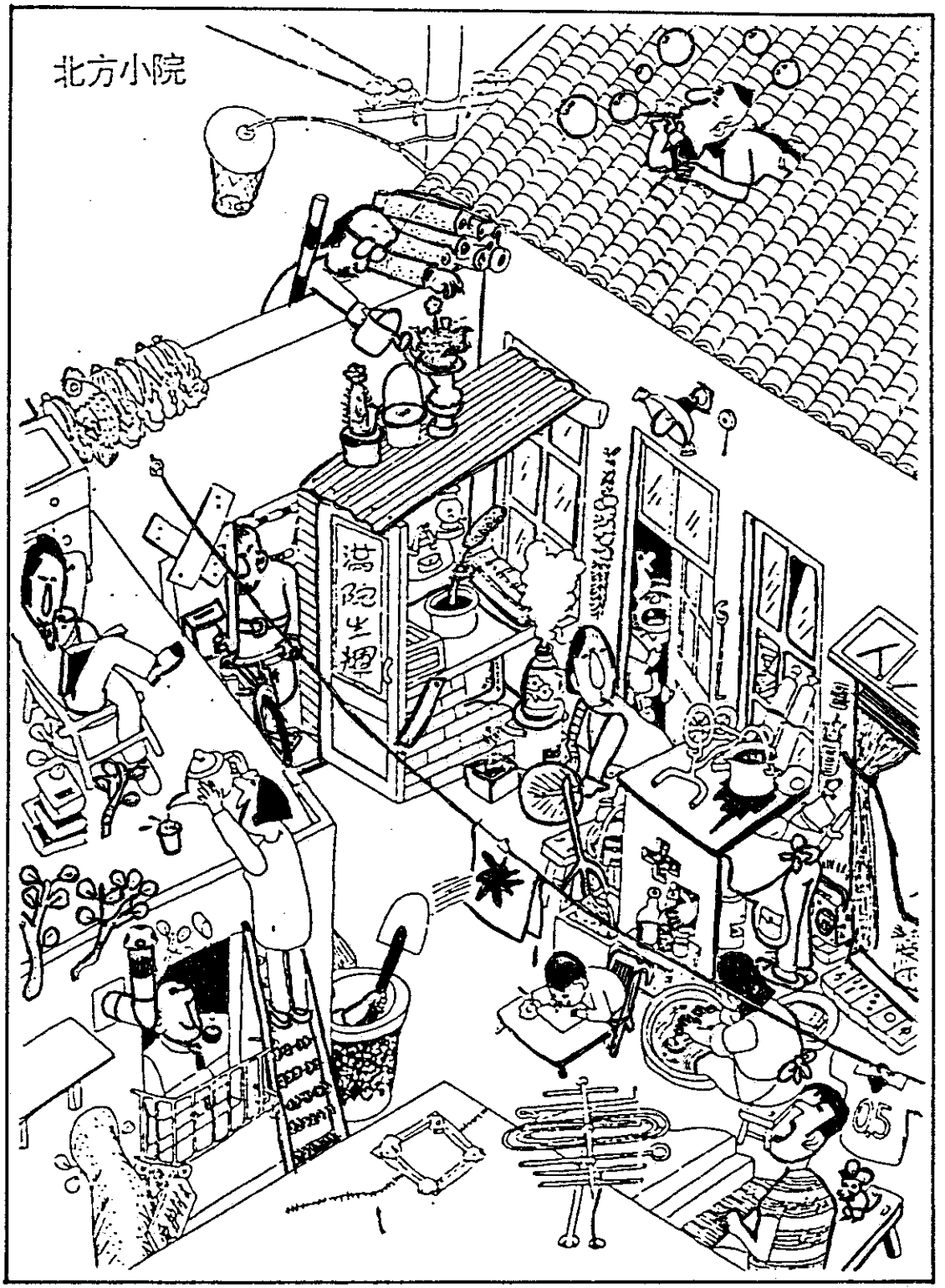
The epidemiological view of crowding that is expressed by sanitary engineers, doctors, social scientists and medical scholars seems to dominate. A more technical view from urban policy makers, environmental planners, urban planners, housing specialists and architects is yet to emerge, if specific guidelines for pragmatic and effective interventions at the citywide, neighbourhood and at the household level are to be provided.

Overcrowding is a problem affecting the lives of many millions of people. For instance, the city core of Beijing accommodates around 800,000 inhabitants, creating both high population densities and remarkably high numbers of inhabitants per dilapidated courtyard houses where service areas and housing facilities are shared (Jing, 1993), see Figure 2.1. The inner city of São Paulo is confronted with the same situation: several households occupy rented rooms in a total of 88,000 tenement buildings (cortiços) accommodating 820,000 families with an average of 10-12 families and 40 people per building, also sharing toilet and washing facilities (Moreira,1993). According to the 1981 census of Bombay, a city with more than 8 million inhabitants, 61 % of the households were living in one-roomed units, with a further 16 per cent in two rooms (UNCHS, 1993).

The explosive growth of Nigerian urban centres during the seventies not only caused a general process of environmental degradation but also exerted extra pressure on the housing stock and public services. A 1975 survey revealed that a large proportion of the dwellings in most Nigerian cities were overcrowded, were physically inadequate and lacking basic services and facilities. Around 1900, overcrowding and serious health conditions were already reported in Lagos (Aina, 1990). In 1975, the city had an average of 4.39 households per house and 2.51 persons per room, and a housing backlog that required an additional 1,000 dwelling units per year. Other cities like Port Harcourt had 7.64 households per house and 2.42 persons per room (Salau, 1990).

In Accra, 70% of the city's households lived in one room in 1980 (Jansen, 1993) while in Cairo, room occupancy can reach up to 13 persons per room and the total number of households living in one-room dwelling reaches nearly 15,000 or 10.8% of all Cairo's families (UNCHS, 1993).

Figure 2.1: Overcrowding in the Courthouse in the Inner City of Beijing



Source: Jing, Z. (1993).

Crowding and density are closely associated, even though they are conceptually different. Density is an important housing and settlement indicator for planning and design. It is generally expressed as either population per unit of land, dwelling per unit of land or number of buildings and their respective uses per unit of land.

Areal density becomes important for the technical and financial assessment of the distribution and consumption of land and provision of basic infrastructure in human settlements. Inhabitants per hectare and dwellings per hectare are usual indicators that express specific qualities and potentials for a site. The density level of an area reflects the level of use of existing infrastructure networks, whether or not these resources are being used to their optimum.

In principle, high residential densities areas assure the maximization of public investments in infrastructure, services, transportation, etc. and may guarantee high rates of return offering at the same time lower recurrent housing expenditures and fewer costs to the inhabitants. Some of these benefits in the economy of scale have influenced the densification and verticalization of human settlements and promoted the compact city model in direct contrast to low density, socially and spatially stratified city model advocated by the garden-city movements. The former is based on economic arguments while the latter on a sanitary and quality of life justifications.

High density alone is not necessarily degrading to the quality of life. There are other factors that combine high density to cause negative impacts for the quality of life in a settlement. Density indicators are strongly linked with socio-economic status, housing typology and land use. Experience shows that high density areas are often linked with low income while low density areas with high income. The inhabitants of high density areas will tend to live in smaller plots or dwellings, will have less resources and will tend to have lower educational background than those living in low density areas. These factors reinforce the direct linkage between density and housing typology, urban standards and social economic development, helping to explain why there are conflicting views and inconsistencies in the empirical research that attempt to assess the effects of high density on physical, social and psychological pathology (Kirmeyer, 1978).

Undoubtedly, the amount of space allocated for private and public domains will influence not only density indicators but will also define certain morphological characteristics and specific qualities of human settlements. Certain settlements have a major part of their areas allocated to public use, e.g. green areas, car traffic and pedestrian circulation providing a certain feeling of emptiness and confined social contacts. Others have most of their space allocated to private use, e.g. residential, mixed residential-commercial or solely commercial-industrial uses. The combination of densities and configuration will define certain patterns of social interaction, and will influence human settlement consolidation and the development of specific human activities and land use.

While density usually refers to citywide or neighbourhood levels because it is strongly dependent on housing typology and land use, overcrowding commonly refers to in-house crowding.

A crowded neighbourhood is defined as one that is continuously occupied by large numbers of people and whose structures, facilities and communal spaces are under exceptional pressure. As a consequence, the housing stock and the urban environment are under pressure as well.

A crowded house is one that has many occupants who live and share the common residential space for long and continuous periods of time. Overcrowding expresses an extreme form of occupation, one that reveals a state of saturation of an existing residential space. It indicates that the stace of a particular plot, building or dwelling has exceeded the number of occupants and users for which it was originally planned and designed. It implies that various spaces and residential facilities are under

high pressure, straining facilities like toilet and sanitation services, water supplies, kitchens or spaces for food preparation, living spaces, leisure space, sleeping areas and even beds.

Increasing the number of persons living under the same roof in a house means decreasing the area of living space per inhabitant. The UNCHS/World Bank-sponsored Housing Indicator Program, which defines the floor area per person as the median usable living space per person in square meters, serves as an indicator to assess the adequacy of living space in dwellings. A low value for this indicator is thus a sign of overcrowding (Angel et al, 1993). An extensive 52 country survey reported a mean floor area per person of about 18 m^2 with a range from 4 to 69 m^2. In terms of regional distribution, Sub-Saharan Africa and South Asia have the lowest median floor area per person, respectively 7.55 and 7.10 m^2 in comparison to 31.93 for the industrialized countries.

Floor area per inhabitant reportedly increases with economic development although this figure varies considerably among countries with similar incomes. This statistics seems to be influenced by idiosyncratic external factors like land prices, construction costs and housing policies. One might conclude from this that overcrowding is an important indicator to measure the performance of the housing sector and that overcrowding has a direct linkage with poverty.

In-house crowding can be measured by the conjunction of indicators such as the total square meters of residential space available per inhabitant of the dwelling, the number of individuals per household, the number of individuals per room, the number of inhabitants per house and the number of households per house. In some cases of extreme crowding, the number of persons per bed also becomes relevant.

People living in a crowded household environment are continuously exposed to situations that severely affect their physical, social and mental well-being. Previous studies have attempted to assess the effects of high density and in-house crowding in different communities by examining issues such as morbidity, mortality, crime, fertility, mental illness or emotional disturbance (Kirmeyer, 1978). These studies showed that social and economic variables do influence the outcome. In-house crowding, the quality of housing, socioeconomic status and ethnicity produce a complex pattern of partial correlations.

Overcrowding and its adverse health effects are closely linked with urban poverty. Disease transmission is exacerbated by the fact that poor people are often exposed to malnutrition while living in the substandard housing in deprived areas of cities. The lack of proper ventilation, natural lighting and hygiene as well as the presence of dampness, smoke and animal waste in the living spaces, flies, insects, rodents and other disease vectors that are related to inadequate sanitation facilities, building quality, health care, illiteracy, and water supply are some of the external factors that increase disease susceptibility and jeopardize health. Crowding is but one of the several environmental factors that can influence health.

One of the main disadvantages of in-house crowding is that it increases prolonged contact between individuals. Thereby increasing the risks and intensity of infections. It also increases the risks of death. Occurrences of whooping cough, diarrhoea, meningitis, respiratory infections, intestinal diseases, polio and influenza are strongly linked to crowding; they have negatively affected child growth and adult well-being (Bradley et al, 1992). All illness have direct impact on labour productivity, health and the psychological condition of the population.

Social and mental disorders may also be caused by a continuous occupation in overcrowded household environments; however, these impacts are more difficult to measure than epidemiological effects. In-house crowding may be one of the main causes of stress and promiscuity since it

drastically affects individual privacy. Human beings require a minimum amount of individual privacy in a supportive physical environment in order to perform and to remain mentally healthy. In Rocinha, the largest squatter settlement in Rio de Janeiro, minor psychiatric disorders amongst mothers of children under five years of age reached 36% (Reichenheim & Harpman, 1991; in Mara & Alabaster, 1995); other studies reveal that youth delinquency, tensions, nervousness and distress are related to overcrowding (Kirmeyer, 1978; Pain, 1987; Mara & Alabaster, 1995; William & Chalmers, 1990).

The longitudinal study in Bissau pays attention to the relationship between crowding and the epidemiological history of particularly vulnerable groups, mainly pregnant women and children under 3 years of age, in three neighbourhoods in Bissau.
A prospective epidemiological study of the determinants of morbidity and mortality among these two groups, the household survey was carried out during the period from May 1993 to April 1994, with a response rate of 97% to questionnaires that included 6,869 households and 2,092 houses. The survey population was estimated from 37,000 inhabitants or 18 % of the total population of the city. Though, the census carried out by the project covered 7,743 households and registered 40,284 persons distributed throughout Belém, Bandim I and Bandim II (UNCHS & COWIconsult, 1995; 1995a), see Table 2.1.

The selected sample area has been systematically studied over the past 17 years during which repeated censuses were undertaken by a DANIDA-sponsored public health project. Since 1978, a series of epidemiological studies of measles, diarrhoea and HIV-II were carried out in Bandim I and from 1984 onwards in Bandim II and Belém. These health studies were the main reason to investigate crowding in Bissau.

This survey revealed a number of crowding indicators, the most important of which are summarized in Table 2.2. The number of people that lived in the household during the period of study was measured and were checked by the rates of morbidity, monthly and sometimes weekly visits.

The starting points of the survey were that in-house crowding increases the risk and severity of poor health by way of transmission of communicable diseases. It increases the risks of morbidity and mortality among children under 3 years of age and pregnant women. Child morbidity was mainly checked on diarrhoea, vomiting, fever, cough, skin and eye infection. The morbidity of women on fertile age was mainly checked on well being, diarrhoea, fever, blood in faeces, vomiting, fever, cough, TB, lepra, skin and eye infection and vaginal bleeding (UNCHS & COWIconsult, 1995; 1995a).
The findings of the survey show that the crowding indicators in Bissau represent additional and specific risk factors to the inhabitants of the popular neighbourhoods since a significant proportion of the sample population lives with more than 10 persons per household, has more than 2 children under five years of age per household and sleeps with more than 3 persons per bed with at least 2 children under five years of age per bed.

The most important health outcomes were measured through birth weight, peri-neonatal mortality, diarrhoea morbidity and post-neonatal mortality as indications of the vulnerability of women and small children. These were cross-analyzed with the crowding indicators in order to appraise the close linkage between them.

It was found that crowding, expressed in the form of individuals per bed and individuals per household, has a negative impact on the health conditions of the population.

Table 2.1

BASIC DATA ABOUT THE SAMPLE AREA (BELÉM, BANDIM I, BANDIM II)

Area	185 ha
Population	37,000 inhabitants
Houses	2,097 houses
Households	6,869 households
Households with children under 5 years	4,420 households
Houses with children under 3 years	1,812 houses
Number of beds	17,535 beds
Questionnaire coverage	6,869 households
Questionnaire response rate	97%
Houses covered by the survey	2,092 houses
Census coverage	7,743 households
Period of the Survey	May/93 to April/94

Source: Project "Crowding and Health in Low Income Settlements", UNCHS, 1995.

TABLE 2.2

SOME CROWDING INDICATORS IN BISSAU
(based on the sample of Belém, Bandim I, Bandim II)

Population density	197 inhab/ha
Housing density	11.3 houses/ha
Household density	37 households/ha
Average number of beds per household	2.5 beds
Mean household size	4 persons/hh
Average household size	5.3 persons/hh
Mean household per house	3.7 hh/house
Mean persons per house	17.2 persons/house
Average number of persons per room (for Bissau)	3.2 persons/room
Mean persons per house in Belém	18.9 persons/house
Mean persons per house in Bandim I	17.5 persons/house
Mean persons per house in Bandim II	16.2 persons/house
1 or 2 rooms per household	79 %
1 to 5 persons per room	80 %
Less than 6 m^2 per person	54 %
Less than 4.5 m^2 per person	50 %
3 to 5 households per house	50 %
11 to 20 persons per house	41 %
6 to 10 persons per household	45 %
10 or more persons per house	9 %
1 to 2 children under 5 years per household	80 %
3 to 4 persons per room	45 %
5 to 6 persons per room	22 %
3 to 4 persons per bed	67 %
1 person per bed	2.8 %

Source: Project "Crowding and Health in Low Income Settlements", United Nations Centre for Human Settlements, 1995.

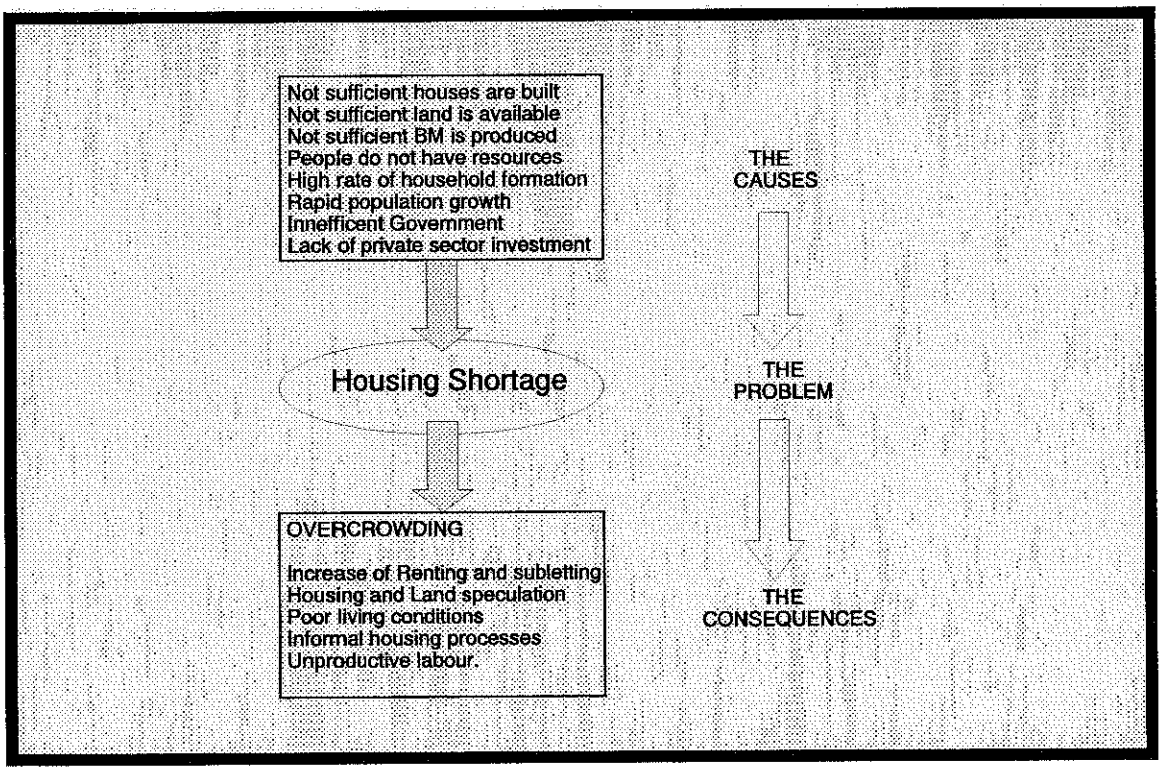
2.2 The Causes of Crowding in Bissau

It would be too simplistic to state that Bissau's in-house crowding is rooted solely in either the size of a typical extended families or the large number of children per household. To do so might lead to the premature conclusion that the lack of family planning is the major cause of crowding in the city.

Indeed, crowding is just one of the direct consequences of a severe and continuing housing shortage. It is an indicator that something is wrong in the housing delivery system, which, in Bissau, is partly explained by the inertia of the Guinean government. One of the essential prerequisites for a functioning housing sector is the existence of an active and enabling public sector: the absence or poor performance of the public sector leads to a series of problems such as overcrowding, informal housing markets, informal urbanization, poor housing and urban environmental conditions, high rent-income, high house price-income ratios, and low urban productivity.

In order to formulate meaningful human settlement interventions that successfully address the problem of in-house crowding in Bissau, it is necessary to understand how crowding arises in the city and then to place it within an analytical framework of causes and effects. Any intervention that hopes to have positive impacts on the phenomenon of in-house crowding must first tackle its basic causes (see Figure 2.1)

Figure 2.1: The Causes of Crowding in Bissau



In general, the existing housing stock will continue to be under pressure because there is insufficient residential space to accommodate the demand derived from population growth and new household

formation. The pressure will escalate until the institutional and regulatory environments are better developed and the public and private sectors begin to react. This could at least bring a certain equilibrium in the housing supply side. That is not the case in Bissau. Consequently, there will be more subdivision of the existing buildings, rental accommodation and land speculation will increase and rent and house prices will go up with overcrowding of the existing housing units as predictable response.

In Bissau, the government has not been able to undertake a comprehensive housing program that could adequately respond to the ever-increasing demand for housing from different socio-economic sectors of the population, particularly the urban poor. Any growth in the housing stock was often the result of informal and self-help, low quality housing schemes. State sponsored housing production was meagre during the years of central planning and there was hardly any provision of formal private housing.

On one hand, only after liberalization and SAP, in 1986, has private provision increased despite being limited to the rental sector and higher income housing needs of expatriate professionals, consultants and foreign organizations that settled in the country after independence. On the other hand, there has been no significant change in state provision of housing until recently.

The problem becomes more acute daily because of continuing building decay and insufficient building renewal, an activity that improved slightly after relief programmes were implemented to alleviate the social impacts of SAP. The absence of a housing finance and credit institution and the dependence on imported building materials such as cement, pipes, electrical wiring, steel, etc. make the situation even more critical, and they contribute to pattern of subletting and crowding in the centrally located neighbourhoods of Bissau.

Thus there have been marginal and opportunistic improvements only; hardly any substantial renewal of the existing housing stock has taken place, with little qualitative and no quantitative impact on the living conditions in the neighbourhoods of Bissau. These locations are continuously subjected to the phenomenon of crowding. The result is that there is an enormous backlog in housing stock expansion.

Previous studies have confirmed that the gap between annual housing production and population growth has been expanding. Annual housing production should have been between 600 and 700 units in response to the annual population growth of the city, which is currently estimated at 5% (Acioly, 1992;1993, Napoco et al, 1995). In the early 1990s, the housing shortage was estimated at 7,000 units (Acioly , 1992;1993), but recent estimates by the United Nations stated a housing need of about 15,000 units (Bijsterveldt et al, 1994).

The consequences of this accumulated "housing shortage" are several, among which are a progressive deterioration of the living conditions throughout the city; the increase of illegal construction that is concentrated in the peripheral zones of the city; a growing speculative rental market; and an increase in subletting and overcrowding in the centrally located neighbourhoods.

In the colonial core of the city, a great part of the residential plots are undergoing subdivision with alternatives for housing offered by house extensions or individual structures built in the backyards and open spaces of the plots. Many of these units have tenant-occupied independent accesses. In these cases, crowding is expressed as in-plot crowding, thereby overloading the existing infrastructure and public utilities.

In the centrally located popular neighbourhoods, horizontal building extensions that are attached to the house or under the roof overhang of the verandas are the most common solutions. These extensions are usually poorly constructed and do not fulfil any standards for minimum room size, ventilation, interior light, stability of walls, etc. As a consequence, the living space is gradually deteriorating in tanden with rapidly increasing population and building densities.

Housing and land policies do not exist, and the government has no instruments to intervene effectively in the problem. Because of absent policy and intervention options, this situation is bound to continue into the future because appropriate responses from the government are unlikely until radical institutional reforms and local government empowerment occur.

In this respect, the urbanization process of Bissau and the problem of in-house crowding, in particular, are related not only to the absence of the most basic prerequisites for a properly functioning housing sector but to the attitude, tolerance or absenteeism of the public sector in the municipality of Bissau. Because it is the most important organization in planning and managing the city, the low performance of the municipal civil services should also be considered as one of the causes of crowding in Bissau.

To cope with and to respond effectively to the problems of the city, the Municipality of Bissau depends upon the good will of its personnel and the eventual financial support and technical assistance provided by foreign organizations. Lacking policy and managerial instruments, the municipality is ill equipped in terms of material and human resources to manage a growing city of 200,000 inhabitants.

Furthermore, Bissau has a severe budget deficit because of an alarming downfall in revenue collection. An analysis of the 1989-1991 municipal budgets, reveals that the most important sources of revenue are undergoing a steep decline. Fines and penalties, building permits, land occupation taxes, licences for advertisement in public spaces and solid waste collection tax continuously declined during this period. Even the amount transferred from the central government's national reconstruction tax was decreasing significantly. The only revenues that increased during this period were those related to the rent and taxes from market buildings, the surplus from the slaughterhouse and the tax payment from the street vendors.

The municipality has neither the instruments to collect revenues more efficiently nor the legal mechanisms to penalize and coerce defaulters. In the course of a visit to the mayor in 1995, he confirmed that there is hardly any change in the total scenario of revenue collection and policy making despite some improvements in the internal management.

Considering the decline in revenue collection and the fact that overhead costs already consume more than 60% of the municipal budget, it becomes obvious that the municipality has very little capacity to invest in the city and to develop and implement important social projects. These investments are important for the maintenance of public spaces; for improving the capacity and quality of its services; for making its personnel more competitive and efficient; and for relieving the pressure on the existing housing stock and residential spaces. In economic terms, the city is simply not able to pay for its own costs.

The responsibility of the municipality in performing its most basic functions is compromised by its inability to formulate urban policies, to generate development programmes and to implement projects that could respond to the needs of the population, in part by alleviating the despairing conditions found in the popular neighbourhoods.

The overall capacity of the poorly paid civil service is low. The situation is exacerbated by antiquated public administrative procedures and urban development legislation inherited from the colonial period.

To this institutional and regulatory vacuum, the absence of a land-supply policy and the inadequacy of the provision, management and maintenance of basic infrastructure services, mainly electricity and water, can be added. After independence, a public agency (CEABI) was created to assume these tasks from the municipality, but until recently it had been disorganized. Privatization has been responsible for internal restructuring and improved consumers' cadastre and tariff levying and collection. However, improvements are still needed because many neighbourhoods are still not connected to the networks and the supply is still unreliable.

Any hoped-for changes in the urban development pattern of Bissau has to start first with a structural reform of the municipal administrative apparatus and the public utility services. Only then, can substantial corrections to in-house crowding be expected. Changes that enable the public sector to perform better in relation to housing and land delivery must take place.

Such reforms must include the establishment of an institutional framework where roles and responsibilities of local and central agencies are redefined, especially where the rigid centralization that occurred after independence is concerned. Despite some recent changes towards decentralization, the existing situation still hinders the process of rational housing production and sustainable human settlement development. By forcing people, particularly the urban poor, to search for alternatives out the official or legal processes.

Although the municipality is not politically and financially autonomous, it retains a certain degree of freedom to operate with a de facto autonomy. Nevertheless, it lacks the necessary human resources and professional cadre to allow it to assume the duties assigned to the Ministry of Public Works i.e. urban policy making and implementation, urban planning, urban programming and housing construction. Hence, both organizations tend to compete with one another. As a result, the agency final responsibility for formulating and implementing the city's master plan is unclear, a situation that leads to increasing unwillingness to cooperate and to public inertia.

In addition to an outdated institutional framework, the city's regulatory instruments are inappropriate. Some building and urban development standards that were inherited from the colonial period are leading to unsustainable urban settlement development patterns that produce urban sprawl (e.g., minimum plot of 500 m^2). Under these terms, the costs of urbanization are becoming unaffordable to both the government and the population. Moreover, the discrimination against local technologies and materials make housing construction even more difficult for lower income groups to afford (e.g., building prescription stating that adobe is a provisional building material).

2.3 The Effects of Crowding in Bissau

As described elsewhere in this report, the inhabitants of Bissau's popular neighbourhoods belong to a large group of unfortunate Guineans who are subject to extremely unfavourable living conditions. They are the ones who are experiencing crowding in its most extreme form and who suffer most from its adverse health effects. How can the effects of crowding be expressed? Do all citizens experience crowding in the same way? Are the adverse health impacts the same for every category of resident? How are these impacts best conveyed to greater awareness of the problem and provoke the formulation of policies and public interventions to improve their lives?

There are difficulties in measuring and appraising the effects of crowding. It was not only important, therefore to define the target groups for the study, but it was also imperative to define specific indicators and to collect specific data that might establish meaningful correlations between health variables, and crowding. External factors needed accurate definition in order to determine their contribution to negative health outcomes from in-house overcrowding and long-term exposure to crowding. A summary of these variables uncovered in the course of the survey is presented in Table 2.3.

One important variable considered by the project was **Low Weight** (children weighting 2.5 Kg or less). Low weight is an important determinant of the child's survival chances since it affects the vulnerability and susceptibility to catch severe infections and diseases and the capacity to overcome disease. It is a relevant variable for awareness and predicting a child's development and mortality.

Nearly 15.5% of 677 children showed weights below 2.5 kg. Among the external factors, the major predictors were season (particularly during the coldest and initial phase of the dry season, Nov-Jan), birth order, twin birth and domestic animals in the household, especially pigs. Although ethnicity showed little variation, the highest figures were registered for the animist groups. The relationship of low birth weight in combination with the absence of sanitation facility accounted for 23 % of the cases.

The other variable was **Morbidity**. Previous studies in the sample area had revealed that overcrowding and prolonged exposure were important determinants of measles mortality (Abby et al,1983;1984;1988; Abby, 1988). Since acute and persistent diarrhoea is strongly associated with a large proportion of childhood death in Bissau, this disease was included as a morbidity measure. Fever, vomiting, coughing and skin diseases were also included. Unfortunately, the project team only explored the cases on diarrhoea during data analysis.

Acute diarrhoea was related to the incidence of rotavirus (higher incident during the cold months) and cryptosporidium (pigs). The survey detected that children under 3 years of age experienced 3.8 episodes of diarrhoea per year. 5,530 children under 5 years of age who were surveyed in the project, 429 were excluded because of lack of information, 59 or 27% of the 203 children who died during the study period did so because of diarrhoea.

The analysis of the survey data showed that there is a significant relationship between certain external factors and diarrhoea incidence. External factors like seasonal weather, breastfeeding, mother's education, ethnic group, household birds and pigs, open well for water supply and house kitchen were strongly related to the incidence of diarrhoea.

The third variable defined by the project was childhood **Mortality**, both peri-neonatal and post-neonatal mortality. Out of 4,932 cases analyzed during the period of the survey, 241 children ranging in age from 1 to 35 months of age died.

The most relevant external factors associated with peri-neonatal mortality were twinning, mother's age, birth order and mother's education. For post-neonatal mortality, child gender, education and marital status of the mother, household birds and pigs, house kitchen inside, toilet and water tap, and household durable goods.

The most significant external factors influencing post-neonatal mortality were annual seasons, more specifically the short period between the end of the dry season and the beginning of wet season, education level of the mother, household pigs, and the ethnicity, with the animists and, particulary, pepel ethnic group scoring the highest.

The survey revealed the external factors that significantly worsened the health impact of in-house crowding in the neighbourhoods of Bissau. Several biological factors of the child, such as gender and twinning, affected morbidity and mortality patterns in relationship to crowding. The biological, social and cultural background of the mother such as age, schooling and ethnicity, also contribute to a negative health-crowding correlation, if these factors are assumed to reflect the predominance of traditional practices and inappropriate hygienic procedures within the household and the mothers' lack of knowledge about basic health. A traditional way of living still predominates in most of the capital's popular neighbourhoods, worsening the conditions created by in-house crowding.

The family's overall socio-economic situation is highly correlated with crowding and poor health outcome as well. Urban poverty was measured auditing the durable consumer goods belonging to the household and assessing housing quality, the latter mainly measured by the existence of a kitchen and toilet inside the house, the type of floor surface and the access to electricity.

Household hygiene represents another important factor that helps to increase negative impacts from crowding. The presence of animals like pigs and birds in the household, the presence of smoking and the lack of sanitation facilities indicate unhygienic practices.

In the analysis of post-neonatal mortality, two significant crowding indicators emerged: individuals per bed and individuals per household. There is a strong and consistent relationship between crowding (persons per bed and number of children under five years of age per household) and post-neonatal mortality. Crowding in bed and crowding of small children were directly linked to 30-40 % of mortality. Sharing a bed implies that a healthy child is exposed to disease in its most acute phase, increasing the severity of disease contraction.

The three surveyed neighbourhoods were assumed to be alike; consequently neighbourhood comparisons were not made during data analysis. Nevertheless, few indicators were analyzed independently. The difference between neighbourhoods in the peri-neonatal period was negligible but differences in post-neonatal mortality among the three neighbourhoods were discovered. Children in Belém tend to survive more adverse conditions and external factors. Belém has roughly half the mortality of the other two neighbourhoods, and, when all background factors are taken into account, Bandim I has more than 1.6 and Bandim II almost 1.4 times Belém's mortality rate although the latter had more inhabitants per house than the other two neighbourhoods (UNCHS & COWIconsult, 1995;1995a). Belém also had the lowest incidence (14% or 35/243) of low weight birth among the three.

Very specific crowding indicators that represent increased health risks to the Bissau population were uncovered by the data. Because significant part of the households were composed of more than 10 persons including more than two children under five years of age, most sleeping beds are shared by more than 3 persons with two children under five years of age per bed.

In terms of urban environment and house quality, there is a major difference between Belém and the other two neighbourhoods that did not appear in the data. Belém is a more consolidated neighbourhood with a relatively well defined urban layout, the results of an urban plan designed by the Ministry of Public Works in the beginning of the eighties. Many plots are legalized and there are many buildings constructed from concrete blocks and ceramic bricks. A more stable population of long-term residents, Belém has a consolidated health centre, along with significantly improved water supply, roads, drainage and public participation awareness all the results of a Dutch funded Neighbourhood Upgrading Project-PMBB.

Unlike Belém, Bandim I and II are neighbourhoods that resulted from a spontaneous process of land occupation and informal housing. They contain few legalized plots, with most houses built from adobe blocks without any official authorization from the Municipality. Furthermore, accessibility to the inner part of the settlements is extremely difficult. Because Bandim I and II have been neglected by the government they lack most of the essential infrastructure and community services. They maintain a rural appearance in terms of living conditions and habits. Some access improvements have taken place in the past two years when two important roads that cross the sites and a third road connecting Bandim I to the colonial core have received asphalt pavement. A health centre has been built recently by the Danida sponsored health project which represents the first community service implemented by the government in the area.

The three neighbourhoods have important locational advantages. They lie nearby the colonial core and are easily accessible to important services and facilities such as markets, shops, governmental buildings. These aspects make them very attractive for people to live and might explain the tendency towards overcrowding, subletting of rooms and rented occupation.

The differences in outcomes between the neighbourhoods urge for a further analysis and double check of the correlations which may explain how negative health outcomes related to crowding can be affected by external factors and public intervention.

Table 2.3: EFFECTS OF IN-HOUSE CROWDING IN THE HEALTH CONDITIONS OF POPULATION IN BANDIM I, BANDIM II AND BELÉM - BISSAU

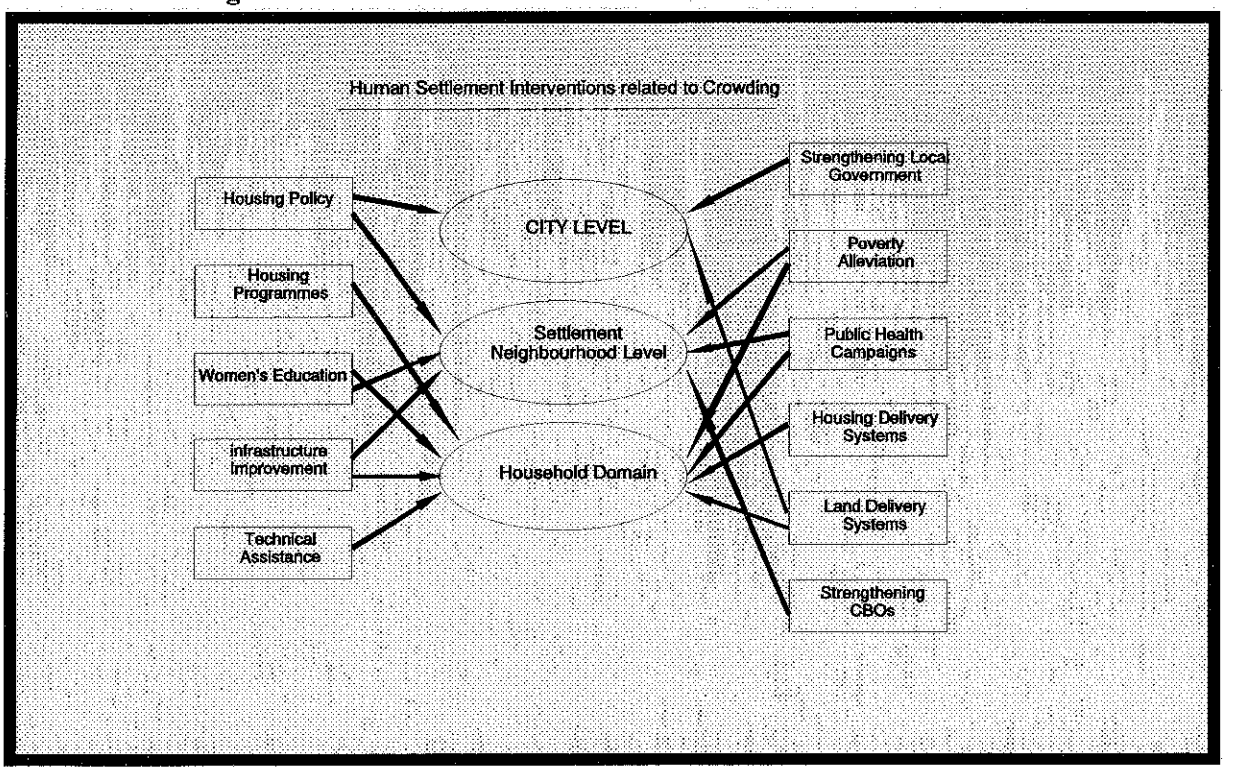
HEALTH RELATED VARIABLES	MAJOR EXTERNAL FACTORS (affecting variable)	SIGNIFICANT CROWDING INDICATORS LINKED TO HEALTH RELATED VARIABLES
LOW WEIGHT (< 2.5 kg)	Season (Nov-Jan / 19.4%) Birth order (1^{rst} / 23 %) Twin birth (59 %) Domestic animals (21 %) Only pigs (19 %) No sanitation facilities (23 %)	2 to 6 persons per bed = 31 % of low weight cases More than 4 persons/room = highest record or 16 %(32/196) Low weight increasing from 14 % (4-18 persons/house) to 16% (27-67 persons/house) or 30 % in total Highest record or 18 % for cases with 6-20 children under five years of age per house
MORBIDITY (Diarrhoea)	Rotavirus (cold season) Cryptosporidium (pigs) Breastfeeding Mother's education Ethnic background Birds and Pigs Open well as source of water Kitchen inside the house	Less persons/household = Lower diarrhoea rates Less children under five/household = Higher diarrhoea rates Less persons per house = Lower diarrhoea rates Less households per house = Lower diarrhoea rates
MORTALITY (peri-neonatal)	Twinning Mother's age Birth order Mother's education	No significant relationship
MORTALITY (post-neonatal)	Sex Mother's education Mother's marital status Ethnic background Presence of birds and pigs Kitchen inside the house Toilet inside the house Possession of durable consumer goods	Individuals per bed Individuals per household Children under five years of age per household

3. HUMAN SETTLEMENT INTERVENTIONS

3.1 General Introduction

Overcrowding affects the lives of a great number of urban citizens, particularly the urban poor in developing countries. It has multiple negative effects on human development. A core problem with differing dimensions, urgent action and intervention are needed to cope with overcrowding, see Figure 3.1.

Figure 3.1: Different Levels of Human Settlement Interventions



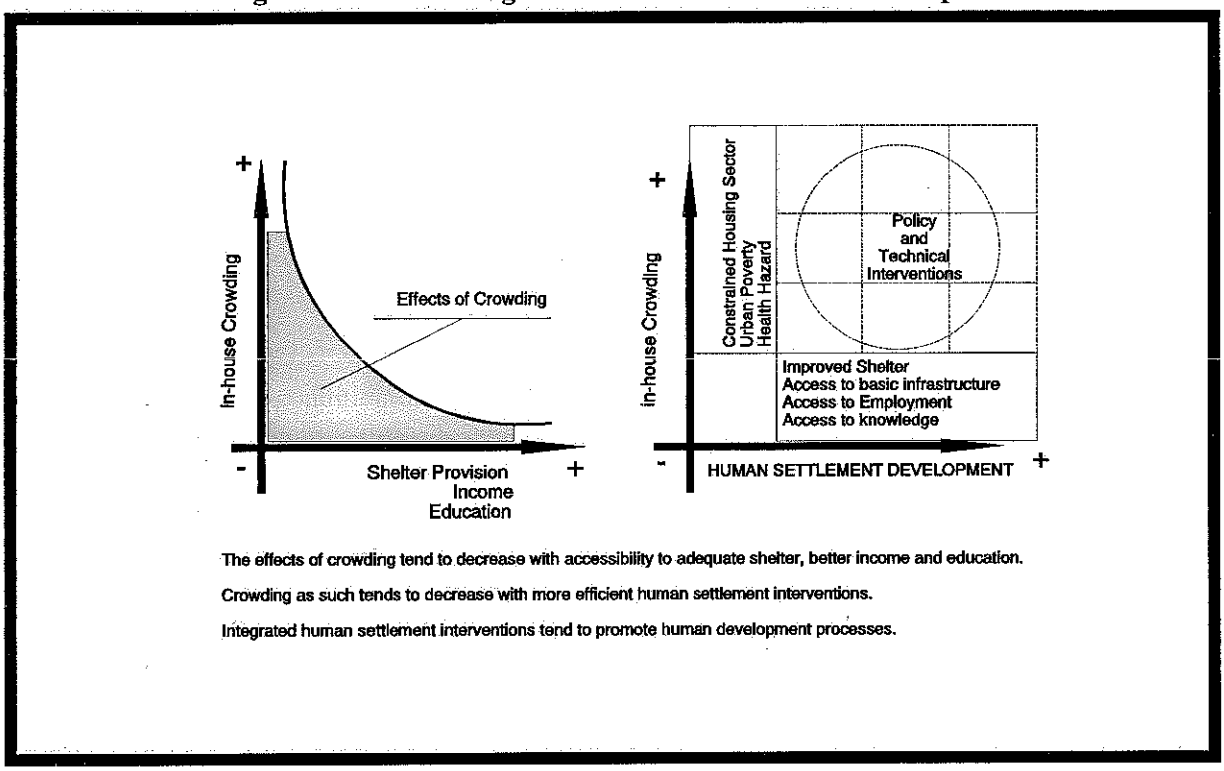
When designing particular interventions, the resulting policies, programmes and projects must address the causes of problem itself rather than the consequences of crowding. Although it is important to alleviate the adverse impacts of crowding on the health conditions of the population, it is even more essential to eradicate its major. To this end, human settlement interventions must address the causes of crowding by creating the conditions and an environment that are conducive to sustainable solutions. Because crowding has so many strong linkages with structural problems such as poverty, governmental policy and the legal and regulatory settings, it is impossible to wipe out crowding and its consequences from the urban environment within a generation.

Programmes to alleviate crowding must be implemented along with poverty alleviation programmes and macro-economic reforms, if any improvements in the living conditions of the affected population are to be realized. In principle such programmes should aim at the gradual decrease of persons per square meters *vis-a-vis* the gradual increase in floor area per person. To translate that into policy and programme objectives, the actions, on the one hand, must target family planning, cultural habits,

public welfare, health condition and the living environment while housing production processes and residential space availability must be addressed on the other hand.

If policy and technical interventions can foster housing production and delivery of adequate shelter and basic infrastructure, it is likely that crowding will tend to decrease. This might reduce its negative effects on the health of the population, see Figure 3.2.

Figure 3.2: Crowding versus Increase of Residential Space



Human settlement interventions in relationship to crowding are multi-faceted in the sense that they include organizational, policy and implementation matters. Besides intervention scale and level, whether at the national level, city-wide, neighbourhood or household level, these interactions must integrate the views of practitioners from the medical, epidemiological, social sciences and health sectors with those from the technical, policy, building, housing, engineering and urban planning fields. While one group will focus on the remedies and relief from the negative effects of crowding, the other will concentrate on the design of actions aimed at eradicating of the problem and its causes.

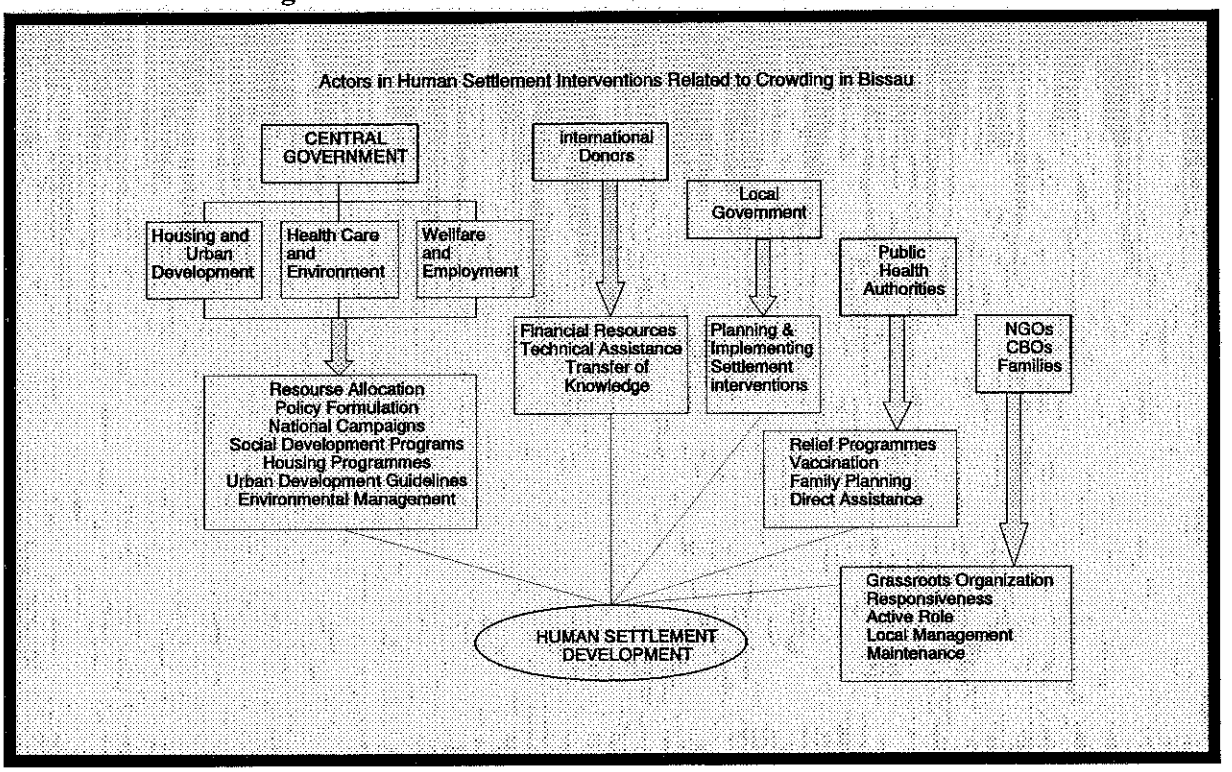
Consensus must be forged among all the actors involved in human settlement interventions so that issues are approached in an integrated manner. Their roles, responsibilities and interactions must be clarified. By doing so, the eventual conflicts that will emerge during the process may be avoided or reduced.

Identifying the main actors and organizations involved directly or indirectly with human settlement interventions must be done at the outset. The central government, as represented by the ministries

of Housing & Urban Development and Public Health & Welfare and their departmental units, will be mainly responsible for resource allocation, policy guidelines and intergovernmental coordination and external assistance when any or all of the foregoing exist. The ministries' roles are important in integrating disparate policy formulation and implementation in the areas of public health and housing & urban development. Consequentl, public health campaigns, vaccination, maternal education, community and social development and urban poverty alleviation programmes would probably be combined and integrated with neighbourhood development planning, upgrading infrastructure and housing policy at the central level.

International donor organizations have a very important role to play in the development and implementation of settlement interventions that are related to crowding in the poorest developing countries. Besides the traditional financial and technical assistance, they can serve as a channel for the transfer of knowledge and experience about planning and management of human settlement development projects that have had positive results on crowding and its effects in other developing countries.

Figure 3.3: Actors in Human Settlement Interventions



At the same time, the local government authority, as represented by its planning, urban standards and public health departments, is an important player with opportunities for sustainable human settlement interventions. Because local government is responsible for managing and implementing policies at the city level, it must play a catalytic role by adapting national policies to local conditions and, in many cases, coupling them with its own policies and programmes. It must forge partnerships and enable other actors to perform their various roles. This last condition implies a need to develop a participatory process. Without an active and enabling local government it will be impossible to undertake major integrated settlement interventions. Strengthening local governments is thus a prerequisite to developing local solutions and accountability. Numerous issues that have a direct and

indirect impact on crowding-land registration, land supply, housing construction, building codes and building permits- are explicitly local government's responsibilities.

The public health authorities are also key actors in crowding interventions. Specific relief actions, such as vaccination, control of epidemics, family planning, maternal education and public health awareness must be incorporated to the planning process. For example, the databank assembled for vaccination programmes may represent an important first step in establishing a neighbourhood based information system that can be incorporated into a local multipurpose cadastre. This database can provide essential information for urban planners, policy makers, health planners, sanitary engineers and community based organizations to monitor neighbourhood based activities.

Nongovernmental organizations that are active in the urban sector may also play a relevant role as intermediary channels between the government, populace and their local organizations. As independent actors, they enjoy operational freedom, often able to gain the trust from the population. They frequently assist neighbourhood based organizations, working in specific activities and programmes and mobilizing external technical and financial assistance. Although NGOs have become the panacea, some countries do not have a tradition of working with them. Whenever and wherever they do exist, they should be considered as potential players in human settlement interventions, especially in fields, where they have more flexibility and adaptability than public sector agencies such as social development, community organization, income generation, vocational training and poverty alleviation projects.

Community-based organizations are the real representatives of the population, when and where they are well-organized and responsive to emerging human problems. They must become part of any established partnership that is forged to intervene in the neighbourhoods and they must take part in the decision making process. If community organizations do not already exist, they must be promoted and facilitated. The most suitable to translate people's needs and priorities into policy, they can even reverse government's initiatives when necessary. Their role is fundamental in dealing with the causes and effects of crowding. By incorporating them in the planning process, communication between planners and residents is significantly improved. Consequently, resources may be maximized, residential spaces might be better planned and accepted. Furthermore, the continuity of policies and programmes can be maintained, enabling local solutions to be found. Empowering grassroots organizations means creating the basic conditions for sustainable human settlement development which has by itself a positive impact on crowding.

The family is most affected by crowding, underscoring the importance of active participation of affected residents in seeking successful settlement interventions. Special attention must be given to vulnerable groups within the household such as women, children and the elderly. Because households are the subject and object of settlement interventions, reversing the trends of crowding and its effects will clearly depend on the willingness of households to become involved. Their participation touches upon the issues of power, calling into question the nature of the planning process which traditionally treats them only as recipients, not initiators. Their perceptions about problems and solutions will depend upon the support of CBOs and neighbourhood leadership.

Sustainable interventions in crowding will partially depend on external conditions. Besides coherent institutional framework where the roles and responsibilities of the actors are well defined, the availability of important inputs in the housing delivery process --for instance finance, land, building materials and infrastructure-- will determine whether the floor area per inhabitant in a city will increase or not. These inputs are required by the people to build, expand or acquire a house in the city where they live. Access to them will certainly decrease the level of in-house crowding by

providing suitable options for the urban poor to improve the living and environmental conditions in their neighbourhoods.

3.2. Interventions to Alleviate the Causes of Crowding

Policy Level Interventions

These are policy interventions which are mainly concerned to dismantle the constraints that causes the phenomenon of crowding. The reorganization of the housing sector in its entirety is one of the most fundamental steps required to tackle the problem of crowding in Bissau. It is essential to redefine the amount and array of responsibilities assigned to the Ministry of Public Works & Housing for planning and managing the city. The current public servant inertia has to be overcome, and a reasonable solution is to decentralize certain responsibilities and to evaluate the private sector. A housing task force must be organized as part of a macro-economic and policy reform programme.

Only a concerted effort can create the basic conditions for the housing sector to function. The banking system must establish credit lines to stimulate housing production through market and private initiatives. The government must adopt a basic regulatory framework by which codes, conditions, functions and responsibilities are explicitly defined. The roles of large- and small-scale building contractors, local government, various governmental agencies, private investors, NGOs and CBOs must be clarified.

The establishment of conducive legal and institutional environment that will stimulate all actors to participate in housing production must be established in order to stop the trend of overcrowding and informal urbanization. Access to urban land and essential building materials must be facilitated through public-private interventions in order to accelerate housing delivery.

Formulating and implementing a land policy is an obvious and important step. Land access, whether serviced or unserviced, is a solution to the city's housing problem. Incremental land development schemes should be implemented at once to ease the pressure on the existing housing stock by providing alternatives to families who can build their own houses. By alleviating the shortage of residential spaces and facilities, housing alternatives may become available to people who live in rented rooms. More alternatives for and choices of housing will decrease rent prices, see Figure 3.4.

Communal services and incremental infrastructure provision should follow the same principle in order to guarantee a minimal living standard in these new sites. Urban standards and building codes are also vital components of the programme. They should reflect local financial, technological and cultural conditions by allowing traditional building techniques and local materials. Rational plot sizes, different housing types and indigenous building materials should be encouraged to lower construction costs. The local clay is excellent; this material in combination with popular knowledge about the methods of producing sun-dried adobe blocks can serve as a starting point for modernizing and improving the quantity and quality of housing. Clearly delineated property rights with special guidelines for rationalizing customary land uses and regularizing occupation must be part of the regulatory package as well.

Another important measure is the design and implementation of a sustainable housing policy with all its different components, programmes and projects. Such a policy must be part of a broad urban development strategy for the city and provide city managers with the instruments to cope with the critical housing shortage.

Institutional and Financial Level Interventions

The present macro-economic difficulties faced by Guinea-Bissau implies that the Government does not have the needed financial resources to implement the housing policy. Thus, some innovative local solutions and mechanisms to generate resources must be created. Establishing an administrative and politically autonomous municipal housing fund in Bissau to support low income and community based housing production processes would be beneficial, see Figure 3.5. The fund could be created with initial contribution from the government and the international donor community. Its financial sustainability could be guaranteed with specific revenues collected in the city e.g., land occupation taxes, property transaction tax, etc.

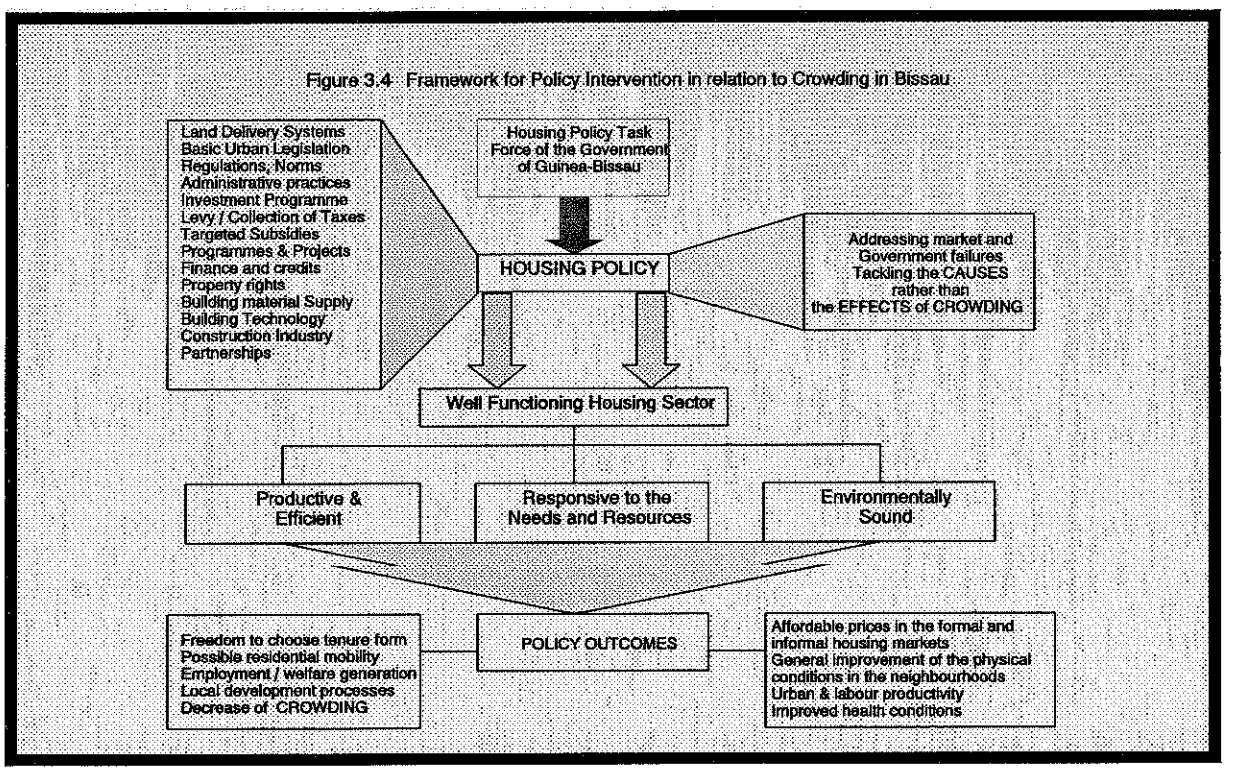


Figure 3.4 Framework for Policy Intervention in relation to Crowding in Bissau

Organizing a municipal housing fund implies that the city must undergo a serious restructuring and administrative reform, a process that will take time. Investments must be made in institutional and local capacity building through on-the-job training and human resources development. Effective human settlement interventions in Bissau are dependent upon strengthening local government's basic responsibility regarding the city and the urban environment. Rather than enabling the market to work, policies must enable the government to function properly if sustainable urban development is to be accomplished in Bissau. Public sector disregard hinders other actors in assessing their roles effectively. This apathy seems to be one of the most critical barriers for any enabling approaches to succeed in Bissau.

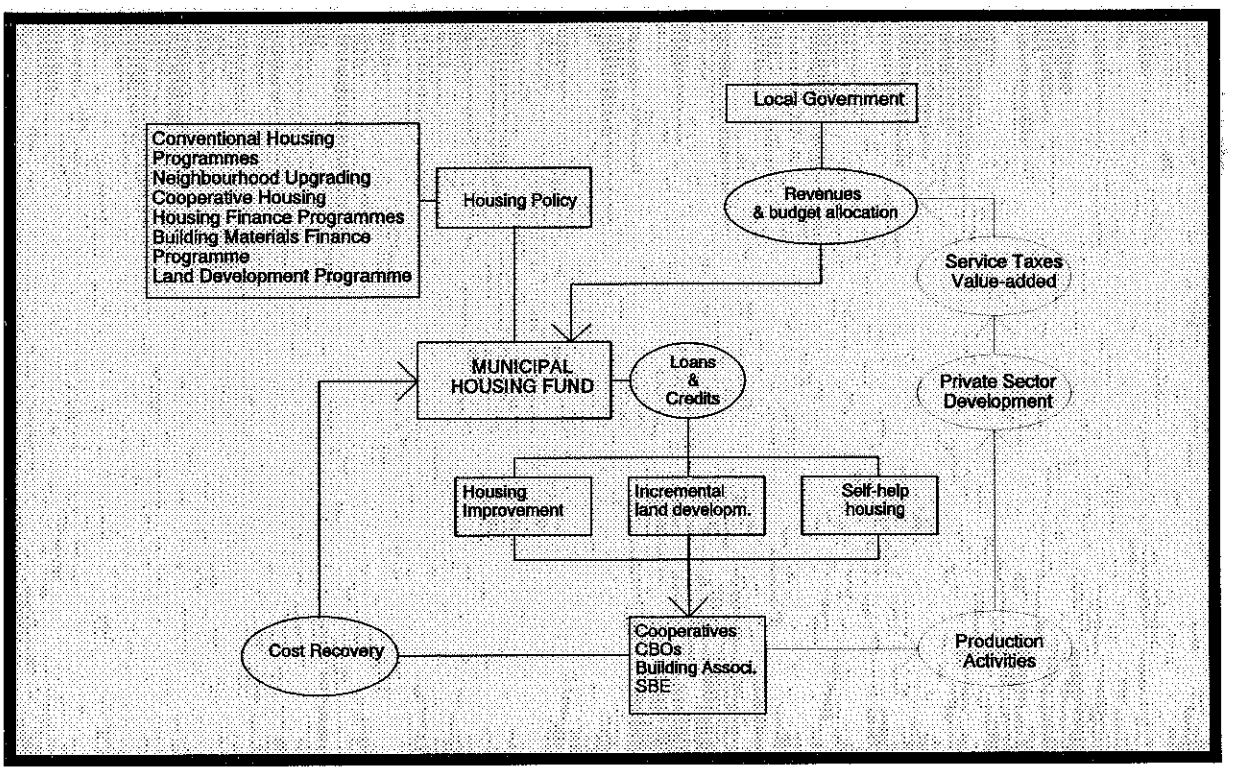
The situation in Bissau is critical and it calls for urgent comprehensive and integrated interventions to enable urban management and planning strategies that can generate short-term and long-term results. The municipal housing fund must go hand in hand with institution building (organization and

sustainability), policy formulation (means to act), staff development (capacity to act) and urban poverty alleviation programmes (social development).

Equally important, the activities generated through the municipal fund can create guiding mechanisms for the development and consolidation of small scale building enterprises-SBE and petty constructors as well. Developing skills and capacity in the construction sector can provide new forms of income and job generation within a framework of urban poverty alleviation. If successful, these activities might have a multiplying effect in the development of the building industry and in the generation of municipal revenues, positively impacting the macro-economic development of the country as a whole.

Since the government is not capable of solving the problem on its own, it has to count on the participation of other actors, including the population. Organizing target groups should be made a condition for access to the resources provided by the municipal housing fund. Those who are organized in community groups, associations, cooperatives or community based organizations may get the financial support and the technical assistance provided by the fund. Without a responsive populace and active CBOs, it will be impossible to accomplish sustainable results in the city. The establishment of grassroot organizations will have to be stimulated through the fund or through partnerships with NGOs because Bissau has little experience grassroot organizations, except for party branch committees of the PAIGC which ceased functioning after the multiparty system was established. Special legislation could support the emergence of such organizations as well as establish the basic regulations for their functioning and development.

Figure 3.5: Concept of the Municipal Housing Fund



The foregoing initiatives are geared to produce new residential areas and more housing alternatives for those who live in crowded accommodation. These initiatives will tend to alleviate the pressure

on the existing housing stock and related residential facilities, ultimately decreasing the levels of crowding. Nevertheless, it is imperative to launch programmes that address renewal of the existing housing stock and upgrading of the popular neighbourhoods.

Neighbourhood upgrading must be elevated to an important position within the framework of the proposed housing policy. At the local level, an upgrading policy should be institutionally and financially consolidated within the municipality of Bissau, one precondition for sustainable human settlement development processes. This programme and approach already put forward by the Dutch-sponsored neighbourhood upgrading project (PMBB) should be continued as a feasible strategy to deal with the informal settlements in the city. This ongoing programme has two advantages: it tackles the fundamental problems at the neighbourhood level and it creates the conditions for land regularization (the establishment of an urban cadastre with incipient forms of urban property taxation). The project can be an important instrument in mobilizing the population, stimulating community organization and launching local development processes.

As part of the upgrading platform, there are a variety of initiatives that can positively impact crowding. The communication and interaction with the population vis a vis public health, crowding, housing and improved sanitation can be maximized, if they are undertaken in conjunction with the upgrading activities. Urban poverty alleviation programmes can also complement physical upgrading processes.

3.3. Interventions to Alleviate the Effects of Crowding

Preparedness is a key word when designing policies and programmes to reduce the negative health outcomes related to crowding. To mitigate the effects of crowding, actions must be focused on the household and the organization preparedness of institutions to act at the neighbourhood, city and national levels.

The leading actors in alleviating the health effects of crowding in human settlement interventions will come from the public health sector. However, actors from the housing, physical planning, social and community development sectors must participate as well. Thus, the development and implementation of an integrated approach is essential for success. Before an integrated approach can be put into practice, it is necessary to define associated institutional and policy frameworks.

A series of small scale interventions should be linked through policy, organizational and implementation mechanisms in order to guarantee continuity and effectiveness, see Figure 3.6. The Ministries of Public Health, Public Works & Housing and Women's Affairs will play important roles in terms policy formulation, allocation of resources, institutional agreements and political commitment. The municipality of Bissau, the water supply and electricity company and several ministerial units must assume certain responsibilities at the city and neighbourhood levels for action planning, general programme management, implementation and monitoring. At the neighbourhood level, existing CBOs, health centres, NGOs, religious organizations, traditional leaders and women's organizations can become active in project implementation.

Interventions to Improve Household Hygienic Practices

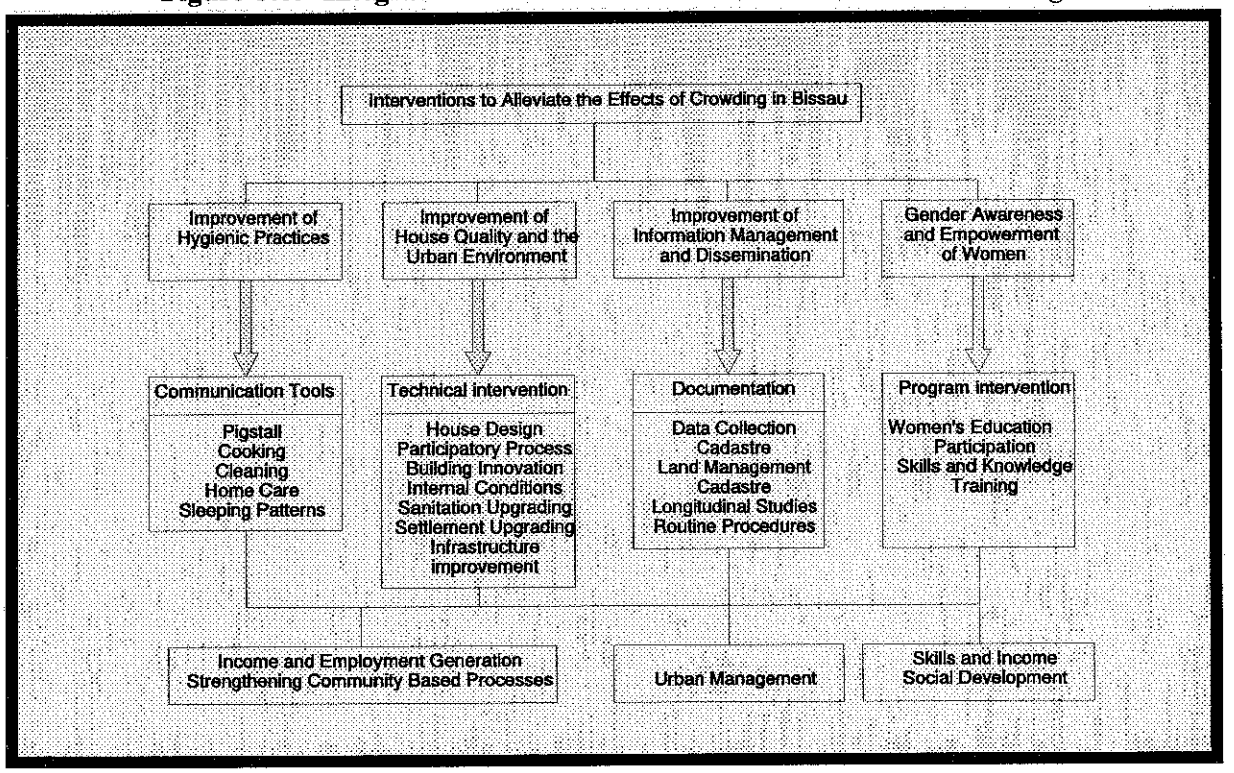
The Bissau project can assume a national importance providing guidelines for all the country's urban centres. However, the project's methods need to be adapted to local conditions and peculiarities in the various neighbourhoods of the cities. It must be primarily centred on the women and their milieu since they are the ones who raise and educate the children, cook and prepare the meals, cleans house

and care for those who fall ill. Secondly, it must target the primary schools of the neighbourhoods since the children form the group most vulnerable to disease. Besides, children can become an effective information and communication multiplier at the household domain, bringing project's messages close to their immediate milieu and to the entire the neighbourhood.

Existing neighbourhood organizations should be the starting points for project inception. NGOs could eventually receive permission to implement the project. The staff from the neighbourhoods health centres must participate in the project from inception to completion.

The project should make use of specific communication means and participatory mechanisms in order to advance basic hygiene and preventative medical information. To be culturally sensitive, the project should respect traditional and ethnic values by exploring local situations with affected residents. This partnership is key to community commitment and involvement. Small group seminars, workshops, neighbourhood sessions, puppet and open air theatre sessions, cultural events, individual visits and community initiatives are some tools that such a project could use.

Figure 3.6: Integrated Settlement Interventions Related to Crowding



By creating a favourable environment for the people to work on improving their household health conditions, they can cope better with infections and diseases. Learning how to deal with potable and non potable water, recognising common diseases and taking measures to cure them, planning their families, managing solid waste, sanitation facilities and domestic animals, altering sleeping patterns, and dealing with crowded households can improve their lives.

Two important aspects deserve special attention in Bissau: bed crowding and owning pigs. These variables affect morbidity and mortality of children under five years. Considering that in-house

crowding will not change within the short-term, ways of changing existing sleeping patterns and separating domestic animals, specially pigs, from people in the household must be devised and communicated.

Bunk beds may solve the problem of useable space in the rooms by offering extra bed space to alleviate bed crowding. It will also help to decrease disease transmission between people. However, there are two constraints to be surpassed: the existing cultural tradition of the population and the marketing of such a bed. The former can be tackled through continuous dialogue to familiarise the population with the advantages of using bunk beds. The latter is more complex. It involves the resources required to produce a different type of bed, to sell it in the local market and to circulate both the technology and prototypes. The last item could be included in the project agenda as a pilot project to create a production unit combining three different objectives: (i) to stimulate income generation activities, (ii) to support small scale enterprises and (iii) to accomplish better public health among the population of a target neighbourhood.

The problem of pigs occupying in-house and neighbourhood spaces with the human occupants is even more problematic. It touches on the issue of ethnicity and welfare. Pigs are not only sources of income, but they are generally kept by animist groups who bring them inside the house during the night to prevent their theft whenever a special space or pigstall is not available. Some house owners build walls under the roof of the veranda and create a closed compartment for the pigs. These enclosures physically separate the animals from people but the pigs still remain too close to residential spaces.

Pigs rearing in Bissau and in the rural areas is the same. Free to roam during the day, they practically have access to all spaces in the neighbourhoods, e.g. backyard, frontyard, wells, water standposts, verandas, open kitchens, etc. Although this practice is unacceptable in an urban environment, it will not be difficult to introduce behaviourial change. Regulations, including confiscation, penalties and fines, must be developed, coupling them with policies to encourage community and municipal pigstalls. To simply prevent pig owners from allowing their animals to roam free is bound to have little effect, if not accompanied by feasible alternatives and incentives. Severe penalties may only force people to keep their animals inside the house in the absence of alternative pigstalls.

Within the formulation of specific regulations about possessing pigs in the city, owners may be stimulated to get together in order to discuss possible alternatives, such as individual or community pigstalls. The municipality and veterinary authorities should encourage them to establish communal pigstalls where the animals could be protected from theft, be properly feed, have their growth monitored and receive treatment when needed.

Interventions to Improve Housing Quality and Living Conditions

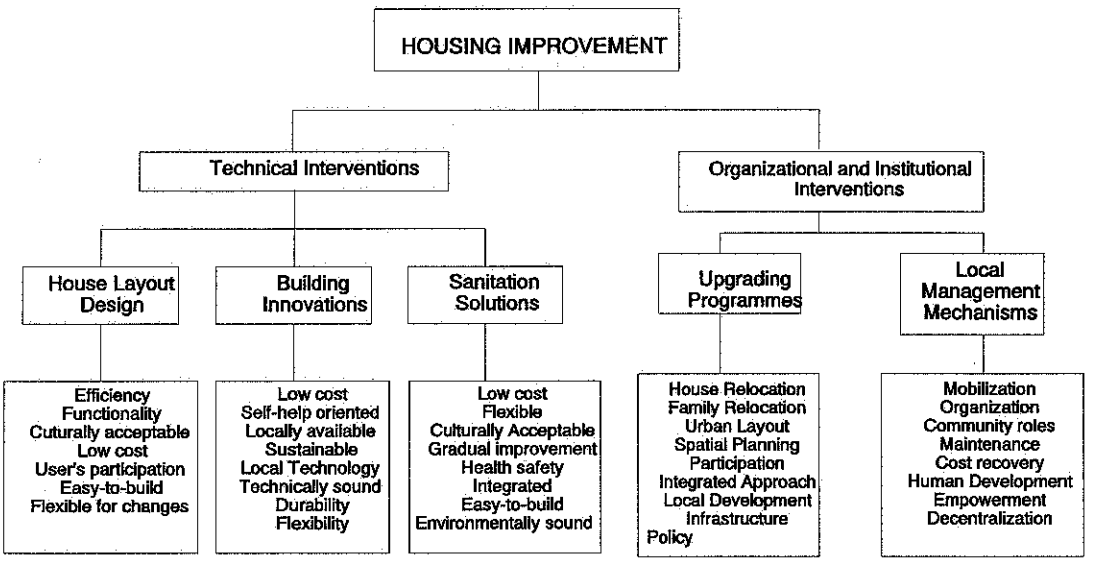
Housing improvement programmes must be implemented within the scope of neighbourhood upgrading policy since adequate shelter produces positive impact on crowding. The goal is to promote housing improvement that can provide to households privacy, healthy living space, security, lighting, ventilation and basic infrastructure at a reasonable price. Self-help construction techniques and technical solutions must be disseminated systematically to inform the inhabitants about low cost alternatives. Special illustrated booklets should be developed and distributed in information sessions organized in the target neighbourhoods. Programmes to provide finance and technical assistance to individual housing improvement must complement the approach.

Following neighbourhood upgrading projects, there is a tendency to increase water consumption. In such cases, the inhabitants must be made aware of the environmental impacts of such increased consumption, especially in terms of waste water disposal and sanitation systems overloads. They should be informed about different ways to manage their increased water supply and to improve their traditional pit latrines. Low cost sanitation solutions such as the double pit water locked latrine, the improved water flush latrine and even a standard toilet hooked on to septic tank could be explored. Any neighbourhood water-supply improvements must be linked to low-cost sanitation programmes.

Inadequate ventilation and natural lighting as well as excessive interior dampness and humidity must be tackled. There are simple ways to solve the problem of dampness and humidity, if it is not associated with improper foundations and floor structures. The inhabitants must receive written and visual information about simple interventions in the building to increase cross-ventilation and natural lighting. Ventilation in the traditional houses cant be improved significantly with openings of 20x40 cm in the outside walls at the hight of the doors and windows. By attaching wooden frames with mosquito nets to the openings, cross ventilation and insect protection are both accomplished.

Applied research is needed on the traditional building process in order to assess the various possibilities of strengthening adobe construction; to develop better cross ventilation; and to improve the interior environment of houses with different roof shapes, ceiling structures, etc.

Figure 3.7: Technical Interventions Related to Crowding and Health



Interventions to Develop Neighbourhood Based Information System

Because the health conditions of the population subject to overcrowding, and more particularly those of the vulnerable groups like children, women and the elderly, require systematic monitoring and surveillance, household surveys must be designed in order to monitor the human and social development process in selected neighbourhoods.

By tradition, data collection procedures and periodic household visits in public health programmes are linked to vaccination and maternity programmes. A pilot longitudinal community-based study in a selected neighbourhood should be explored to link data about behaviourial and cultural traditions in households to information about health situation, housing and building condition, in-house crowding, land tenure regularization, geographical location, employment patterns and income generation. The study results may be useful in establishing a neighbourhood-based information system, systematised with procedures for data collection, storage and manipulation and multipurpose areal cadastre. Routine documentation procedures may also be developed in the course of the project.

Establishing such an information system implies strong cooperation and clear agreements between different organizations; its success will finally depend on the availability of equipment, computer hardware and software and trained personnel. Whether or not an information system of this type makes sense in a poor country like Guinea-Bissau is unknown.

The advantages of an information system would be enormous. However, local management and monitoring processes can be established, allowing city managers, urban planners, medical staff and epidemiologists to develop an integrated view of the urban environment and contribute to more meaningful human settlement development. In-house crowding and general morbidity could be monitored more effectively.

Interventions to Develop Gender Awareness in Settlement Development

A gender-sensitive approach is extremely important if the effects of crowding are to be minimized. A comprehensive programme for women's education can create better conditions for improved hygienic practices household management. Mothers and young girls should be targeted. The latter serve as surrogate mothers in Guinean society. They usually take over the tasks of working mothers or search for food sources within their survival networks.

Not a programme for maternal schooling, this approach should empower women in their normal domain -- the household -- and in their cultural environment, enabling them to accomplish a degree of autonomy in a society that relies heavily on them for family reproduction and maintenance. Access to knowledge, information and skills must receive high priority. The target group should be well informed about family planning, the causes and effects of in-house crowding, the transmission and prevention of communicable diseases, and basic public health care but they should acquire specific skills that foster economic independence. Community saving systems, vocational training and job creation programmes might become part of this gender approach.

All Bissau neighbourhoods inherited a women's organization from the one-party system that could be used as a starting point. UDEMU-Women's Democratic Union was formerly under the control of the PAIGC party but its experience in women's voluntary organization might be used to good advantage. A selected group of women could be trained to assume certain tasks and the leadership of specific programmes and activities aimed at empowering women in settlement development processes.

To make such a gender oriented programme effective, it is essential to involve existing community based organizations (CBOs) from the early stage of programme planning through the implementation and monitoring processes. These CBOs are legitimate actors who can translate public policy into actions at the level of the community and households.

CBOs must help in identifying residents who can be appointed to work as project agents in the neighbourhoods. Micro-planning workshops might provide excellent opportunities for training and may guarantee continuity and acceptance within the population. These workshops serve to consolidate the participatory process and to establish channels of communication between the government and the population. A workshop is an effective grassroots tool to identify the most urgent problems and feasible actions that could solve or at least alleviate the impacts of overcrowding.

In locations where these organizations do not exist, the local government must tailor activities to stimulate the involvement of natural and/or traditional leaders. Without having counterparts who are capable of mobilizing internal support in the community, it becomes difficult to have initiatives accepted and supported by the inhabitants.

Although the major interventions have been discussed in this report, others can be mentioned. Implementing an immunization programme with total coverage will definitely decrease certain negative health effects from in-house crowding, but they should be seen as epidemiological measures within standard public health programmes. In crowded neighbourhoods, these programmes gain importance because of the high risks of disease epidemics, e.g. measles, meningitis, etc.

Obviously, there is a need to continue public investments in basic health and infrastructure to improve the quality of neighbourhood water supplies and the overall environment. However, because overcrowding and poverty are linked, human settlement interventions cannot disregard programmes to reduce poverty. And because the relationship between environmental degradation and poverty is becoming more apparent, these programmes might reinforce sustainable development as well.

Within a short period of time, these measures on their own will not be sufficient to reduce the rate of morbidity from crowding, but they will certainly decrease the rate of mortality, if they are integrated into broad neighbourhood-based development programmes. In the longer term, measurable results and improved public health in the neighbourhoods of Bissau can be expected.

4. TECHNICAL INTERVENTIONS RELATED TO CROWDING AND HEALTH

Intervention at the House Layout Design Level

In terms of functionality, the traditional house layout responds quite effectively to the residential space needs of the population. The shape and the building process are a popular domain, it is simple to build, provides shelter for different households and does not demand complex solutions for pipes and cables since water and electricity are usually absent. The residential facilities - toilet, shower, washing place and the kitchen when it exists - are usually situated at a certain distant from the house.

However, it is likely that the popular neighbourhoods of Bissau will develop in the near future and gradually become an integrative part of the urban fabric. It is expected that the neighbourhoods will be gradually connected to the different networks and urban systems. This will place an extra pressure on the existing housing stock and will demand special attention for the spatial planning of the sites. Assuming that the proposed interventions at the policy level will be successful - provided that it launches housing production processes thus increasing the floor area ratio per inhabitant - one must start thinking about interventions that can improve the spatial and building quality of the existing traditional houses. This will certainly alleviate the effects of crowding during a transitional period when housing production will rely very much on low-cost self-help processes and on extensions of the existing building stock (see illustrations in the annexo).

The problem is how to integrate the residential facilities to and to improve the functionality of the traditional house layout in relation to crowding alleviation?

The traditional housing typology should be used as a starting point.

To alleviate the pressure of crowding, a simple, low-cost and easy-to-do intervention to increase residential space may be accomplished through expansion towards the veranda, making use of the existing roof overhang in the sides and back of the building. This is already commonly done in a primitive manner by the population. Far from being optimal, it just allows a simple creation of extra rooms to alleviate the pressure of in-house crowding. Though it causes other sort of problems related to the internal climatic conditions of these rooms - constraints in natural lighting and ventilation - since the roof is too low in comparison with the rest of the house and the verandas are usually narrow (maximum of 1.60 - 2.00 m). The existing openings between the top of the walls and the basis of the roof structure disappears with such extensions as well.

This solution demands extra care for the external walls that will be exposed to rain; a special attention must be given to strengthening the foundations and floors of the veranda as well.

Special ventilation openings protected by mosquito nets can possibly solve the problems of ventilation and lighting of these rooms but not for the rest of the house. The stability and durability of the walls can be accomplished with the use of foundations built with concrete blocks or natural stone mixed with cement and a special impermeability protection applied on the external surface of the adobe walls (see illustrations in the annexo).

Occupying the veranda means that collective space usually used for cooking, resting and keeping the pigs will decrease or disappear completely. One needs to think about the replacement of these functions. That can be accomplished through the construction of independent structures at a certain distance of the house assuming that the available space at the plot domain allows these alternatives.

A Practical Example of Popular House Construction in Bissau

In Mindará, in 1989, the PMBB was able to implement the first experience of assisted self-help housing construction in the country. As agreed with a group of residents, the PMBB carried out a restructuring project in a site in the neighbourhood based on the demolition and reconstruction of the houses in a different urban layout.

The PMBB was responsible for the implementation of the building components that mainly depended on the imported building materials - cement, galvanized corrugated metal sheets and nails - while the residents were responsible for the local building materials such as mud and sun-dried adobe blocks, palm tree wood (cibes).

The pilot initiative implied the relocation of a total of 10 houses. The house had measured 10 x 12 m (120 m^2), including the veranda, with rooms 3.30 x 2.80 m of size. The concrete foundation - made with concrete blocks of 20x20x40 cm - was an innovative component introduced in the traditional construction. It guaranteed a solid and balanced outcome of the adobe walls that could at the same time prolong its durability and avoid the common cracks when it is traditionally built. The foundation was at least 10 cm above the ground in order to lift the adobe from the ground and protect the walls from humidity and termites, two serious enemies of the adobe walls in Bissau. And whenever the floor of the veranda would be implemented the walls would still be above the ground.

The foundations were designed as layers of concrete blocks because it was indeed the most appropriated technology because it allowed local production.

The design of the house incorporated the elements of the traditional house. The four sided roof and the veranda surrounding a fixed plan of six rooms. The roof overhang protected the adobe walls from the rain.

The resident could define the location of windows and door and arrange the internal circulation system between the rooms according to his needs. The advantage of the traditional pattern is that it was quickly accepted, easy to build and allowed the immediate use of the traditional technology, favouring the identification of the house owner with his house.

The whole intervention was based on the concept of gradual housing improvement. Further steps of improvements such as windows, doors, floors, plastering, ceiling, verandas would depend completely on the resident and his capability to fulfil his needs along the time. But there was no question of evolutionary design.

The residents were not prepared to accept a core house approach and there were too many constraints to insist with the idea. There was not much time to discuss other alternatives, the families were composed of many members and could not be accommodated inside a minimum dwelling. The fact was that the size of the families was not compatible with the sizes of a core house.

The inhabitants of Mindará evaluated the size of the houses very negatively. In Cupilom de Cima, the house size was increased to 165 m2, with 6 rooms of 3.50 x 4.00 m and the floors, doors, windows and an individual latrine were included in the assisted self-help package. The house owner had to agree with the new location of his house, the plot size and its demarcation which had to take place in the presence of the president of the neighbourhood council and the president of the political party branch. A contract was signed in which clear responsibilities and financial commitments were defined. During the two-year intervention in Cupilom de Cima, a total of 36 houses were demolished and rebuilt according to the settlement layout plan.

Source: Acioly, 1992;1993.

However, the improvement of the layout of the houses and the technical solutions to relieve crowding problems can only be successfully achieved if there is an improvement of the settlement layout as a whole. It is expected that interventions at the neighbourhood level will (re)define the settlement layout and determine the individual private domains for future regularization and legalization of tenure - meaning that some houses will eventually be relocated and rebuilt in another site while others will remain where they stand. In the case of relocated houses, a more rational layout can be implemented and whenever possible, a "modern" design may be experimented if the conditions are there e.g. residents' willingness, availability of piped water, financial resources and open space, etc.

In case of new buildings, the house layout must be sufficiently flexible to allow the introduction or attachment of a kitchen and toilet in the building structure. A participatory design process can be launched and must be coherent with the resources and local conditions.

The principle of core house and incremental housing improvements seems to be unrealistic when one considers the phenomenon of in-house crowding and more specifically the size of the traditional household and the total number of inhabitants per house. Though, it is worth to introduce such concepts and projects addressed to the needs of newly started households. But again, this will depend very much on the success of the interventions at the policy level. New settlement areas, sites and services and incremental land development schemes might help to lessen in-house crowding and provide housing alternatives for specific target groups.

When dealing with useful interventions at the house/building level, one must take into the account the following guidelines:

1. To explore the potentials of the local building technologies and materials such as adobe, cibe (palm tree timbers), taipa (compact adobe walls), etc. in order to allow affordable housing solutions which can be implemented on a self-help basis.
2. To minimize the costs derived from total dependency on imported building materials and inputs like cement, pipes, wires, steal components, etc. providing an incremental solution for house building.
3. To search for an easy-to-do and low cost solution sufficiently illustrated in booklets and information handouts that can be understood by any resident willing to build his/her own house.
4. To realize solutions that accomplish stability and durability of the local building materials and technologies through simple solutions. For example, concrete block and stone foundations, impermeability of adobe walls with a mixture of carpenters' glue and water, etc.
5. To offer different design alternatives for roofing which can allow flexible expansions of the building and better internal climatic conditions e.g. four and double sided roofs, cross-ventilation mechanisms, etc.
6. To segregate critical spatial uses related to hygiene, sanitation, cooking and domestic animals in the final house layout.

A Practical Example of Neighbouhood Upgrading in Bissau

Since 1987, the Guinean government is carrying out a programme to improve the living conditions of the popular neighbourhoods of Bissau. Financially and technically assisted by the Netherlands, the neighbourhood upgrading project of Bissau - PMBB has consolidated an upgrading approach after the interventions in four different neighbourhoods. Initially, the project was basically concerned with infrastructure improvements like water supply system and public water taps, drainage system, improvement of main access roads, trash collection system, and some public latrines. Issues such as housing and urban planning were out of the project agenda.

The lack of a settlement layout plan for the neighbourhood meant that the PMBB was not intervening in the complex morphology and urban structure of the neighbourhoods. Instead, it implemented the basic infrastructure networks respecting the existing morphological structure. The government wished to implement bulldozing actions and redevelopment projects rather than settlement upgrading, an idea that received very little support from the Dutch counterparts. Mindará was the first neighbourhood to be upgraded in this model followed by Belém, Cupilom de Cima, Reino-Gambeafada and Cupilom de Baixo.

In Belém, the establishment of productivity system in the implementation works where minimum performance rates were defined for working brigades was achieved and here the PMBB carried out its first campaign to raise the sensibility of the residents towards the neighbourhood improvement. Focussing on water supply and trash collection, it tried to raise community awareness, neighbourhood organization and individual responsibilities concerning several aspects of neighbourhood upgrading. The schools of Belém and the women in particular were targeted concerning solid waste management. For the management of the water supply system the whole neighbourhood was involved. The population was responsive and several small scale seminars could finally define a maintenance fee and appoint representatives who became responsible for the management of the 13 public water standpost constructed in the neighbourhood.

In Cupilom de Cima, the PMBB successfully implemented an integrated plan which combined provision of infrastructure, housing and urban planning, individual sanitation facilities and residents' participation. The realization of the settlement plan implied demolition and reconstruction of houses, and its reconstruction only took place when the intensive participation of the house owner was guaranteed. By relocating houses and creating better accesses to the inner spaces of the neighbourhoods, it was possible to achieve more rational urban patterns necessary to implement the public utility networks, land subdivision and its future regularization.

The optimization of the adobe block as a building material, produced "in loco" by the residents, showed the potentials of a local building material. The building process revealed where and how the participation of the resident is necessary, and it showed how the production of a house can stimulate the resident's self-esteem and motivation. This experience demonstrated that housing was a relevant instrument to capture residents' mobilization. Housing, in this context, became an instrument for human settlement restructuring. An assisted self-help housing programme was implemented with specific subsidy and finance mechanisms provided by the PMBB through which cost-recovery was partially accomplished through rental rooms. A low cost sanitation programme was also established and provided opportunity for the implementation of double pit water locked pit latrine. The inhabitants were well instructed about how to use it and very little problem was reported after extensive use of the system.

In the last years, the PMBB started to gradually include new components in its working agenda such as institutional and capacity building through training, income generation activities, environmental management, community development and gender oriented activities.

In terms of physical improvements, in 1994, the PMBB had already accomplished 9.5 km of roads, 11.1 km of drainage gutters, 7.8 km of water supply network, 41 public water standposts, 82 houses and 400 latrines.

Source: Acioly, 1992;1993; Bijsterveldt, 1994.

Interventions at the Level of Building Materials and Technologies

Although the survey could not reveal the direct connection between building quality and negative health impacts related to crowding, the improvement of the building quality will certainly have a multiplying effect in the overall physical conditions of the house and the household domain. Fomenting the use of indigenous technologies and local building materials will have a trickle-down effect. It might motivate people to build, expand the possibilities and house options and increase the supply of residential space for needed households.

The quality of the clay in Bissau is very good and should be explored as a local natural source for building materials production. This option may decrease the severe dependence on imported building materials. The only ceramic brick factory in the country produces good quality materials but is uncapable to respond to the existing demand. Prices are therefore very high and beyond reach of low income groups.

Assuming that the legislative barriers that hinder the widespread use of adobe blocks and compacted mud walls in the overall housing production process will be abolished, it is relevant to think of ways to improve its durability, applicability and sustainability.

Adobe technology should be promoted vis-a-vis self-help housing programmes. There are simple measures that can improve the quality of the adobe blocks produced in the city. Inhabitants should be instructed to let it dry in the shade for at least four days in order to increase its durability. The mixture of the clay with a bit of sand and cement will turn the block extremely strong, will give it a certain degree of impermeability and allow an easy plastering. The mixture of rice pealing with the clay is also an option that will improve its adhesiveness and durability.

All these procedures and tips should be printed in a form of self-help instruction booklet which will allow anyone to use it in a correct way.

Physical Planning Intervention at the Settlement Layout Level

Meaningful interventions in the neighbourhoods of Bissau will have to deal with the problem of building densities and in-house crowding simultaneously. As previously stated in this report, the overcrowding of the houses puts pressure on the adjacent spaces and residential facilities. But on the neighbourhood level, the pressure is placed on the available space needed for circulation and accessibility of people and automobiles, and for laying down the necessary infrastructure networks.

There is an over-occupation of the ground due to the large sizes of the houses and the spontaneous or unplanned character of the settlements. This leads to a significant cramping of the open space. The houses are often encroached to one another meaning that environmental conditions are deteriorated.

Obviously neighbourhood upgrading has to deal with the general improvement of the living conditions of the inhabitants but also with the spatial planning of the sites. The layout of human settlements play a very important role in defining the quality of the urban environment. Efficient and culturally acceptable settlement layouts will provide an urban environment that maximizes the use and cost of land and infrastructure while providing a conducive milieu for social interaction.

At first, when dealing with existing neighbourhoods, it is necessary to establish a certain order and criteria to urban restructuring. Houses need to be relocated, private domains need to be clearly

defined and a consensus about the public domain must be accomplished (see illustrations in the annexo).

In the absence of a resettlement site (spill-over area) or in case there is no resident's willingness to move to another site outside the neighbourhood, it is much probably that the same housing density will be kept. Though keeping the same housing density, a reorganization of the urban layout of the neighbourhoods is possible and will define individual property boundaries and create more room for public use. Consequently, accessibility, better ventilation and sunlight may be improved, and the precise locations for domestic animals will be determined. It is almost impossible to decrease the size of the houses but perhaps it is possible to rationalize the use of the available space.

Such interventions may minimize the negative impacts of crowding as much as it can generate better environmental conditions and decrease the pressure on the available space. Shallow wells and sanitation systems will be able to be situated apart from each other and that might decrease the chances of pollution of water supplies. Logically that the other interventions to alleviate the effects of crowding, mentioned earlier in this report, will have to be undertaken within an integrated framework if meaningful results in relation to crowding and health are to be accomplished.

Interventions at the Solid Waste Management Level

Solid waste collection in Bissau is a great problem. There is no capacity in terms of management and equipments to carry out this service on a regular basis. Accumulation of trash throughout the city is just a common feature. In the popular neighbourhoods, one sees piles of solid waste dumped in the adjacent spaces of the houses where domestic animals and children play. As children and animals move into the house, they bring eventual disease vectors with them. Besides the restructuring of this service and a city-wide education campaign to teach the population how to deal with solid waste, it is necessary to intervene at the household domain in order to reduce health hazards. The negative health impacts of crowding could be alleviated by this measure.

A collection service could be organized at the community and neighbourhood levels as part of an integrated neighbourhood upgrading programme. The inhabitants could be asked to be organized per group of houses or sections of the neighbourhood and define the regularity and costs implied with the service.

Due to the characteristics of the trash in Bissau, it is possible to think about a simple and low cost solution for solid waste collection. A carriage pushed by a bicycle could do the job in an efficient way provided that maintenance and management activities are well taken care of. Disposal points could be identified in the form of small removable containers or large removable coaches in common agreement with the local government or solid waste collection agency.

Technical Interventions at the Sanitation System

Improving the sanitation system of the houses will have a multiplying effect in terms of health. Consequently, the negative health impacts of crowding may be decreased.

At first, one must think about the improvement options for the traditional pit latrine. In the beginning water is scarce and it is likely to increase as a result of neighbourhood upgrading. Consequently, it is important to provide incremental solutions that guarantee the substantial improvement of the existing system and allow the move from a dry pit latrine towards a ventilated dry pit latrine solution and finally to a pour-flush water locked pit latrine. It is possible to design variations of the latter

including the option of a double pit which will allow manual cleaning procedures of the sullage. The alternate use of the pits gives the possibility to maximize saturation time of the system.
The expected increase of water supply demands a special look at the sanitation system. Otherwise, there is a risk to have increases of open air drainage with grey water and sullage in the vicinity of the houses.

A more developed toilet solution adhered to the house and linked to a septic tank may be the final sanitation solution that is already used in the "legal" housing stock of the city. However, this will demand investments and changes in the structure of the houses. Extensions may result in encroached solutions. A feasible alternative seems to be the separate structures that stand on their own within a fair distance from the house.

Desirable Integrated Interventions to tackle the Causes and Effects of Crowding

LEVELS	POLICY	PROGRAMMES	PROJECTS
CITY	Structuring the housing delivery system Incremental land development To foster infrastructure improvement Strengthening community participation To guarantee a public health care system To stimulate a municipal housing fund To promote local building materials and indigenous technologies Employment and income generation	Social development Incremental land development Low cost sanitation Family planning and maternal schooling Vaccination coverage and public awareness Social housing finance	Urban restructuring Relocation Small scale building material credits Support of small scale building enterprises Land registration Urban cadastre building Property taxation and land valuation Urban information system
NEIGHBOURHOOD	Strengthening grassroots organizations Urban environmental management Participatory planning Neighbourhood upgrading	Integrated neighbourhood development Local maintenance and management of public benefits Building material credits and loans	Solid waste collection Community pigstalls Infrastructure improvement A gender approach to neighbourhood development Pilot/demonstration house projects Settlement layout design plans
HOUSEHOLD	Direct credit and loans Targeted subsidies Participatory house design Illustrated self-help information dissemination	Vaccination Basic education Technical and financial assistance School children education	Information system Cost recovery Financial contribution

5. CONCLUSION

Preliminary conclusions about the research itself merit mention. A breakthrough in the knowledge about the subject - external and internal factors affecting the relationship health-crowding, the health impacts related to crowding - the research poses new questions about crowding that need further study. Nevertheless, the methodology of and the findings from the Bissau longitudinal study reveal several points that need to be critically appraised.

The research has been influenced by medical and epidemiological considerations, as consequence, the "technical" viewpoints of housing experts, architects and urban planners have been disregarded. Merging these two views would have given a more balanced approach to understanding the causes and consequences of crowding, especially for the preparation and formulation of the questionnaires and definition of the strategies.

Within the context of the Bissau research, the surveyors audited particular durable goods and facilities, such as inside kitchen and toilet, at the moment of the interviews. These goods and facilities were indicators of higher income and better quality of housing. Because in-housing crowding is strongly linked with poverty, future studies must use different types of instruments to assess the social and economic structure of the population.

Research and field experience point out that these material indicators are insufficient to discern the difference between a poor and higher income household or the quality of a house in Bissau. Low and higher income people employ complex strategies to acquire highly wanted household goods such as ventilator, freezer, radio and television. Furthermore, the existence of a toilet or kitchen inside a house does not necessarily mean that building and interior environment qualities are better than in a house without it. Future studies must assess the quality of the residential spaces with a much broader view and define criteria for ranking the different findings.

This study makes clear that crowding is a fundamental factor in explaining poor living and health conditions of the population. It is also an indicator for the inefficiencies and malfunctioning of the housing sector as a whole. These point to the need for an integrated approach to study and to intervene in crowding.

Crowding is correlated to external factors that contribute to different types of pathologies. It is essential to identify these factors in order to address their major causes and consequences. Only by doing so will it be possible to design feasible strategies to alleviate crowding. Systematic studies should be undertaken in order to disclose the exact role better educational, feeding, income, shelter and access to basic infrastructure, play in the general health condition of the people who live in crowded conditions. The study on Bissau gives some indications that poor health is not strictly related to poor housing and poverty, because it is also correlated to other external risk factors, e.g. bed crowding and domestic animals.

The questions raised by the mortality differences in the three neighbourhoods might be better explained by understanding whether or not neighbourhood upgrading in Belém had any effect on public health and whether or not it had any positive impact on crowding. These data would support the design of suitable policies for the popular neighbourhoods of Bissau.

The design of the survey puts considerable emphasis on the measurement of crowding as it is related to the health of two groups, e.g., children under five years of age and pregnant women. It was assumed that it would be easier to detect negative health outcomes via mortality and morbidity for these two vulnerable groups. Although unanswered, the question remains whether or not crowding

has any adverse effects on the health of working adults. This information would be useful in determining the effects of crowded household on labour productivity.

The local context is also important. Future studies must include research questions that address carefully the local context. The crowding research project used the same methodology for both Jakarta and Bissau; but the major differences in development and social practices between Indonesia and Guinea-Bissau may have required the use of different variables.

Further studies must consider neighbourhood differences, paying attention to issues such as location, site-specific economic and productive activities, accessibility to services and employment centres, the land market, the rental housing sector and the general performance of the housing market. Only then will it be possible to place the problem of crowding within the larger context of urban development. What causes people to live in crowded neighbourhoods? Why do people choose to live in a crowded house in a particular site instead of choosing another location in the city? Does the phenomenon of crowding takes place in the same way in peripheral neighbourhoods as it does in centrally located ones? Do renters and house owners experience crowding in the same way?

Subletting of rooms is directly related to crowding, meaning that room renters are subjected to severely crowded conditions. Rental housing is particularly important in studying crowding.

Finally, human settlement interventions must be concerned primarily with the basic causes and effects of crowding. Land and housing delivery systems should become more efficient, as efficient as vaccination and social development programmes. Integrated human settlement development must form the core of interventions that aim at reducing crowding and the ill effects on the health of the urban poor.

6. BIBLIOGRAPHIC REFERENCES

Abby, P., Bukh, J., Lisse, I.M. and Smits, A.J. (1983). "Measles Mortality, State of Nutrition and Family Structure: a community study from Guinea-Bissau", Journal of Infectious Diseases, Vol. 147 (4), April. 693-701 pp.

Aaby, P. Bukh, J.; Lisse, I.M., Smits, A.J., Gomes, J., Fernandes, M.A., Indi, F. and Soares, M. (1984). "Determinants of Measles Mortality in a Rural Area of Guinea-Bissau: crowding, age and malnutrition". Journal of Tropical Pediatrics, 30, 164-168 pp.

Aaby, P., Bukh J., Lisse, I.M. and Silva, M.C. (1988). "Further Community Studies on the Role of Overcrowding and Intensive Exposure on Measles Mortality". Reviews of infectious Diseases, Vol. 10 (2), March-April, 474-477
jpp.

Abby, P. (1988). "Malnutrition and Overcrowding/Intensive Exposure in Severe Measles Infection: review of community studies". Reviews of Infectious Diseases, Vol. 10 (2), March-April, 478-491 pp.

Acioly Jr., C.C. (1991). "Estudo Preliminar sobre o Bairro Reino-Gambeafada", PMBB, Bissau, mimeo. 46 pp.

Acioly Jr., C.C. (1992). "Settlement Planning and Assisted Self-help Housing: an approach to neighbourhood upgrading in a Sub-Saharan African city", Publikatieburo Press, Faculty of Architecture, Delft University of Technology, The Netherlands. 131 pp.

Acioly Jr., C.C. (1993). "Planejamento Urbano, Habitação e Autoconstrução: experiências com urbanização de bairros na Guiné-Bissau", Publikatieburo Press, Faculty of Architecture, Delft University of Technology, The Netherlands. 189 pp.

Acioly Jr., C.C. (1994). "Urban Poverty Alleviation and Neighbourhood Upgrading: the international agendas versus a Sub-Saharan African context", Paper prepared for the 2nd Symposium HOUSING FOR THE URBAN POOR, Birmingham, UK, April 1994. 14 pp. Unpublished.

ADB-Asian Development Bank (1991). "The Urban Poor and Basic Infrastructure Services in Asia and the Pacific", Vols. I, II and III, ADB, Philipines. 804 pp.

Aina, T.A. (1990). "Housing and Health in Olaleye-Iponri, a Low-income Settlement in Lagos, Nigeria", in Hardoy, J.E., Cairncross and Satterthwaite, D. (eds), The poor Die Young: Housing and Health in Third World Cities, Earthscan, London, 56-88 pp.

Angel, S., Mayo, S.K. and Stephens, Jr., W.L. (1993). "The Housing Indicator Program", in Netherlands Journal of Housing and the Built Environment, 8 (1), Delft University Press, The Netherlands, 13-47 pp.

Aquino Consultores Associados Ltda. (1995). "Programa de Participação Comunitária", Relatório Final - Vol. II, anexo 4. Pesquisa Sociológica. MES, Projecto SECAL. 114 pp. Unpublished.

Bijsterveldt, T., Attahi, K., Hoogenboom, A. and Napoco, A. (1994). "Projecto Melhoramento dos Bairros de Bissau. Relatório de Avaliação e Linhas de Orientação". SNV-Dutch Development Organization and Municipality of Bissau. September 1994. Mimeo. 60 pp.

Bradley D.; Stephens, C.; Harpham, T. and Cairneross, S. (1992). "Environmental Health Impacts in Developing Country Cities", The Urban Management Programme, The World Bank.

Delgado, A.M. (1990). "O Emprego em Bissau: perfil sócio-econômico da micro empresa e o setor informal. Resultados de uma pesquisa". PMBB/INEP, Bissau, mimeo.

EIU-The Economist Intelligence Unit (1992). "Guinea-Bissau, The Country Profile 1991-1992", The Economist, England.

Jansen, M. (1993). "Urban Poverty in Sub-Saharan Africa: an overview". Institute for Housing and Urban Development Studies, The Netherlands. Mimeo. 31 pp.

Jain U. (1987). "Effects of Population Density and Resources on the Feeling of Crowding and Personal Space". Journal of Social Psychology, 127(3), 331-338 pp.

Jing, Z. (1993). "Settlement Planning and Urban Renewal in Beijing: possible alternatives for improving the city core", unpublished report, IHS-Institute for Housing and Urban Development Studies, Rotterdam. 59 pp.

Mara, D.D. and Alabaster, G.P. (1995). "An environmental Classification of Housing-related Diseases in Developing Countries". Journal of Tropical Medicine (98), 41-51 pp.

Mengers, H. (1986). "Investigação Sócio-econômica no Bairro de Cupilom de Cima", SNV, Bissau, mimeo.

Moreira, T.A. (1993). "A Public-Private Partnership Approach in Inner City Renewal in São Paulo". General lecture at the Institute for Housing and Urban Development Studies, Rotterdam, 14-4-93.

Napoco, A., Gomes, D.F. and d'Alva, E.M. (1995). "Nota de Estratégias sobre Desenvolvimento Urbano Sustentável e Gestão dos Assentamentos Humanos". Minuta preliminar, Ministério do Equipamento Social, Direcção Geral do Habitat e Urbanismo, Guiné-Bissau, 28 pp. Mimeo.

Salau, A.T. (1990). "Urbanization, Housing and Social Services in Nigeria: the challenge of meeting basic needs", in Potter, R.B. and A.T. Salau (eds) (1990), Cities and Development in the Third World, England, Mansell Publishing Limited, 51-69 pp.

Tablada, A.D. (1990). "Bissau, Programa de Desenvolvimento a Médio Prazo", Câmara Municipal de Bissau & Instituto de Planificación Física de Cuba, Bissau, mimeo.

Turton, R.W. and Chalmers, B.E. (1990). "Apartheid, Stress and Ilness: the demographic context of distress reported by South Africans". Social Science and Medicine, 31 (11), 1191-2000 pp.

UNCHS-United Nations Centre for Human Settlements (1991). "Housing-Related Crowding and Environmental Health". Bibliographic Notes, No. 20, December, 9 pp.

UNCHS-United Nations Centre for Human Settlements (1993). "Metropolitan Planning and Management in the Developing World: spatial decentralization policy in Bombay and Cairó", UNCHS, Nairobi, 150 pp.

UNCHS & COWIconsult (1995). "Crowding and Health in Low Income Settlements". Draft Technical Report, April 1995, mimeo, 109 pp.

UNCHS & COWIconsult (1995a). "Crowding and Health in Low Income Settlements". Draft Case Study Report on Bissau, April 1995, mimeo, 86 pp.

UNDP-United Nations Development Programme (1994). "Human Development Report", Oxford University Press.

7. ANNEXES

1. Urban Restructuring
2. Environmental Improvement inside the House
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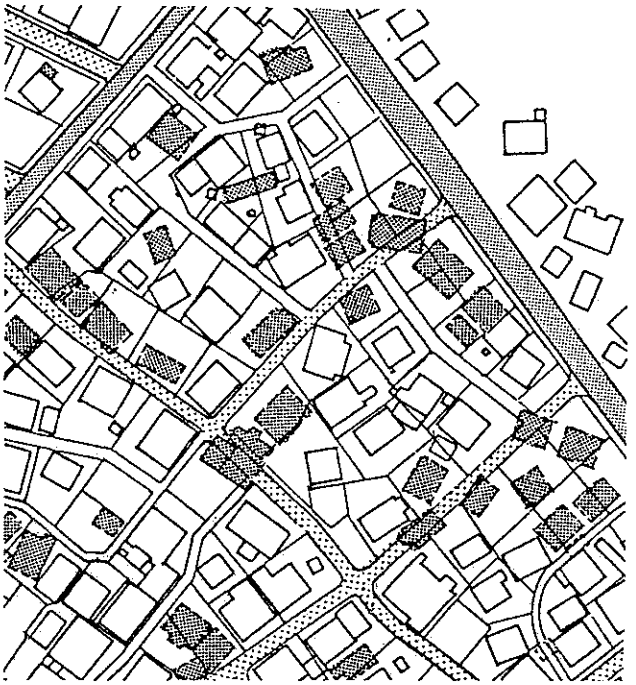
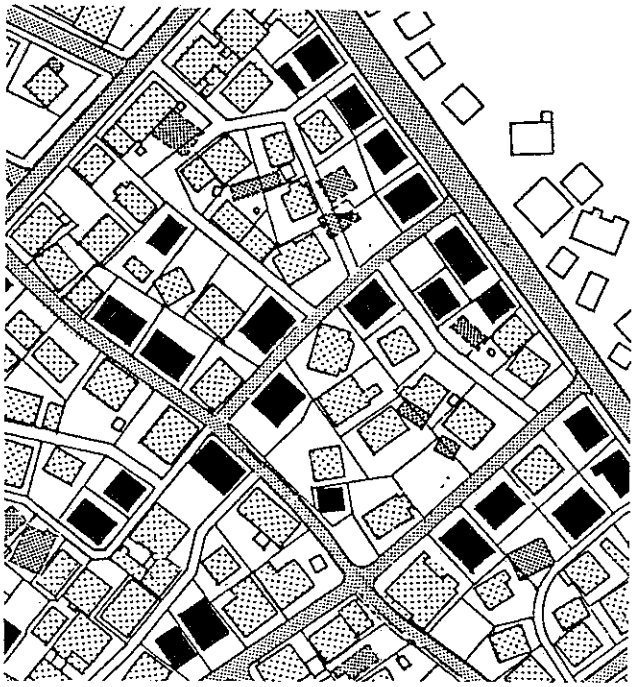
13. Houses in Cupilom de Cima
14. Houses in Cupilom de Cima
15. Traditional Wells in Mindará, 1987.





Urban Restructuring

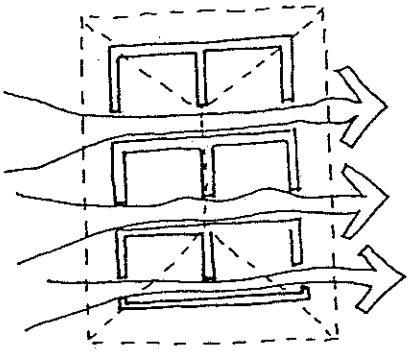
In the neighbourhood of Cupilom de Cima, the changes in the settlement layout was substantial.

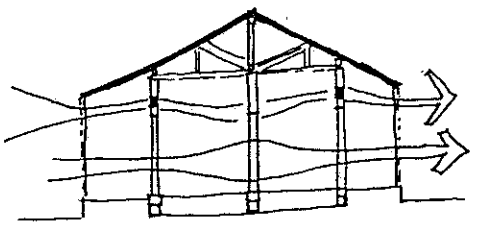
One aspect praised by the inhabitants was that the accessibility was improved significantly. The infrastructure networks were rationally implemented and although the urban structure was altered, the cohesion of the settlement was maintained.

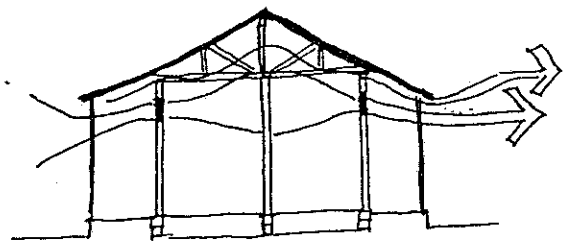
The feeling of crowding was solved through a settlement intervention and for the large households, there a noticeable increase in open spaces available for circulation and other social activities.

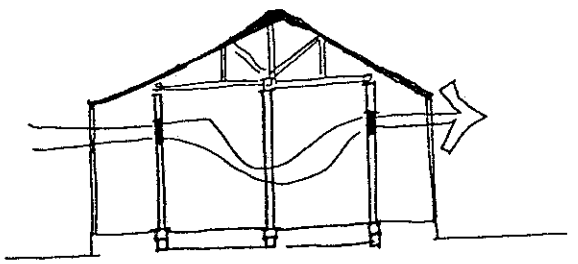
Not only circulation, accessibility and services were improved but also the general environmental condition.

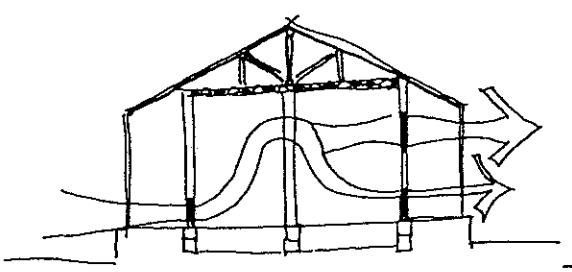
The population was responsive and was engaged in the whole process of urban restructuring. This intervention is now used as an example of a successful neighbourhood upgrading approach in Bissau.

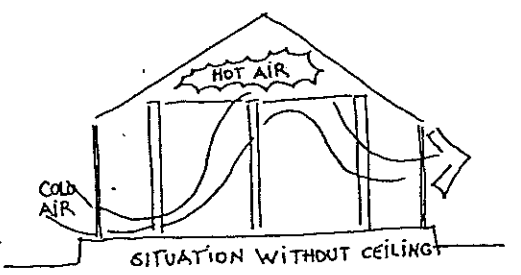












Environmental Improvement inside the House

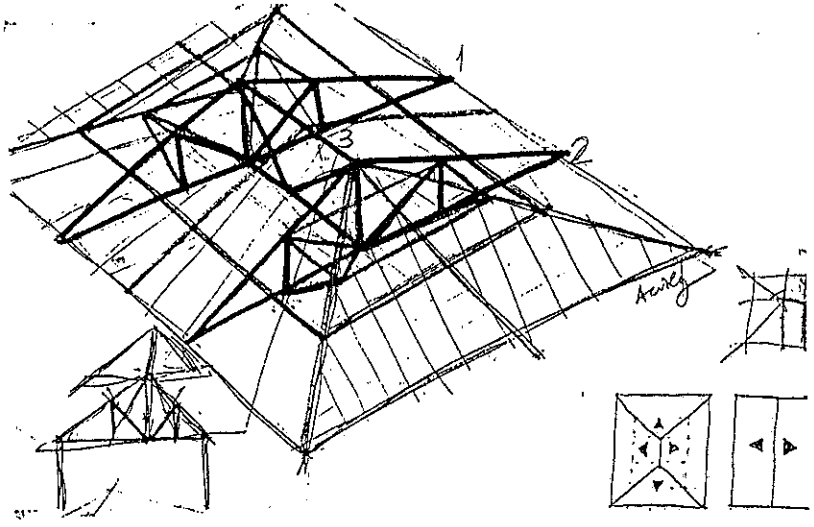
Improved environmental conditions inside the houses is essential to alleviate the negative health impacts of crowding.

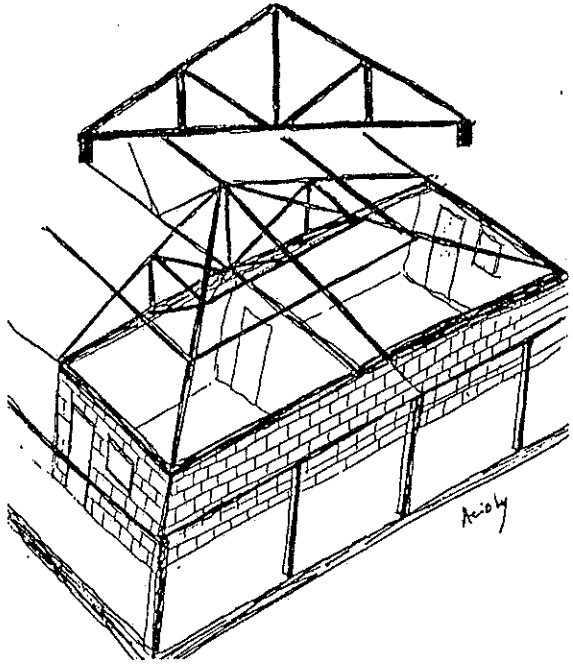
One must think about increasing the ventilation through cross-ventilation mechanisms and the orientation of the largest facade of the house towards the direction of the most dominant winds. In the case of Bissau, the eastern and southeastern facades should receive special attention.

The logic is simple. The wind only comes in if it can come out. Usually, the entry points are situated in high pressure sites and the exit in the low pressure areas. This cross-ventilation mechanisms is important for air renovation inside the house meaning that smells, smoke, mould and suspended particulates can be removed naturally.

A crowded household will certainly get a substantial benefit if these two principles are used when building a house or improving its ventilation: the orientation towards the dominant winds and cross-ventilation to take the hot air from inside the house.

Roof Structure of Traditional Houses in Bissau, Guinea-Bissau

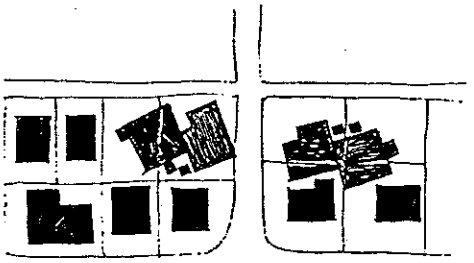


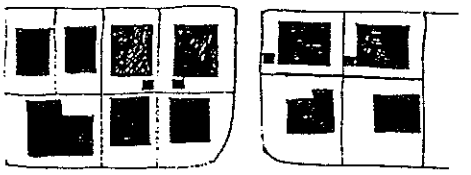


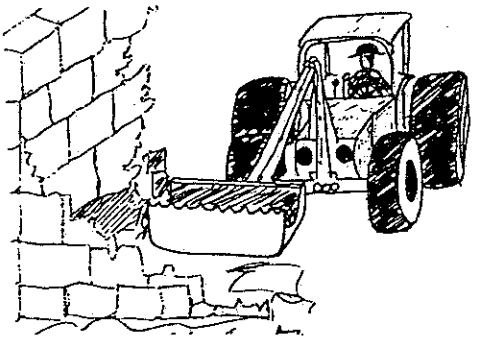
In a tropical, hot and humid climate as Guinea-Bissau has, the roof is an important element to define the environmental conditions inside the house. The corrugated metal sheets are in principle unsuitable for the climatic conditions in Bissau since it absorbs too much heat and let it pass towards the inner spaces of the house. However, the roof structure and particularly the main beam is placed around 2.25 above the walls. In that way, the heated air goes up and since there are openings between the roof structure and the walls, the space is reasonably ventilated.

The palm tree timber - cibe - is flexible and can be used in all parts of the roof. Since the corrugated sheet is also flexible, it can be placed on this structure without any problem. Once a ceiling is implemented, then one must be aware that the air circulation and natural ventilation is decreased. Special openings and cross-ventilation mechanisms must be executed in order to expel the hot air from under the roof.

Tiles are very good environmentally speaking but they demand very good quality wood for the roof structure since they do not have the same flexibility of the corrugated metal sheets. The improvement of the environmental conditions of the houses will have a positive impact and particularly will alleviate the effects of crowding. One must work from this traditional or popular solution when looking for better ventilated roofs.



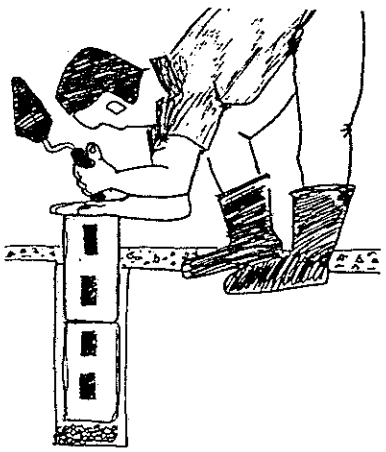


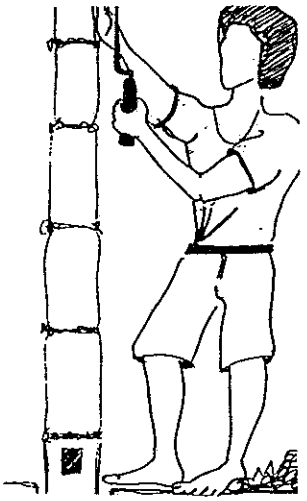


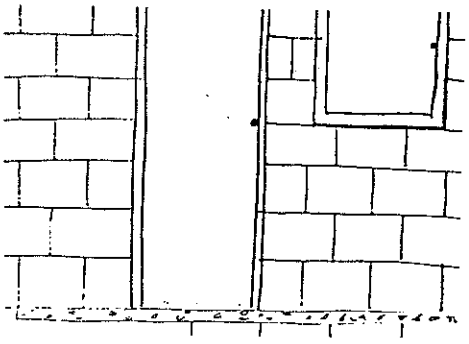
The problem of crowding and its effects demand an intervention at the settlement level guided by a clear integrated approach. As the settlement layout is restructured, the population needs to be well informed about the changes in the urban structure. Above all, they need to be conscious about the reasons and the benefits gained by the colectivity. This calls for a participatory approach and the establishment of a clear understanding and cooperation between the local government, the CBOs and the households.

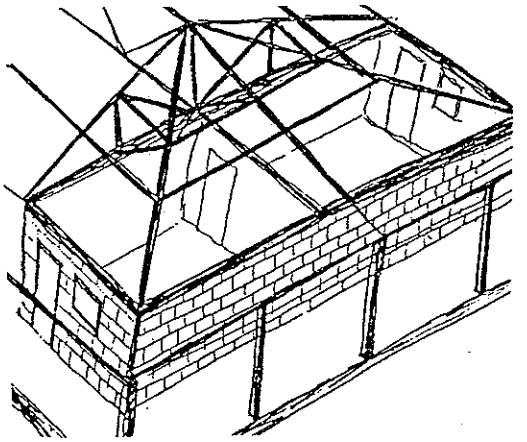
Microplanning workshops complemented by an effective communication mechanisms will guarantee that the process is effective and the population responsive. Drawings showing the various steps and who are responsible for them are always helpful.

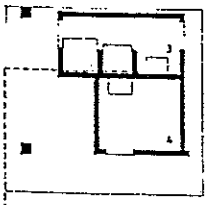
Individual housing and building improvement and urban environmental improvement go vis-a-vis. The benefits for crowded households is obvious.

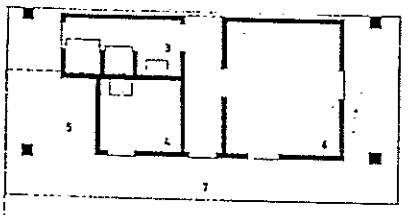


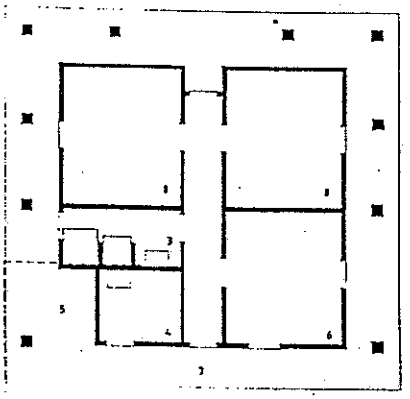


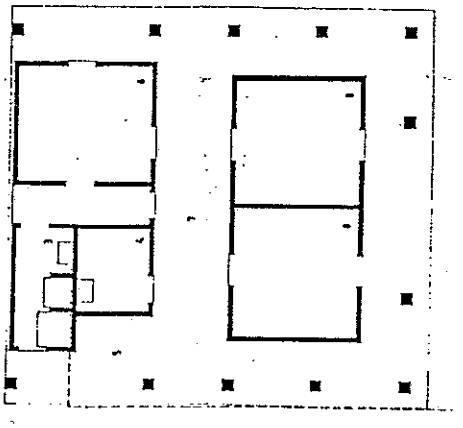


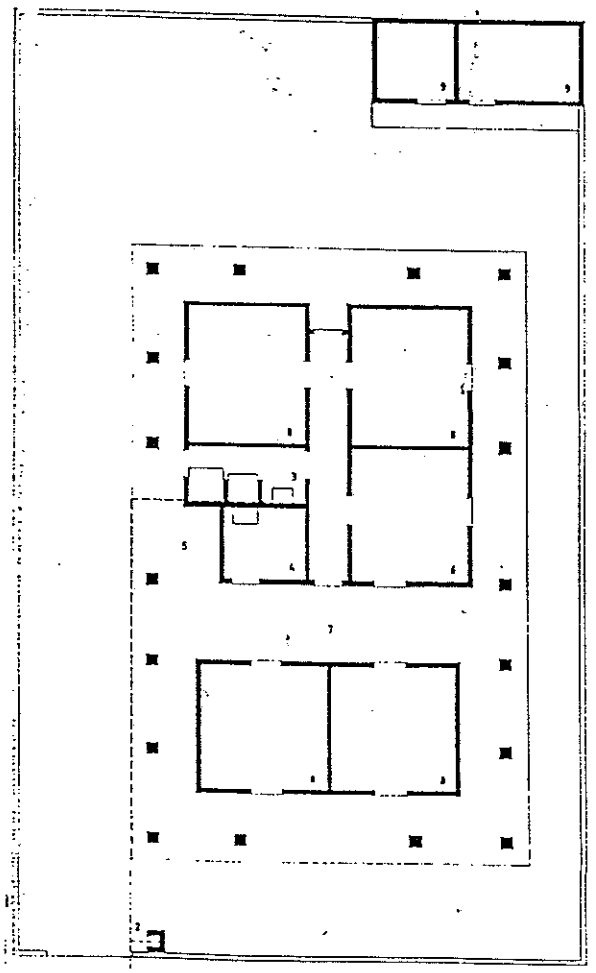








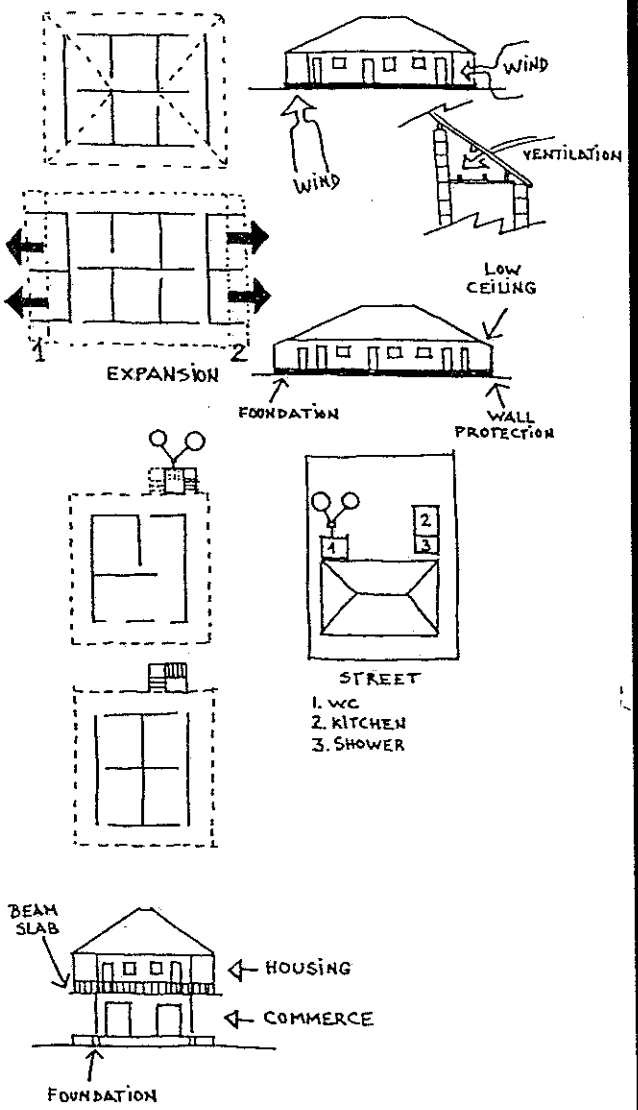




Incremental Core House Approach

The sites and services project "Antula Bono, sponsored by the UNCHS, World Bank and UNEF introduced the principle of incremental core house development based on the traditional house layout. The houses have not been build yet, except the demonstration units.

The solutions are very costly but show that it is possible to incorporate some of the important cultural elements of the traditional housing typology. There are some constraints for the success of such approach. The absence of an urban culture in the city, the still dominant traditional way of living, the building costs implied in such large houses and the tremendous cost in land and servicing derived from large plot sizes.

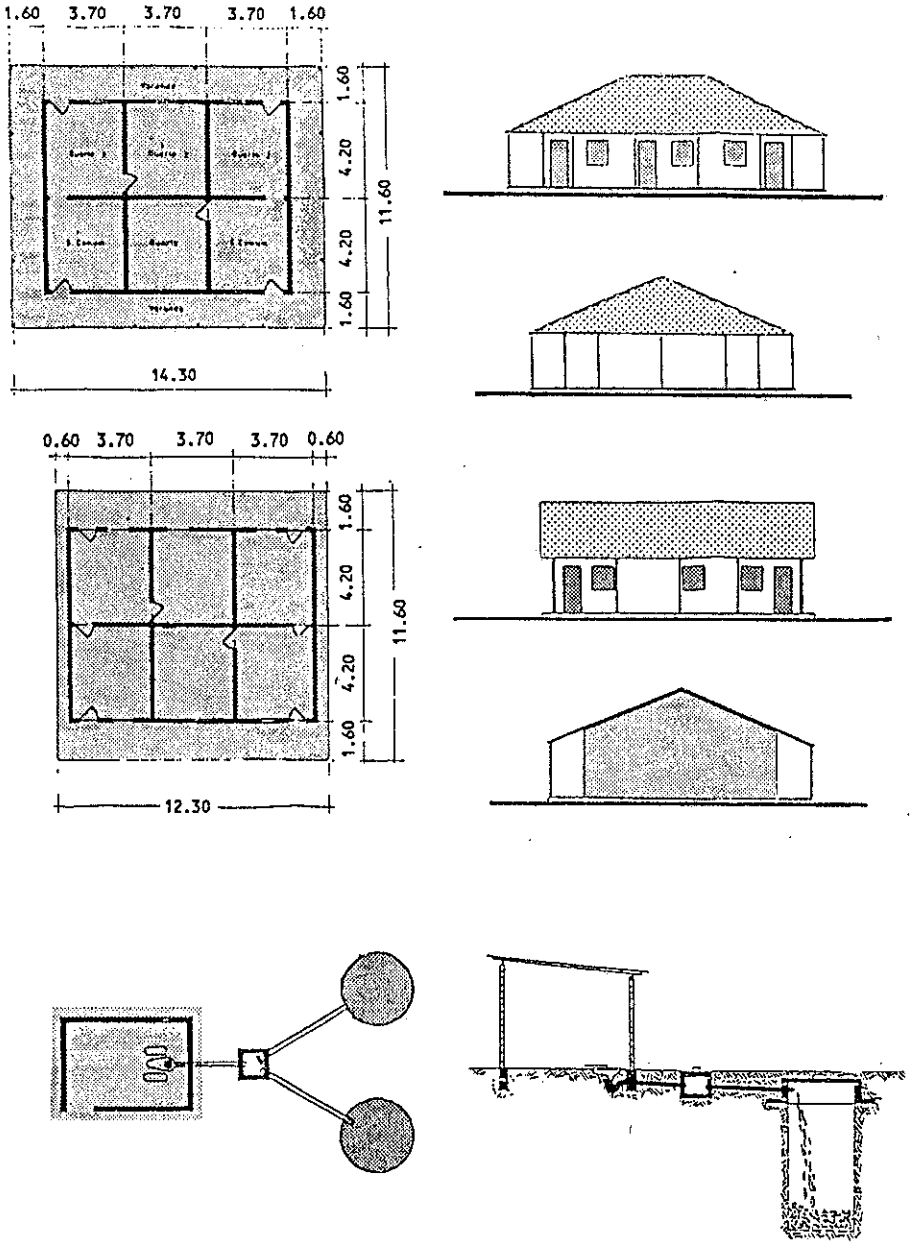


Creating Extra Residential Space

One of the most immediate measures to alleviate crowding is to create extra space for the household. Sleeping spaces are particularly important considering the problem of bed crowding in Bissau. The traditional housing typology does not offer many alternatives. Creating rooms through horizontal expansion of the roof is a common and rather improvised practice. For this palliative solution, the inhabitants must be instructed to minimize the negative environmental effects. The ventilation must be well taken care of since the ceiling is much lower. The outside wall must be well executed in order not to deteriorate during the rainy season. The foundation of the walls and veranda must be reinforced. This solution alleviates the pressure on residential space but usually create unpleasant living spaces. Some technical interventions as mentioned above may decrease the negative impacts of that.

Another alternative is to provide some vertical extension. But this can only be done in new buildings. For small households, this can be combined with a mixed use approach. On the ground floor the space can be used for income generation activities while the top floor is exclusively used for housing. This implies that the ceiling or slab needs to be strong enough to support the walls of the upper part of the building. The foundation must be reinforced for this purpose and the veranda on the top floor must be able to support itself. This solution was once implemented as a pilot project in Cupilom de Cima. The advantage is that the land requirement is minimized and commercial activity is stimulated. The staircase is combined with the structure of the latrine and a kitchen is installed upstairs.

The traditional housing typology - using the house shape, the adobe blocks and the corrugated metal sheets - becomes a constraint if one needs to increase densities through vertical extensions of the buildings. Costs are severely increased due to the use of reinforced concrete elements for supporting the upper floor and roof. As the population acquires an urban culture, one must start disseminating different housing alternatives and low cost solutions that can provide the population with other ways rather the traditional one.



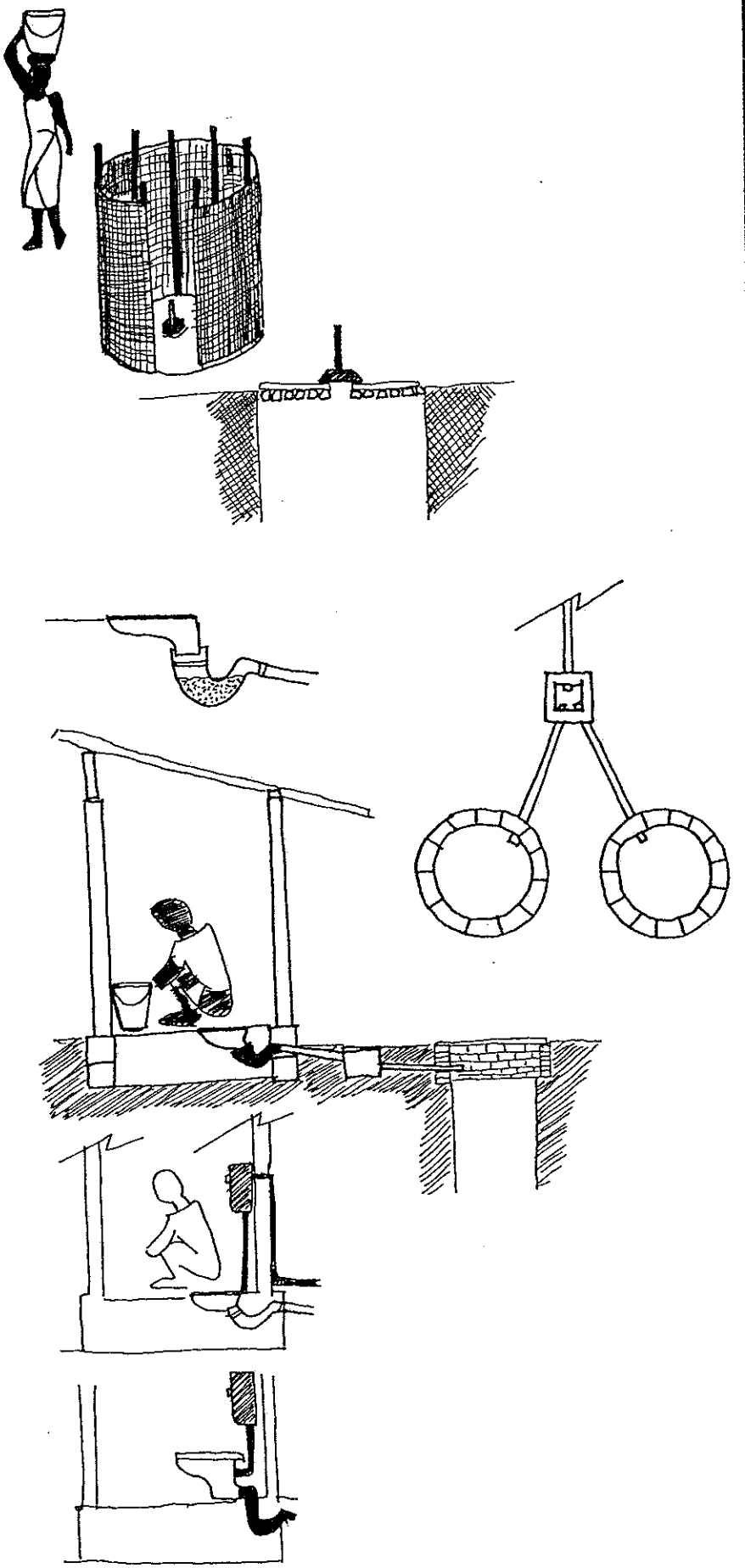
The housing typology used by the PMBB

In 1991, the cost of a popular housing unit implemented by the PMBB was US$3,500. The house owner had to make a downpayment equal to US$300. He also had to be responsible for adobe production, implementation of the walls, compactation of the floors and the roof structure.

This figure is specific for the PMBB and does not reflect the market prices. Therefore it is possible to affirm that the cost of a minimum standard house is out of reach for the great majority of the population of the city.

The cost of the latrine (US$ 300.00) is excluded. So as the preparation of the site, renting machines, transport of sand and fillings to be used in the floor, labour to produce adobe blocks, cost of transportation of cibes, administration and technical assistance. The cost of this house is US$21.00 per m2 and the cost of the roof still represents more than half of the total cost of the house although a much cheaper and smaller galvanized corrugated sheet was utilized. The house utilized 160 sheets of 2.60 x .82 mts and 350 concrete blocks of 20x20x40 cm in the foundation. This was the only possible alternative for housing during the process of neighbourhood upgrading. It was immediately accepted when relocation was necessary and it was easy and fast to build.

The foundation was an innovation and provided a significant improvement in the stability and durability of the walls. The internal environmental conditions were improved since the hight of the walls (3.00 m) and the roofs were strictly controled. Some cross-ventilation openings were introduced and a new house typology of double sided roof was successfully implemented in the narrow plots.



Improving Sanitation

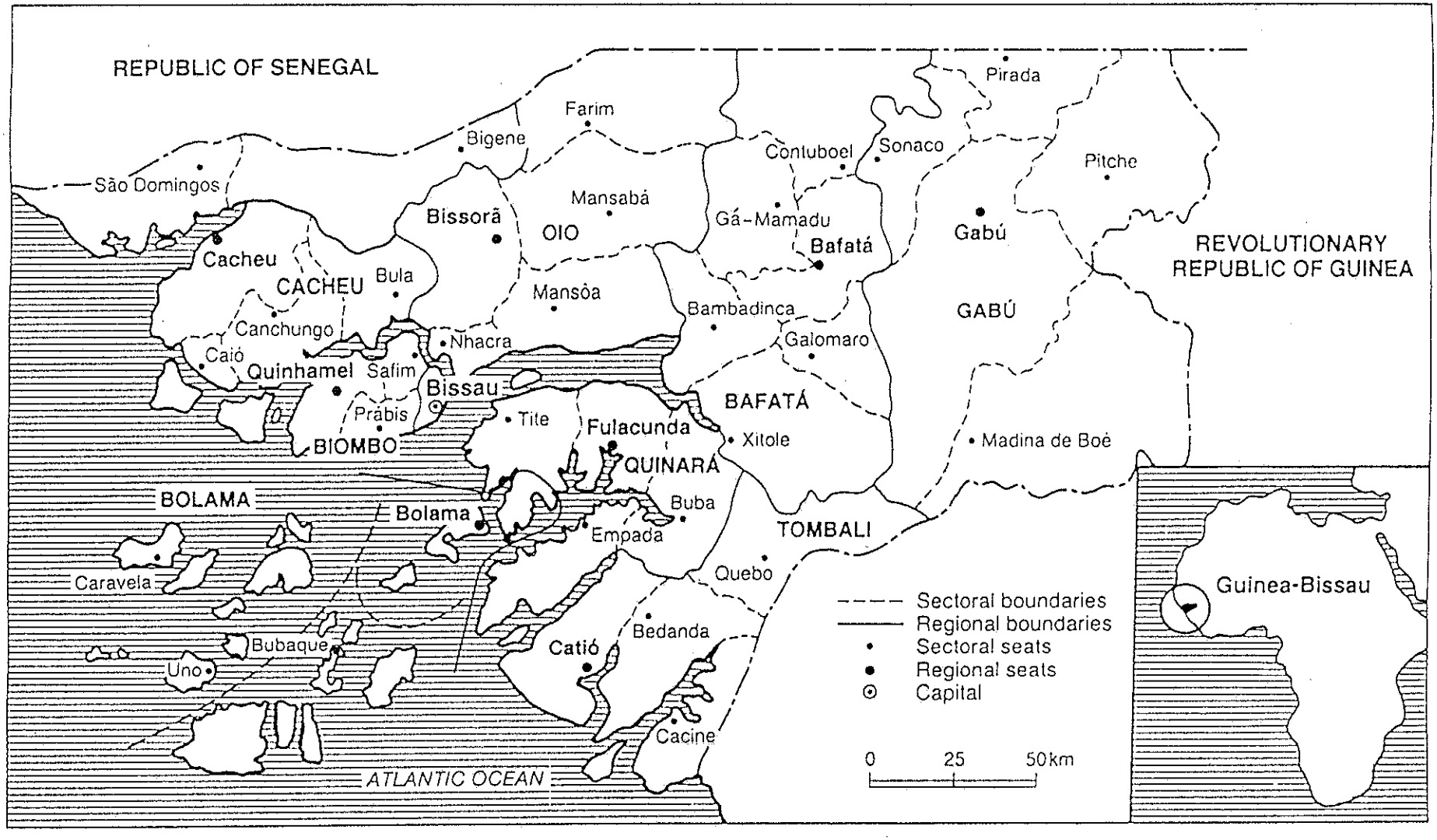
While dealing with interventions to alleviate the negative effects of crowding, one must seriously think about alternatives for the sanitation system.

The traditional pit latrine is made of local materials except for the concrete that is applied on top of the cibe structure placed on the ground. The walls are made of bamboo frames called quirintim. The place is used for private hygienic needs e.g. toilet and shower.

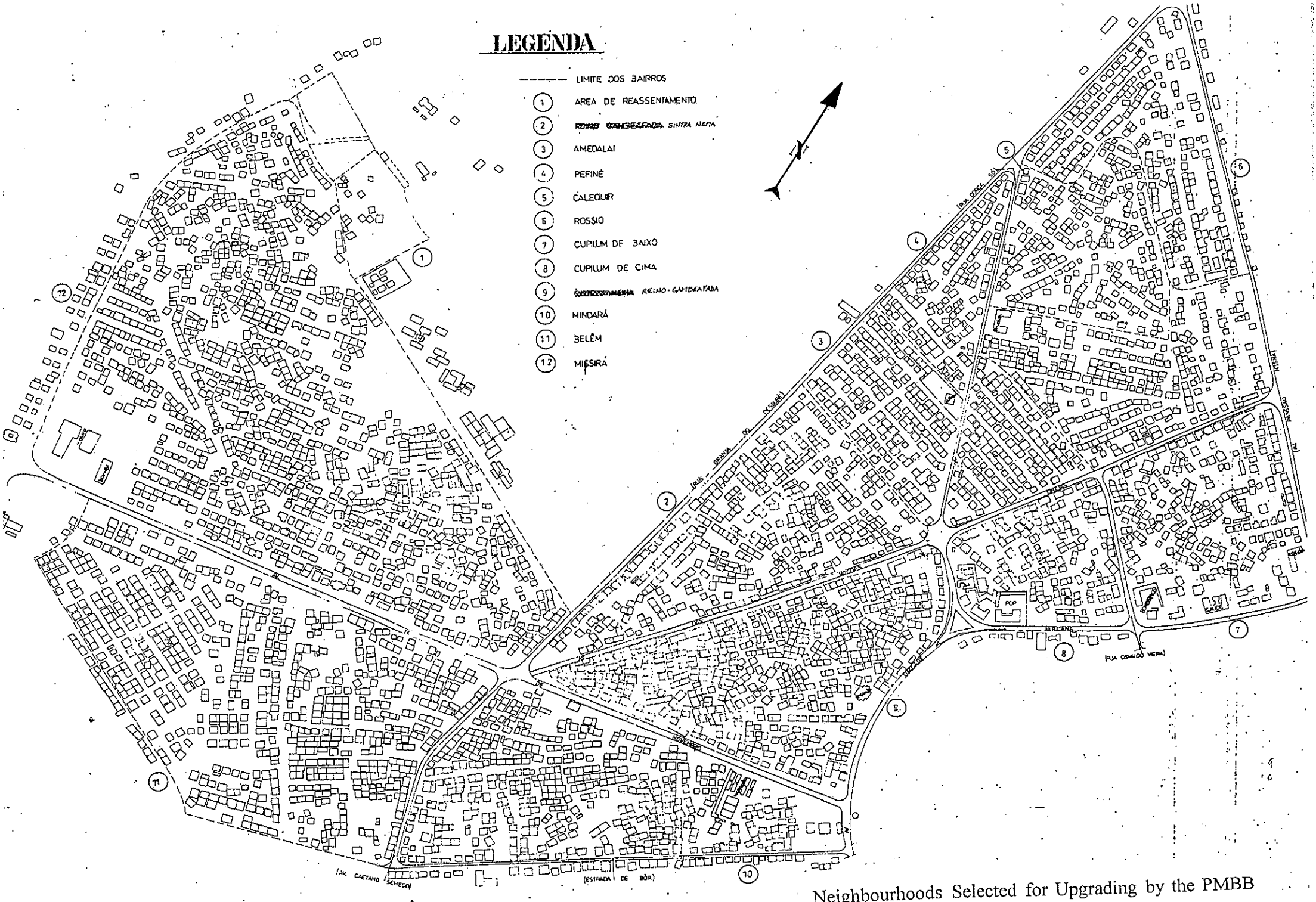
The improvement of the sanitation facilities in the popular neighbourhoods must have as a starting point the traditional dry pit latrine. As water becomes more abundant, it is necessary to think about an incremental solution for it.

The PMBB implements a double pit water lock latrine which has been very much accepted by the population of the popular neighbourhoods. In this solution, the inhabitant uses it as both toilet and shower.

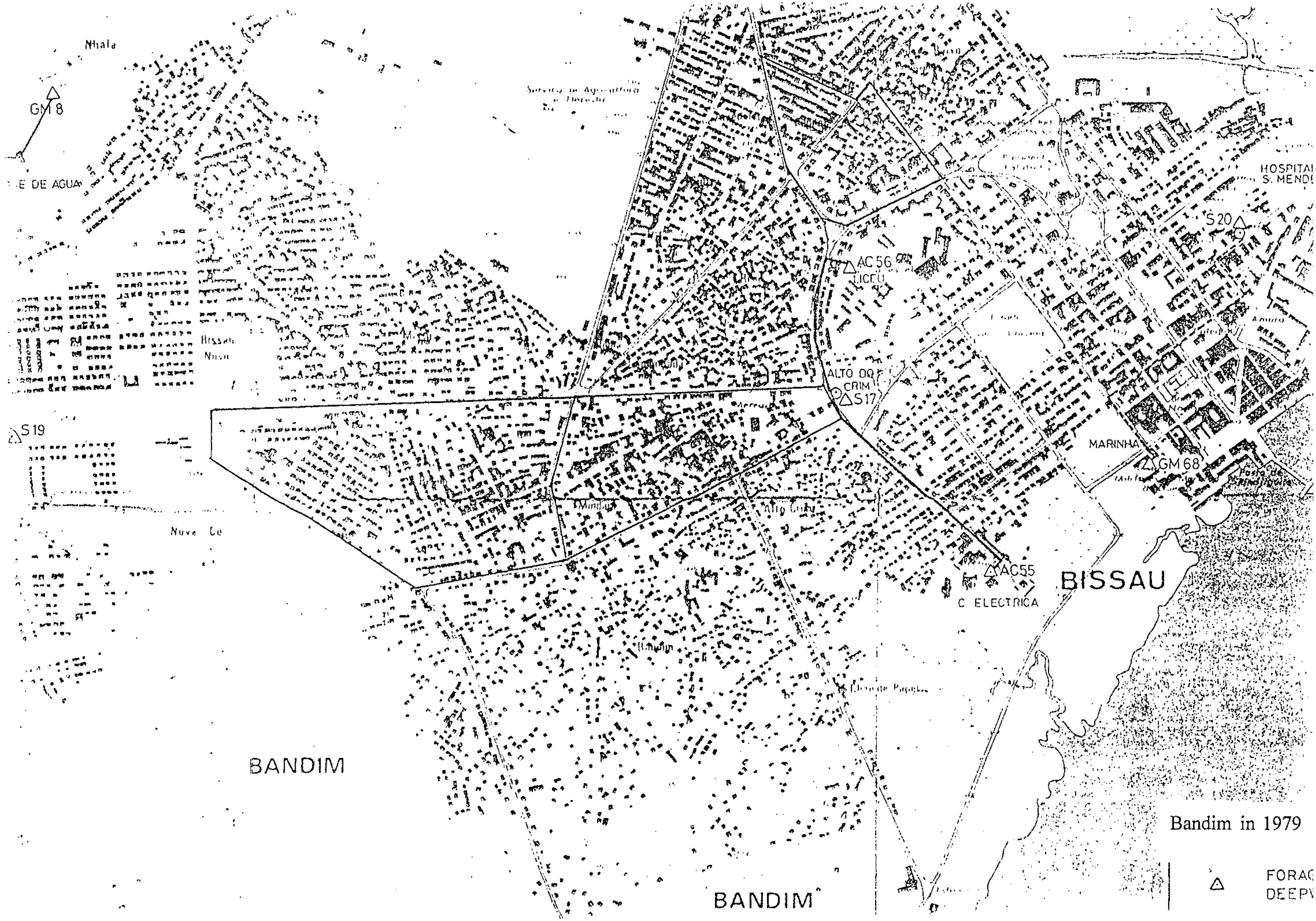
Once the house owner can get an individual connection to the water supply network, it will be possible to transform it into a pour flush latrine. Once this is accomplished, it will be necessary to separate the outlet of the shower and the toilet. Otherwise, the saturation period of the pits will be seriously affected.



Source: Galli, R.E. and Jones, J. (1987), "Guinea-Bissau: politics, economics and society", Frances Pinter (Publishers) Limited, London.



Neighbourhoods Selected for Upgrading by the PMBB



Nhala
GM 8
E DE AGUA
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S. MENDI
S20
AC 56
LICEU
ALTO DO
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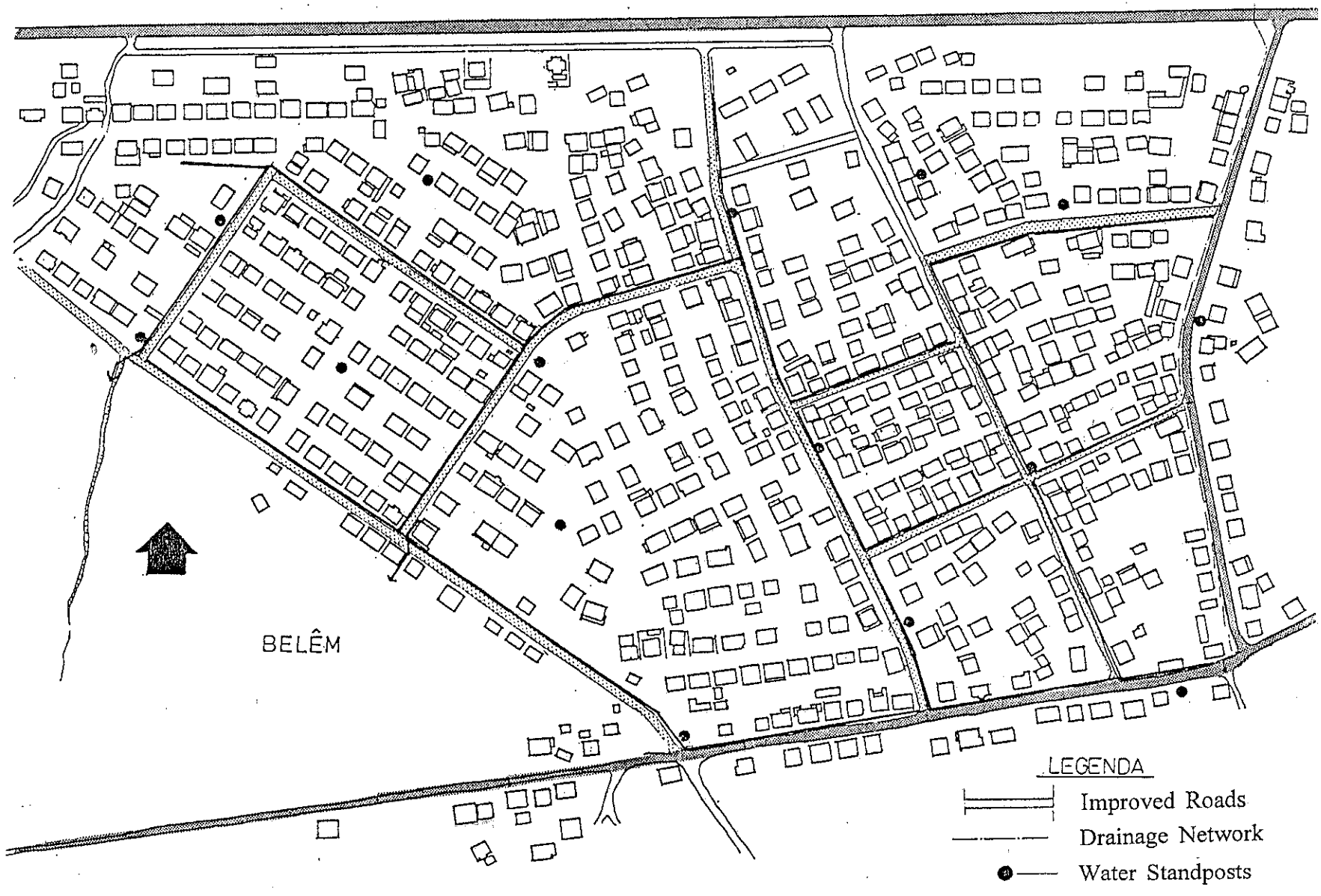
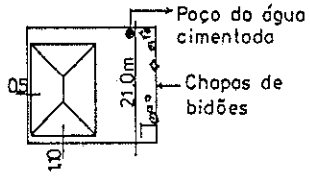
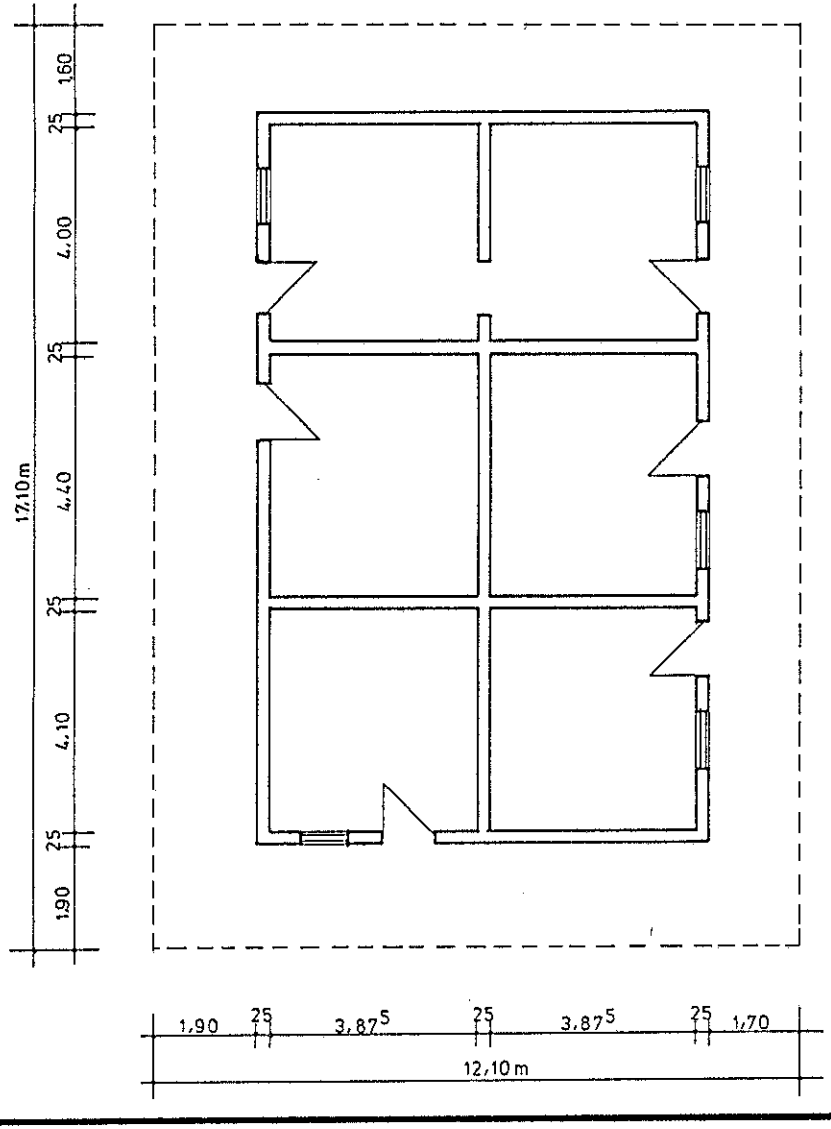

BELÊM
LEGENDA
Improved Roads
Drainage Network
Water Standposts



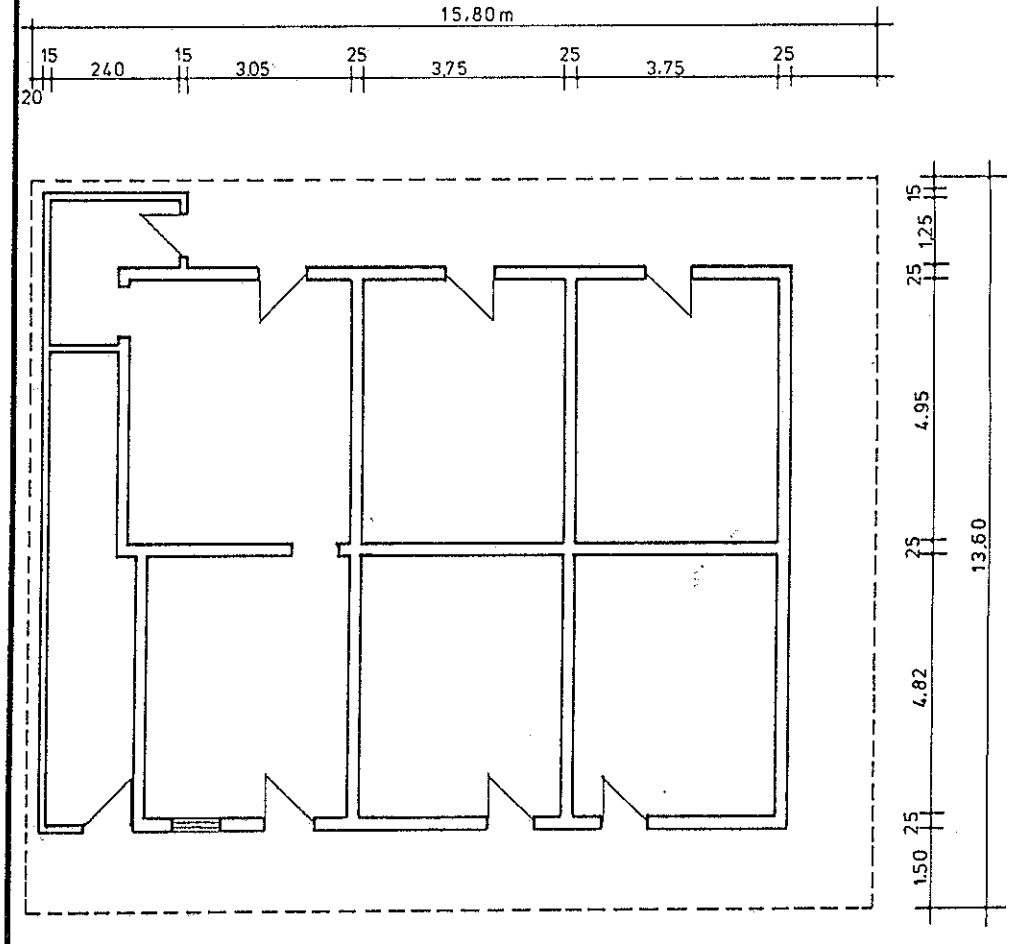
ÁREA COBERTA DA CASA
Nº CC 144
17,10 x 12,10 m = 207 m2



PROJECTO MELHORAMENTO DOS BAIRROS DE BISSAU

Houses in Cupilom de Cima

ÁREA COBERTA DA CASA Nº CC 245
15,80 x 13,60 = 245 m2

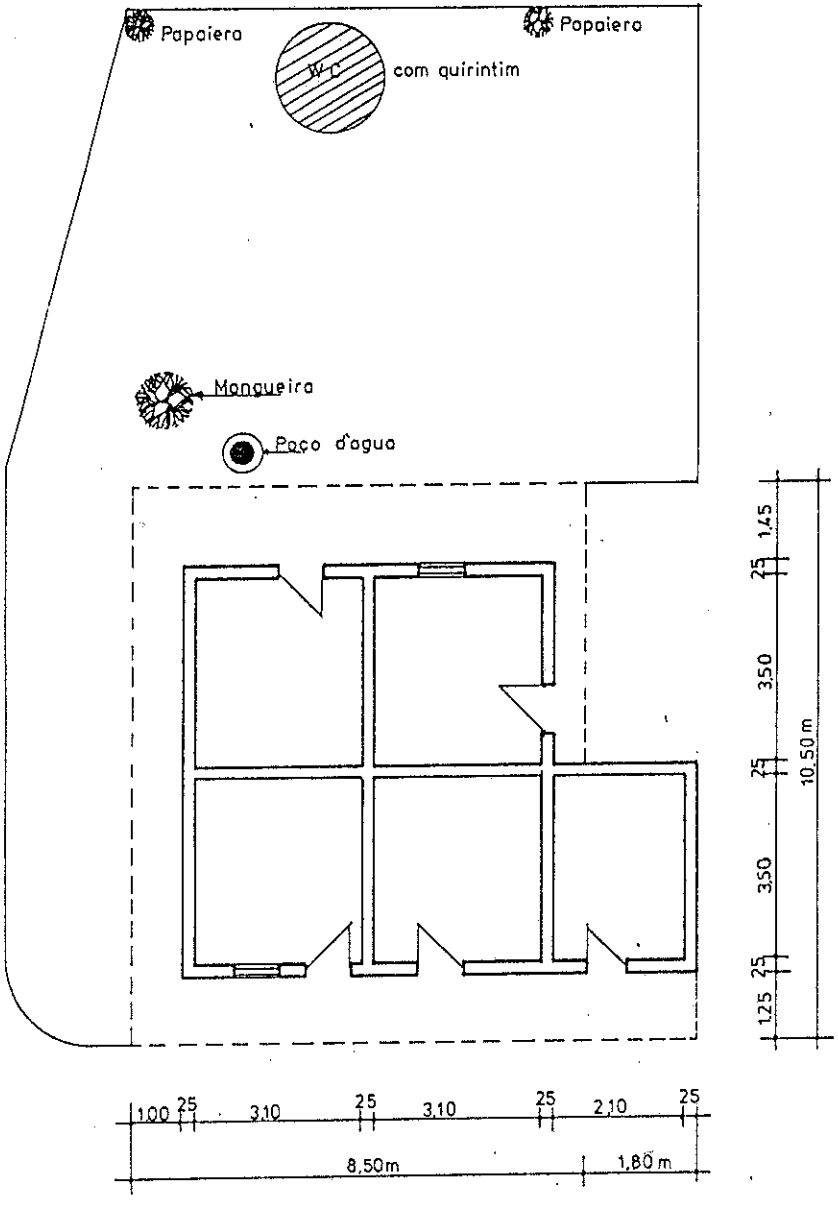


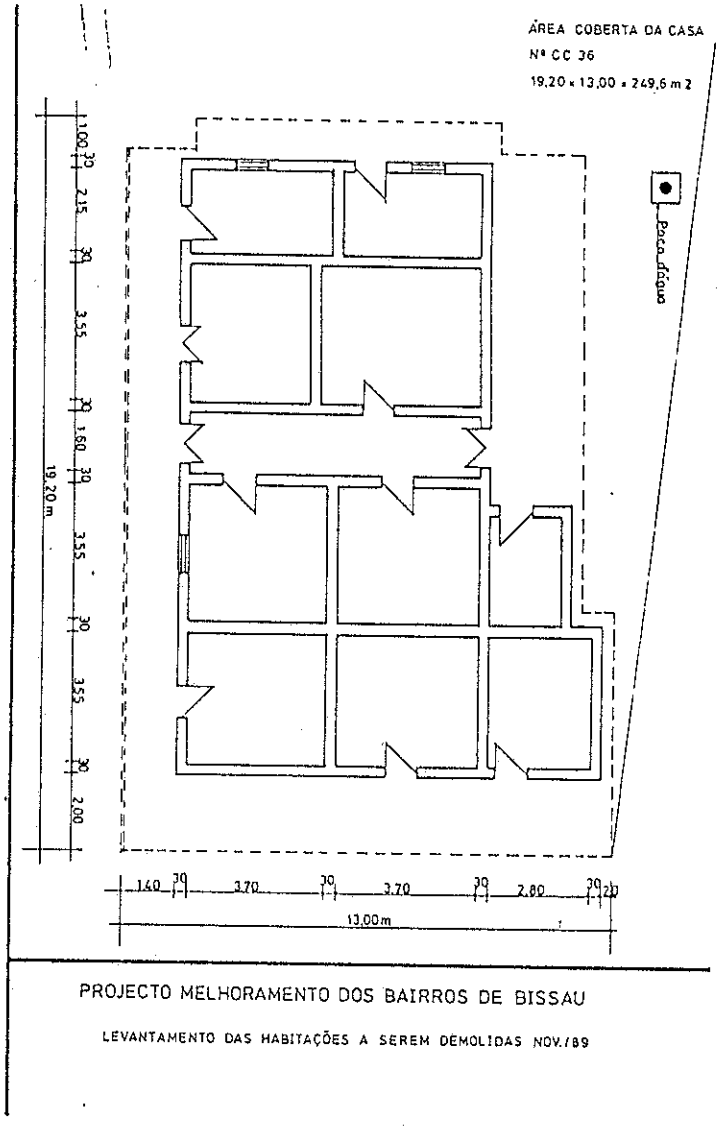
PROJECTO MELHORAMENTO DOS BAIRROS DE BISSAU
LEVANTAMENTO DAS HABITAÇÕES A SEREM DEMOLIDAS NOV. 89

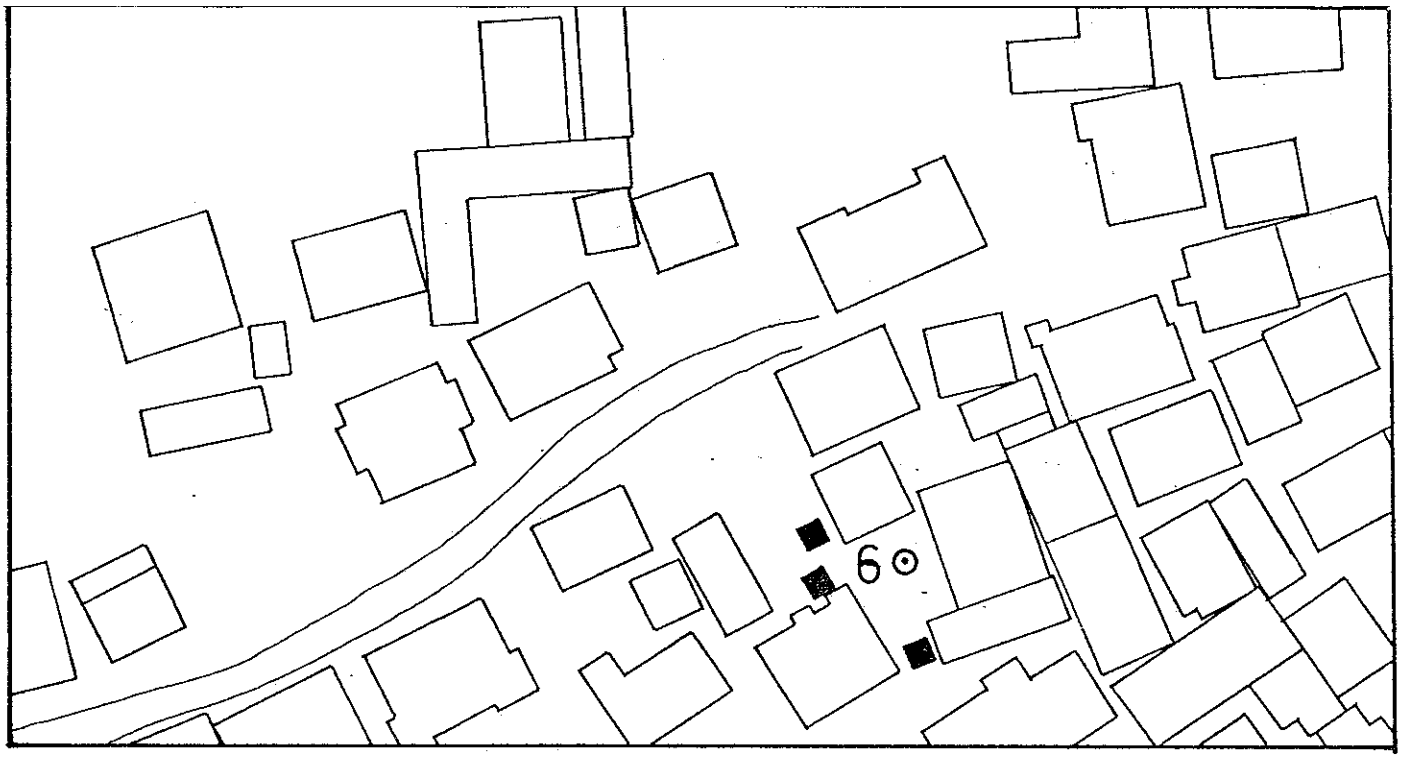
Houses in Cupilom de Cima

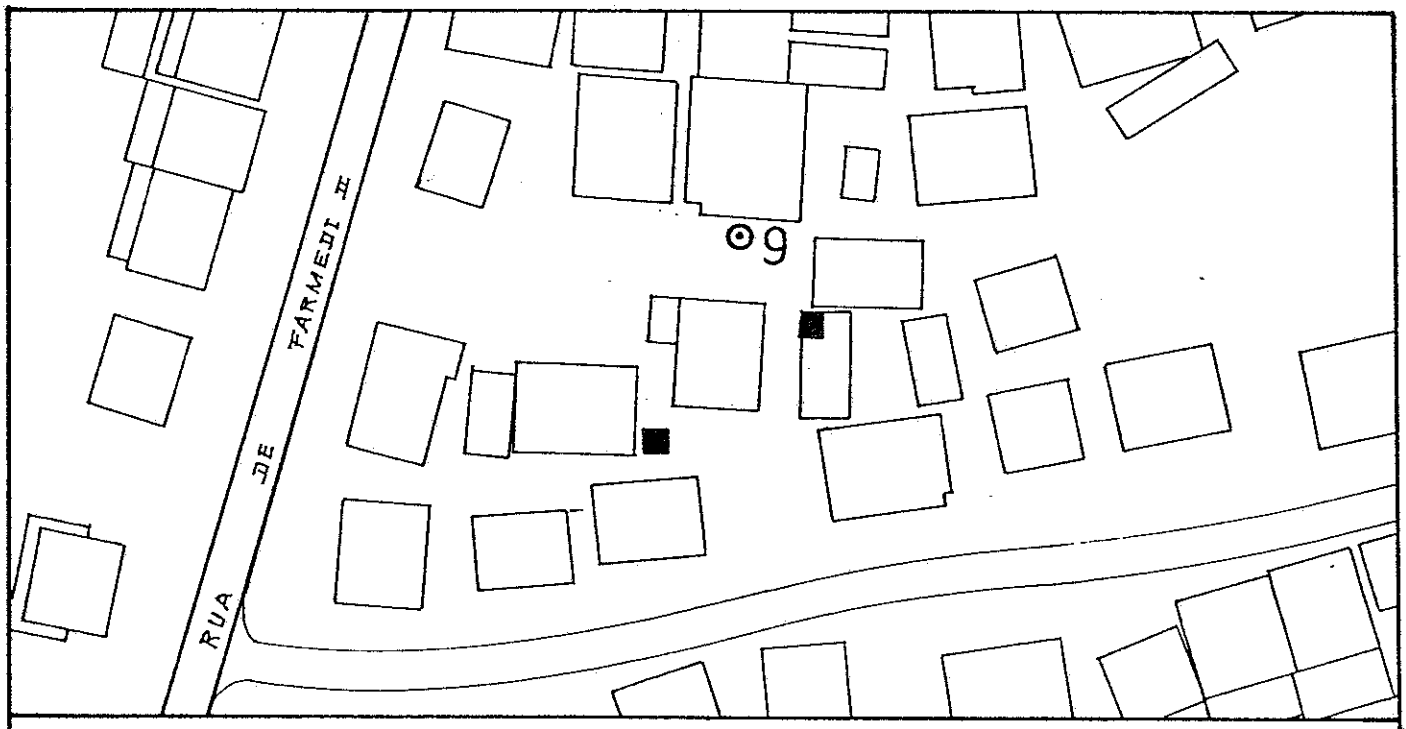
ÁREA COBERTA DA CASA Nº CC 147

10,50 x 8,50 + 1,80 x 4,00 = 96,45 m 2









Traditional Wells in Mindará