

<p style="text-align: center;">FINAL REPORT PRIPODE/CICRED PROJECT POPULATION, DEVELOPMENT AND ENVIRONMENT IN METROPOLITAN ACCRA: A TWO PHASE STUDY</p>

PART I

1. SUMMARY DESCRIPTION OF RESEARCH OPERATIONS

Introduction

The proposed research was designed to test the hypothesis that health levels in urban places are importantly influenced by the local neighbourhood environment, including the nature of the built environment (buildings and infrastructure), the socio-economic environment (including average levels of income and education as well as the availability and judicious use of resources), and the location of a neighbourhood within the broader urban environment (including its proximity to health clinics and hospitals). This is also tied to the kind of institutional arrangements that regulate resource allocation from the centre to the local level. The Accra Metropolitan Area (AMA), Accra, Ghana was selected for this study.

Research activities

PHASE I

The first phase of the project involved the collation of existing census, survey and health data for the city and organizing these data in a common geographical database. The primary unit of analysis was the 2000 census Enumeration Areas (EAs) of which there are 1741 in the city. The census data allow the calculation of a measure of early childhood mortality (children ever-borne/surviving) as well as providing detailed information about living conditions at the household level (water, sanitation, bathing and cooking, house type and tenure, for example). The routine death registration data for 1999, 2000 and 2001 were captured in a new database with the usual addresses, age, sex and cause of death of the decedents. The ICD-10 codes were added to this file.

Environmental conditions in each EA were then assessed from ground enquiries and from a digitised satellite image available for 2002. The Digital Globe multi-spectral satellite image of Accra was purchased and used to classify areas into land cover classes using multiple end member spectral mixture analysis with creation of

variables representing land use and landscape metrics as measure of the built and natural environment.

Health data on women were added from the Accra Women's Health Survey (WHS - fieldwork March –July 2003) with the geocodes for the sample EAs. Objectively assessed and subjectively reported measures of adult health were available for a representative sample of 3200 women aged 18 and over from the AWHS. These data were linked and a spatial statistical analysis conducted to assess measures of association between environment, living standards and health.

The spatial analysis was conducted using OLS logistic regression models in which threshold level of EA is modelled by variables describing social and built environment as derived from census, survey, vital statistics, administrative, and remotely secured imagery sources. The basic model tested with data on health derived from census and/or vital statistics was as follows:

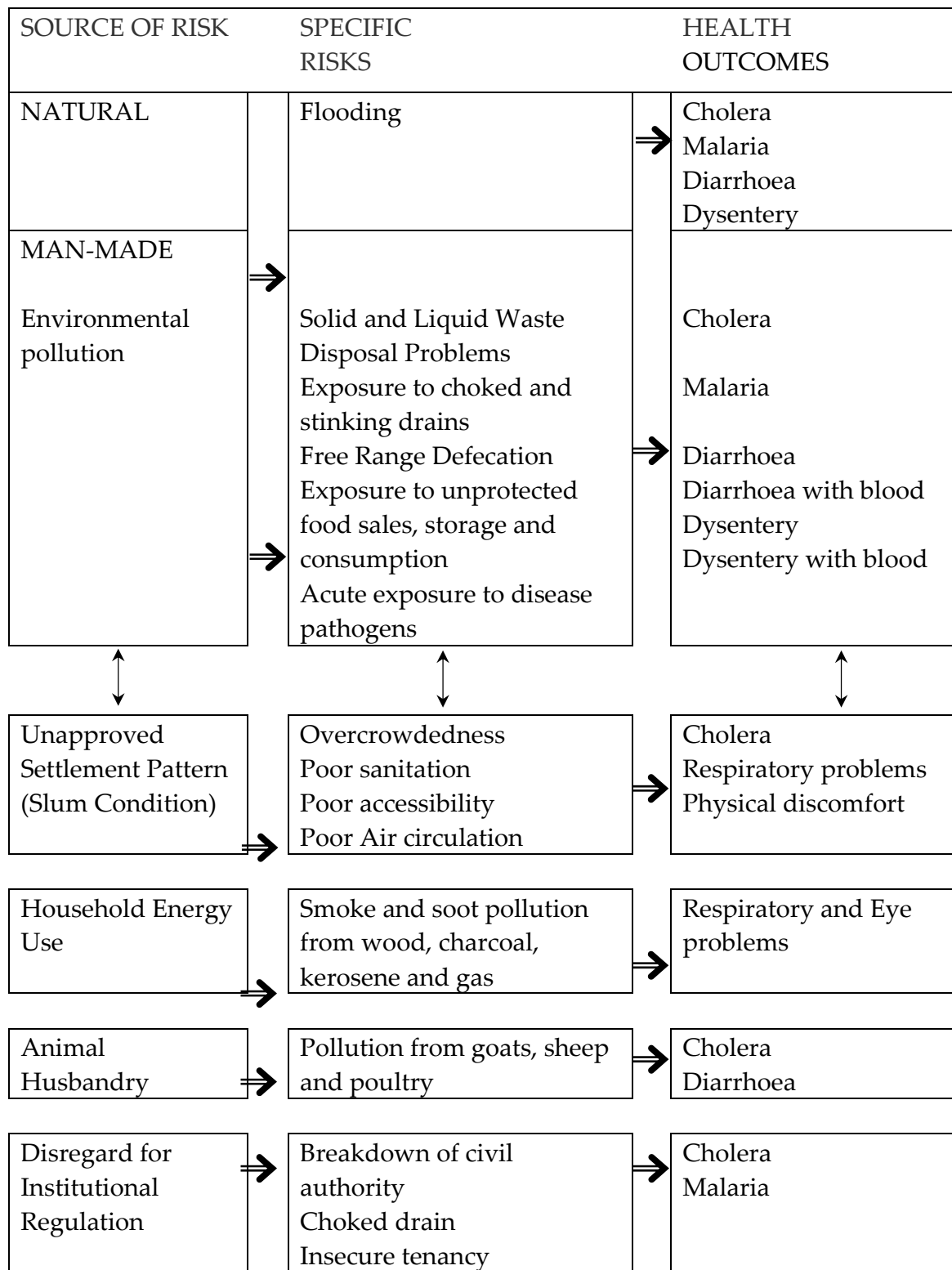
Health levels in EA ~ fn [individual socio-demographic characteristics, characteristics of neighbourhood environment (including census variables, satellite image variables, and proximity and use of health facilities)].

PHASE II

In the second phase, the project examined in detail these connections at a local level in a poor neighbourhood, Nima-Maamobi, where the Legal Resources Centre, a local NGO, has been active in health promotion at the community level for over five years. The LRC, staffed by lawyers from the Faculty of Law, other lawyers and environmental scientists, has formed solid working relations with women's groups, the gender action committees and local political, religious and traditional leaders to promote health through improved water and sanitation and the payment of exemptions from user fees for health services. Working with the local community, the project produced a subjective assessment of environmental risks and compared this with assessments based on the statistical evidence. The Medical Officer for Public Health for the AMA was part of to ensure good connection to policy and action.

The assessment of local perceptions of environmental risks within communities in Nima and Maamobi is based on the premise that health levels in urban areas especially in poor urban neighbourhoods are importantly influenced by the local neighbourhood environmental characteristics. This relationship is presented in Figure 1.

Figure 1. Environmental risk framework



In Phase II, new fieldwork based on focus group interviews and re-interview of some of the Women's Health Survey women resident in Nima and Maamobi produced some new data on the community's own perceptions of environmental hazards. The purpose of these interviews was to compare the objectively assessed and subjectively reported risks and to match the two to be able to draw appropriate conclusions and lessons. The framework shows that the sources of environmental risks are both natural and man-made. The consequences of these environmental risks are reflected in the specific risks which lead directly to the health outcomes as indicated. The flows in this framework from the sources of the environmental risks through specific risks to the health outcomes should not be interpreted as uni-directional flows. They also imply important feedback relationships indicating that improvement in the health outcomes should be undertaken simultaneously with improvements in the sources of the environmental risks to ensure healthy and sustainable living conditions.

This framework was empirically tested in Nima and Maamobi, which are very poor urban neighbourhoods in Accra. As a prelude to the empirical assessment of the environmental risks, the study surveyed the background characteristics of the population in the poor urban neighbourhoods. It is useful to relate these characteristics to the responses to the environmental risks.

The new data collection activities included in phase II of the project comprised:

- Development of local perceptions of environmental risk with communities in Nima – Maamobi EA and recording these by type and reasons for severity ratings. This included conducting focus group interviews with sub-groups of the population.
- Mapping of these areas and comparing them with the objectively assessed risks from satellite, survey data and work on the ground based on the statistical models described above;
- Showing how income generating projects that are environmentally sound, such as the Legal Resource Centre (LRC) work on composting and garbage separation by Nima – Maamobi youth, can be extended and broadened;
- Establishment of a baseline and preparation for intervention projects directed by the LRC, the AMA Health Department and Communities and Nima – Maamobi.

MEETINGS

Given the fact that members of the research team were located in different countries, meetings of all of us were conducted on the few occasions that we were all around in Ghana. There were thus more virtual meetings than real and most transactions were done via e-mail. In addition there were so many other informal meetings some members of the research team which were not recorded.

MEETING TO FINALIZE THE WORKPLAN FOR THE PRIPODE/CICRED PROJECT – “POPULATION, DEVELOPMENT AND ENVIRONMENT IN METROPOLITAN ACCRA: A TWO-PHASE STUDY”

ISSER, TUESDAY 28 SEPTEMBER 2004.

AGENDA

1. Review of key activities of the grant application and revised budget.
2. Shape files for EAs and districts (sub-metro areas)
3. Death registration data
4. Purchase of QuickBird digital image and transfer to CERSGIS
5. Focus groups in Nima-Maamobi: number and composition
 - a. LRC initiatives and resources (Dr. Raymond Atuguba)
 - b. Field staff
6. Re-interview of a sample of women in WHS households located in Nima-Maamobi EAs.
 - a. Questionnaire models
 - b. Field staff
 - c. Numbers and timing
7. Responsibilities and financial control

PROJECT SUMMARY

Phase I:

- Digitise the boundaries of the Enumeration Areas and produce an ArcGIS shape file to which all other data will be linked. 200 EAs already captured so feasibility and costs known.
- Link the census data by EAs to the EA shape files.
- Link all other survey data (WHS, AWHS, DHS) to the EAs in which the sampled households were located.

- Link all vital statistics and administrative data to the EA or sets of EAs in which events occurred.
- Geocode health facilities in Accra and measure distance from the centre of each EA to the closest health facility of each type.
- Purchase DigitalGlobe multispectral satellite image of Accra, classify image into land cover classes using multiple end member spectral mixture analysis, and create variables representing land use and landscape metrics as measures of the built and natural environment.
- Develop indices of threshold health levels by EA.
- Test OLS, logistic regression models in which threshold health level of EA is modelled by variables describing the social and built environment as derived from census, survey, vital statistics, administrative, and remotely sensed imagery sources.

Phase 2:

- Develop local perceptions of environmental risk with communities in Nima-Maamobi, record these by type and reasons for the severity ratings. Focus groups with sub-groups of the population.
- Map these areas and compare them with the objectively assessed risks from satellite, survey data and work on the ground, based on the statistical models as described above
- Show how income-generating projects that are environmentally sound (the LRC work on composting and garbage separation by Nima youth) can be extended and broadened.
- Establish a baseline and prepare for intervention projects directed by the LRC, the AMA Health Department and communities in Nima-Maamobi.

MODIFIED 28 July 2003

1. General table (total budget for the duration of the project) Request made to

<i>Item</i>	<i>Euros</i>	<i>\$</i>
<i>A. Permanent staff</i>	13,514	\$ 16,400
<i>B. Temporary staff</i>	17,469	\$ 21,200
<i>C. Premises</i>	2,472	\$ 3,000
<i>D. Running costs</i>	6,056	\$ 7,350
<i>E. Small equipment</i>	5,562	\$ 6,750
<i>F. Large equipment</i>	0	\$ -
<i>G. Travel expenses inside the country</i>	4,779	\$ 5,800
<i>H. Travel expenses outside the country</i>	1,648	\$ 2,000
<i>I. Other expenses</i>	6,500	\$ 7,888
TOTAL	58,000	\$ 70,388

A. Permanent staff.

In these conditions, senior and junior staff alike has to identify salary support to keep them in post and motivated. In this budget, we have estimated the level of effort for each Ghanaian researcher and allowed for the equivalent of an annual salary supplement of not more than 20% of gross pay. Support from this project. Amongst the costs is support for research fellows and doctoral students.

B. Temporary staff

Most of the staff here is needed for data capture (vital statistics and health data), GIS mapping and data coding and editing. Some higher-level workers will organize the focus groups and other in-depth analyses outlined in Phase 2.

C. Premises

Although the costs of premises are formally excluded, ISSER is an autonomous body that rents space to projects on a regular basis. In this case, space may be required in offices occupied by RIPS. The project will thus need to cover the costs of a rented office and office equipment. ISSER normally has a 15% finance and administration charge but this is being waived in lieu of these direct costs.

D. Running costs

There will be substantial stationery needs as stationery and computer consumables are expensive in Accra. The costs here include printing of forms, local meetings, reporting costs and seminars at the University.

E. Small equipment

Desktop computer, large format printer and large memory size is needed for the study. ARCGIS software alone costs over Euro 1000.

F. Large equipment

None.

G. Travel expenses inside the country

Local travel to study sites. Costs of using ISSER buses and cars. The capital costs of these are not being charged to the project.

H. Travel expenses outside the country

Two visits by Weeks and Hill, with air fare and local living costs for 15 days in country each. Two external visits by ISSER-based investigators to present findings at international meetings.

I. Other expenses

Digital satellite imagery costs \$6528. Additional external support estimated to cost Euro 5000 is needed to interpret these images and adapt them to local needs but these costs are not included in the CICRED budget.

Phase 1 (see attached summary) mostly concerns the building of the geographical database and the addition of relevant geocoded data from different sources. The main expenditures outside ISSER are a) negotiation with CERSGIS for assistance with the geographical frame using ARCVIEW/GIS and satellite imagery; and b) acquisition of the death certificate data from the Registry of Births and Deaths for the city for the years 1999, 2000 and 2001; c) purchase of the Quick Bird satellite imagery. An invoice for this imagery is now attached. San Diego State is ready to acquire this imagery for us and with the education discount, the price is \$6528. This was fully covered in the budget approved by PRIPODE/CICRED. I am

ready to take a dollar cheque with me when I leave for the US on the night of Thursday 7 October 2004.

We will work out separate agreements with CERSGIS and the Registry of Births and Deaths for the data and technical support we need from both.

Phase 2 involves some new field work – focus groups and re-interview of some of the Women's Health Survey women resident in Nima-Maamobi about the community's own perceptions of environmental hazards. The aim is to compare the objectively assessed and subjectively reported risks and to decide how to match the two. At our meetings, we decided to try and complete Phase 1 by December 31 this year; to hold a review meeting in late January 2005 at ISSER; and then after deciding on the field strategies at this meeting, to commence the fieldwork in Nima-Maamobi early in 2005.

To this end, Dr. Botchie is now identifying his core team of full and part-time assistants, recognising that we are trying to help support ISSER Mphil and Junior Faculty as far as possible. We will need a couple of quite powerful new computers and fast printers – the GIS files are very large. I will work with Dr. Botchie to produce specifications for these machines which we hope can be purchased locally with pre-installed software as soon as possible. The budget for these items is \$6750 which should be adequate. Dr. Botchie is also producing a detailed timetable of activities.

PART II

2. Presentation of the Research Team with responsibilities.

Name of Research Team Member	Description of Responsibilities
Prof. John K Anarfi, ISSER, University of Ghana	Research Team leader and Director of the diverse activities undertaken by the project. Participation in focus group discussions in Nima – Maamobi.
Dr. George Botchie, ISSER, University of Ghana	Served as day-to-day co-ordinator of the project. In addition to identifying core team of full and part time research assistants, he drew up the interview guides for the focus group discussions in Nima – Maamobi and prepared the draft report in the new data collected from Nima-Maamobi.
Dr. Samuel Agyei-Mensah	Collation of census and survey material. Demographic analysis of Nima-Maamobi data. Liaison with CERSGIS and GIS specialists.
Dr. Nii Ayite Coleman	Conduct and coding of survey of health establishments. Assistance with cause of death coding of death certificates.
Dr. Raymond Atuguba, Faculty of Law, University of Ghana.	Facilitating contacts and field work in Nima-Maamobi through the Legal Resources Centre.
Mr. Julius Najah Fobil	Liaison with youth groups.
Prof. Allan G Hill, Harvard Center for Population and Development Studies. ahill@hsph.harvard.edu	Direction of WHS field work and analysis. Geocoding of EAs. Survey design, data entry and analysis advice.
Prof. John Weeks, Dept. of Geography, San Diego State University John.weeks@sdsu.edu	Rectification of EA shape files with other maps and the Quickbird satellite imagery. Image interpretation and classification algorithms.
Prof. Jacob Songsoore, Graduate Studies, University of Ghana	Strategic advice on design and content of perceived environmental risks.
Research Assistants	

PART III

3.1 Brief Summary of Research Proposal as initially submitted

The proposed research is designed to test the hypothesis that health levels in urban places are importantly influenced by the local neighbourhood, including the nature of the built environment (buildings and infrastructure), the social environment (including average levels of income and education as well as the availability and judicious use of resources), and the location of a neighbourhood within the broader urban environment (including its proximity to health clinics and hospitals). This is also tied to the kind of institutional arrangements that regulate resource allocation

from the centre to the local level. The Accra Metropolitan Area (AMA), Accra, Ghana has been selected for this study.

The lead institution is the Institute of Statistical, Social and Economic Research with researchers from other Departments and Schools of the University of Ghana (Dept. of Geography & Resource Development, School of Public Health, Medical School, Faculty of Law) working with health officials from the Accra Metropolitan Assembly. Collaboration is planned with colleagues from San Diego State University for the satellite interpretation and spatial statistics and with the Harvard School of Public Health for the epidemiology and demography.

The first phase of the project involves the collation of existing census, survey and health data for the city and organising these data in a common geographical database. The primary unit of analysis will be the 2000 census enumeration areas of which there are 1700 in the city. The census data allow the calculation of a measure of early childhood mortality (children ever-borne/surviving) as well as providing detailed information about living conditions at the household level (water, sanitation, bathing and cooking, house type and tenure, for example). The routine death registration data for 1999, 2000 2001 will be captured in a new database with the usual addresses, age, sex and cause of death of the decedents. Morbidity data will be added from out-patient records from the city's public hospital and clinics. The environmental conditions in each EA will then be assessed from ground enquiries and from a digitised satellite image available for 2002.

The project will then link new data from the 1998 DHS survey, the 2003 proposed DHS, the WHO World Health Survey (WHS – fieldwork February – May 2003) and the Accra Women's Health Survey (AWHS – fieldwork March – July 2003), each of which contains geocodes for the sample clusters (DHS) or for the individual households interviewed (WHS and AWHS). Objectively assessed and subjectively reported measures of adult health will this be available for a representative sample of 3200 women aged 18 and over from the AWHS. Only self-assessed health status is available in the WHS but this covers adult men and women. These data will then be linked and a spatial statistical analysis conducted to assess measures of association between environment, living standards and health.

In a second phase, the project will examine in detail these connections at a local level in a poor neighbourhood, Nima-Maamobi, where the Legal Resources Centre has been active in health promotion at the community level for over 5 years. The LRC, staffed by lawyers from the Faculty of Law, other lawyers and environmental scientists, has formed solid working relations with women's groups, the gender

action committees and local political, religious and traditional leaders to promote health through improved water and sanitation and the payment of exemptions from user fees for health services. Working with the local community, the project will produce a subjective assessment of environmental risks and compare this with assessments based on the statistical evidence. The result will be a plan of action developed by the AMA Health Department in conjunction with the community leaders for enlargement the project to cover other poor neighbourhoods of the city. For this reason, the Medical Officer for Public Health for the AMA is part of this project from the outset. Other support is being sought for objective assessment of water and air quality at a later stage. The baseline analysis in Phase 1 will also form the starting point for the assessment of planned interventions.

3.2 DETAILED PRESENTATION OF RESEARCH FINDINGS

PHASE I

We began with a relatively simple model of intra-urban health patterns in Accra, hypothesizing that there was spatial variability in health within Accra and that this would be explained by the local neighbourhood environment, including the nature of the built environment (buildings and infrastructure), the socio-economic environment community and contextual factors.

Our results suggest that our original hypotheses were not wrong, per se, but that the health situation in Accra is vastly more complex than the literature and thus our simpler models would suggest. Most puzzling is the relative inability of any of the usual risk factors at the individual level to explain intra-individual variability in health levels. Answers to that puzzle may lie within the neighbourhoods themselves, as suggested by the results of the geographically weighted regression. That analysis confirmed at the individual level what was shown at the ecological level. Not only do health levels vary by location within Accra, the predictors of health levels also vary according to place of residence. In particular, it is not clear whether slums are overrated or underrated with respect to their impact on health, but our analysis—the first of its kind as nearly as we can tell from the literature—indicates that slums are far from being all alike with respect to health levels. Some of the worst slums in Accra also have some of the poorest health levels, but some do not. Furthermore, poor health is evident in some places that are not considered to be slums, and some slum areas have reasonably good levels of health.

One technical problem involves the measurement of the health outcomes of interest. In most previous studies, self-rated health was chosen as the dependent variable. Our work and others associated with the WHO World Health Survey has shown the importance of cut-points in these assessments which are themselves associated with social class. Thus, we often find an inversion of the usual gradient in health by social class with the poorest or lowest SES group reporting the lowest morbidity.

An additional technical dimension in the objectively assessed health measures we were able to obtain in the Women’s Health Survey was that the pattern of morbidity varied widely by SES. Thus, we found that the poor, especially those living in low lying areas by the river, were more prone to infectious conditions (malaria in particular) whereas the higher social class were more afflicted by chronic conditions such as the risk factors for cardio-vascular disease. This complicates the comparison of even objectively assessed health states by social class.

Overall, we do see clustering of health conditions by district although these district level effects cannot be readily distinguished from some historical patterns of ethnic concentration in the city. The Ga, the oldest established residents of Accra, are concentrated in some former villages – Jamestown, Osu, La – now absorbed into the city and at the same time these older neighbourhoods share common characteristics such as crowding, proximity to the sea and an older housing fabric.

PHASE II

The key results can be summarized in four tables:

Table 1: Assessment of environmental risks

Risks	Responses (%)	
	Nima	Maamobi
Flooding	14.0	79.6
Environmental pollution	87.5	91.1
Unapproved settlement pattern	21.1	59.9
Household energy use	2.6	35.7
Animal husbandry	23.0	64.3
Disregard for institutional regulations	17.1	53.5

Table 2: Assessment of severity of environmental risks

Risks	Degree of severity
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	No Risk		Small Risk		Moderate Risk		Severe Risk	
	Nima	Maamobi	Nima	Maamobi	Nima	Maamobi	Nima	Maamobi
Flooding	37.5	8.3	30.3	8.9	17.1	31.2	15.1	51.6
Environmental pollution	1.3	1.3	1.3	3.8	5.3	16.6	92.1	78.3
Unapproved settlement pattern	3.9	11.5	5.9	14.6	42.1	43.3	48.0	30.6
Household energy use	34.2	28.7	50.0	19.7	13.2	32.5	2.6	19.1
Animal husbandry	10.5	7.0	12.5	22.9	26.3	43.3	50.7	26.8
Disregard for institutional regulations	11.2	28.0	7.9	15.9	19.7	27.4	61.2	28.7

The responses suggest that the people interviewed perceive environmental pollution as the major source of environmental risks in Nima and Maamobi. On the whole, the environmental risks are more pronounced in Maamobi than Nima. Flooding, environmental pollution, unapproved settlement patterns, animal husbandry and disregard for institutional regulations are the major environmental risks in Maamobi. These situations are closely related to the relatively low educational levels in Maamobi. In Nima where the educational levels are relatively higher, similar environmental risks are relatively low. It would seem that these responses suggest more exposure to environmental risks in Maamobi than in Nima. The severity of these environmental risks in the two communities is important. The study therefore assessed the degree of the environmental risks in terms of their severity in the two communities. The major causes of environmental risks in Nima and Maamobi are many and varied. These various causes are stated under each environmental risk in relation to the responses from Nima and Maamobi.

Table 3: Major Causes of Environmental Risks in Nima and Maamobi

Causes	Locality		Combined Sample
	Nima	Maamobi	
Flooding			
Poor drainage	73.0	93.6	83.5
Choked gutters	76.3	98.1	87.4
Building on water sources	72.4	49.7	60.8
Spontaneous settlement pattern	55.3	60.5	57.9
Environmental Pollution			
Solid waste disposal	96.7	96.2	96.4
Liquid waste disposal	91.4	68.8	79.9
Flooding	30.3	47.8	39.2
Choked and stinking drains	96.7	91.1	93.9
Free range defecation	86.2	60.5	73.1
Exposure to disease pathogens	69.7	40.8	53.0

Slum conditions			
No layout/building regulation	48.7	74.5	61.8
Refusal to adhere to building regulation	85.5	56.7	70.9
Teaming influx of low-income migrants into the community	78.9	83.4	81.2
Sub-Standard housing	92.1	68.2	79.9
Overcrowding			
Too many occupants in household	95.4	73.9	84.5
High room occupancy ratios	94.1	65.6	79.6
Low income	89.5	93.6	91.6
Lack of alternative housing	75.7	50.3	62.8
High illiteracy rate	80.3	33.1	56.3
Enjoy living in dense populated neighbourhoods	47.4	54.8	51.1
Disregard for Institutional Regulation			
Weak enforcement of law and order regarding building regulations	83.6	89.8	86.7
Non-existence of statutory layout for the community	13.2	60.5	37.2
Weak institutional structures	82.2	59.2	70.6
Civil disorder	89.5	66.2	77.7
N	152	157	309

There seems to be no significant difference between Nima and Maamobi with regard to the causes of environmental risks. Poor drainage, choked gutters, solid waste disposal, liquid waste disposal, choked and stinking drains and low income among others are relatively high in both communities. It does not seem easy to explain away the variations of the causes of environmental risks in terms of the relative level of literacy or ethnicity in both communities. Overcrowding and high room occupancy ratios are higher in Nima than Maamobi despite the fact that literacy rates are relatively higher in Nima than Maamobi. The level of responses to the causes of environmental risks in both communities suggests that they are indeed very poor urban neighbourhoods.

In the survey, opinions of the communities were sought on how to cope with the environmental risks and health problems in Nima and Maamobi. Generally, the opinions expressed by the respondents in Nima and Maamobi are expressed in Table 4.

Table 4: General Opinion of respondents in Nima and Maamobi on how to cope with Environmental Risks and Health Problem

General opinion	Locality	
	Nima	Maamobi
Provision of rubbish containers/Regular Collection of refuse	52.2	19.7
Adherence to Public Regulations	54.4	43.1
Provision of Public Toilets	12.2	15.3
Prohibition of Animal Husbandry in a free range manner	1.4	5.8
Encouragement of communal labour	2.0	4.4
Reconstruction of houses with toilet/bathing facilities	3.4	10.2
Stop charging people for disposal of waste into containers	1.4	1.5
N	147	157

In general terms, provision of rubbish containers and adherence to public regulations are the preferred options in Nima and Maamobi for coping with environmental risks and health problems.

Opinions in the two communities vary on the role the Central Government should play in coping with the environmental risks and health problems. In Nima, law enforcement, provision of refuse containers and intensive public education featured prominently in the opinions expressed on the Central Government's role in coping with environmental risks and health problems. In Maamobi, law enforcement, provision of more public toilets and provision of logistic support for communal labour are important roles that the Central Government should play in coping with environmental risks and health problems in their community.

The detailed work in Nima-Maamobi also brought out some clear differences in community responsibility even between these two low income areas. In Nima, more homogenous and consisting of migrants from the north, the willingness to engage in communal efforts to improve health seemed more developed. Encouragement of communal labour especially in Nima, adherence to public regulations and public education on sanitation especially in Maamobi are the major opinions expressed by the communities in Nima and Maamobi on the roles the communities should play to cope with the environmental risks and health problems.

An additional variable leading to the development of social networks and associations may be the duration of residence of migrants and residents in particular neighbourhoods. The debate on the significance of social capital – social arrangement and functions operating at a level beyond the aggregate of individual actions – is still raging and unfortunately our data are not dense enough on the

Nima-Maamobi case to decide if there are additional over-arching social functions that go beyond kinship ties or the participation of individuals in clubs and associations to maximize individual rather than collective gain. This work will probably need to adopt a more long term anthropological approach to such issues.

Access to the remotely sensed data added some additional truly ecological variables to the analysis. At the local level, people's perception of environmental risk was not necessarily adapted to the public health risk factors commonly linked to the infectious conditions – malaria, diarrhoea and cholera, for example. Although rubbish in the streets is a nuisance, attracting rodents and other pests, very few rated the introduction of latrines or piped sewage above other possible sanitary improvements.

We have shown that there are very discernible spatial patterns of health inequalities in Accra, and similarly there are very clear spatial pattern to poverty. However, contrary to our expectations, at this ecological level of analysis, poverty was not very highly predictive of health. We also found that using data from the satellite imagery showed that a lack of vegetation is associated with poverty, but since poverty levels at the locality level are only weakly associated with health, the lack of vegetation is similarly not very predictive of poor health.

GH1

**REPORT ON ENVIRONMENTAL RISKS
PRIPODE/CICRED PROJECT**

**POPULATION, DEVELOPMENT AND ENVIRONMENT IN METROPOLITAN
ACCRA: A TWO PHASE STUDY**

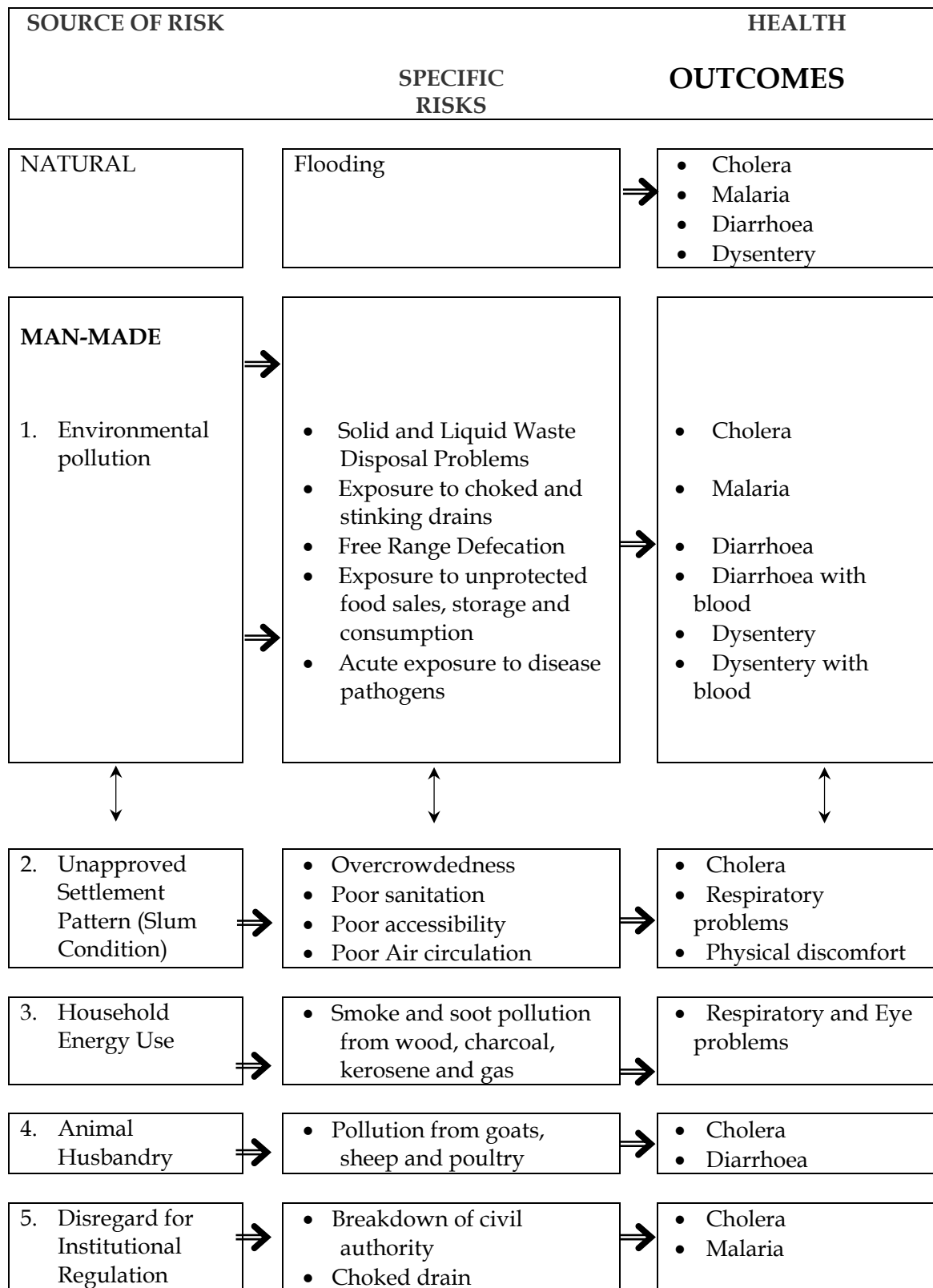
PHASE II

Assessment of Local Perceptions of Environmental Risks within Communities in
Nima and Maamobi

1.0 METHODOLOGY

The assessment of local perceptions of environmental risks within communities in Nima and Maamobi is based on the premise that health levels in urban areas especially in poor urban neighbourhoods are importantly influenced by the local neighbourhood environmental characteristics. This relationship is presented in figure 1.

Fig 1: ENVIRONMENTAL RISK FRAMEWORK



• Insecure tenancy

The framework shows that the sources of environmental risks are both natural and man-made. The consequences of these environmental risks are reflected in the specific risks, which lead directly to the health outcomes as indicated. The flows in this framework from the sources of the environmental risks through specific risks to the health outcomes should not be interpreted as uni-directional flows. They also imply important feedback relationships indicating that improvement in the health outcomes should be undertaken simultaneously with improvements in the sources of the environmental risks to ensure healthy and sustainable living conditions.

This framework was empirically tested in Nima and Maamobi, which are very poor urban neighbourhoods in Accra.

The new data collection activities included in phase II of the project comprised:

- Development of local perceptions of environmental risk with communities in Nima – Maamobi EA and recording these by type and reasons for severity ratings. This included conducting focus group interviews with sub-groups of the population.
- Mapping of these areas and comparing them with the objectively assessed risks from satellite, survey data and work on the ground based on the statistical models described above;

- Showing how income generating projects that are environmentally sound, such as the Legal Resource Centre (LRC) work on composting and garbage separation by Nima – Maamobi youth, can be extended and broadened;
- Establishment of a baseline and preparation for intervention projects directed by the LRC, the AMA Health Department and Communities and Nima – Maamobi.

1.1 Background Characteristics of Population in Nima and Maamobi

As a prelude to the empirical assessment of the environmental risks, the study surveyed the background characteristics of the population in the poor urban neighbourhoods. It is useful to relate these characteristics to the responses to the environmental risks.

The background characteristics of the population in Nima and Maamobi include, residential status, marital status, age, religion, education, ethnicity and occupation.

Table 1 shows the characteristics of respondents in each community.

Table 1: Background characteristics of respondents in Nima and Maamobi

Characteristic	Locality		Combined Sample
	Nima	Maamobi	
Residential Status			
Migrant	32.2	29.9	31.1
Indigene	67.8	70.1	68.9
Marital status			
Never married	40.1	36.9	38.5

Currently married	38.2	59.2	48.9
Divorced	1.3	1.9	1.6
Not stated	20.4	1.9	11.0
Age			
<20	9.9	0.6	5.2
20 – 29	42.1	27.7	34.9
30 – 39	17.1	30.3	23.8
40 – 49	15.1	21.9	18.6
50 – 59	9.2	12.3	10.7
60 +	6.6	7.1	6.8
Religion			
Christianity	49.3	26.1	37.5
Islam	50.7	72.0	61.5
Traditional	0.0	1.9	1.0
Education			
No formal education	4.6	2.5	3.6
Primary	10.5	8.9	9.7
JSS/middle	39.5	14.0	26.5
Secondary	30.9	25.5	28.2
Tertiary	7.2	12.7	10.0
Not stated	7.2	36.3	22.0
Ethnicity			
Ga-Adangbe	11.2	5.7	8.4
Akan	30.9	12.1	21.4
Ewe	18.4	13.4	15.9
Mole-Dagbani/Northner	38.2	68.8	53.7
Non-Ghanaian	1.3	0.0	0.6
Occupation			
Farming/Fishing	0.0	3.4	1.6
Trading	32.2	33.6	32.9
Artisan	18.4	19.9	19.1
Professional/Managerial	6.6	8.2	7.4
Student/Apprenticeship	14.5	13.0	13.8
Others	20.3	19.8	20.1
Unemployed	7.9	2.1	5.0
N	152	157	309

The population in the two communities are relatively young. While 59.2% of the population in Nima fall within 30 – 49 age group, the population in the same age group in Maamobi constitutes 58.0%. Educational levels however vary widely

between the two communities. Literacy is higher in Nima than Maamobi. The proportion of the population in Nima, which attained the JSS/Middle, and Secondary levels of education is 69.5% while the same level of education in Maamobi is only 39.5%. The residents in the two communities are predominantly Moslems even though the proportion is higher in Maamobi (72.0%) than Nima (50.7%). These characteristics bear important relationships to environmental risks in the two communities. The detailed background characteristics of the population of Nima and Maamobi is attached to this report as Appendix 1.

2.0 RESEARCH FINDINGS

2.1 Sources of Environmental Risks in Nima and Maamobi

What the respondents perceived as the sources of environmental risks in Nima and Maamobi are identified as flooding, environmental pollution, unapproved settlement pattern, household energy use, animal husbandry and disregard for institutional regulations. Table 2 shows the responses of the population in Nima and Mamobi to these sources of environmental risks.

Table 2: Sources of Environmental Risks in Nima and Mamobi

Risks	Spontaneous Responses		Probing		No Response	
	Nima	Maamobi	Nima	Maamobi	Nima	Maamobi
Flooding	14.0	79.6	86.0	20.4	0.0	0.0
Environmental pollution	87.5	91.1	9.9	8.9	2.6	0.0

Unapproved settlement pattern	21.1	59.9	76.3	32.5	2.6	7.6
Household energy use	2.6	35.7	63.8	39.5	33.6	24.8
Animal husbandry	23.0	64.3	65.1	31.2	11.8	4.5
Disregard for institutional regulations	17.1	53.5	73.7	25.5	9.2	21.0

The responses suggest that the people interviewed perceive environmental pollution as the major source of environmental risks in Nima and Mamobi. On the whole, the environmental risks are more pronounced in Mamobi than Nima. Flooding, environmental pollution, unapproved settlement patterns, animal husbandry and disregard for institutional regulations are the major environmental risks in Maamobi. These situations are closely related to the relatively low educational levels in Maamobi. In Nima where the educational levels are relatively higher, similar environmental risks are relatively low. It would seem that these responses suggest more exposure to environmental risks in Maamobi than in Nima. The severity of these environmental risks in the two communities is important. The study therefore assessed the degree of the environmental risks in terms of their severity in the two communities.

2.2 Assessment of Environmental Risks

To ascertain the severity of environmental risks, the study assessed the degree of severity in terms of no risk, small risk, moderate risk and severe risk. Table 3 shows the assessment of the degree of environmental risks in Nima and Maamobi.

Table 3: Assessment of Degree of Severity of Environmental Risk

Risks	Degree of severity							
	No Risk		Small Risk		Moderate Risk		Severe Risk	
	Nima	Maamobi	Nima	Maamobi	Nima	Maamobi	Nima	Maamobi
Flooding	37.5	8.3	30.3	8.9	17.1	31.2	15.1	51.6
Environmental pollution	1.3	1.3	1.3	3.8	5.3	16.6	92.1	78.3
Unapproved settlement pattern	3.9	11.5	5.9	14.6	42.1	43.3	48.0	30.6
Household energy use	34.2	28.7	50.0	19.7	13.2	32.5	2.6	19.1
Animal husbandry	10.5	7.0	12.5	22.9	26.3	43.3	50.7	26.8
Disregard for institutional regulations	11.2	28.0	7.9	15.9	19.7	27.4	61.2	28.7

Environmental pollution constitutes severe risk in both communities even though it is higher in Nima (92.1%) than in Maamobi (78.3%). Flooding is more severe in Maamobi than in Nima while disregard for institutional regulations and animal husbandry are more severe in Nima than Maamobi. This is quite surprising because the population in Nima is more literate than population in Maamobi.

2.3 Causes of Environmental Risks in Nima and Maamobi

The major causes of environmental risks in Nima and Maamobi are many and varied. These various causes are stated under each environmental risk in relation to

the responses from Nima and Maamobi. Table 4 shows the level of responses to each cause of environmental risk in Nima and Maamobi.

There seems to be no significant difference between Nima and Maamobi with regard to the causes of environmental risks. Poor drainage, choked gutters, solid waste disposal, liquid waste disposal, choked and stinking drains and low income among others are relatively high in both communities. It does not seem easy to explain away the variations of the causes of environmental risks in terms of the relative level of literacy or ethnicity in both communities. Overcrowdiness and high room occupancy ratios are higher in Nima than Maamobi despite the fact that literacy rates are relatively higher in Nima than Maamobi. The level of responses to the causes of environmental risks in both communities suggests that they are indeed very poor urban neighbourhoods.

Table 4: Major Causes of Environmental Risks in Nima and Maamobi

Causes	Locality		Combined Sample
	Nima	Maamobi	
Flooding			
Poor drainage	73.0	93.6	83.5
Choked gutters	76.3	98.1	87.4
Building on water sources	72.4	49.7	60.8
Spontaneous settlement pattern	55.3	60.5	57.9
Environmental Pollution			
Solid waste disposal	96.7	96.2	96.4
Liquid waste disposal	91.4	68.8	79.9
Flooding	30.3	47.8	39.2

Choked and stinking drains	96.7	91.1	93.9
Free range defecation	86.2	60.5	73.1
Exposure to disease pathogens	69.7	40.8	53.0
Slum conditions			
No layout/building regulation	48.7	74.5	61.8
Refusal to adhere to building regulation	85.5	56.7	70.9
Teaming influx of low-income migrants into the community	78.9	83.4	81.2
Sub-Standard housing	92.1	68.2	79.9
Overcrowding			
Too many occupants in household	95.4	73.9	84.5
High room occupancy ratios	94.1	65.6	79.6
Low income	89.5	93.6	91.6
Lack of alternative housing	75.7	50.3	62.8
High illiteracy rate	80.3	33.1	56.3
Enjoy living in dense populated neighbourhoods	47.4	54.8	51.1
Disregard for Institutional Regulation			
Weak enforcement of law and order regarding building regulations	83.6	89.8	86.7
Non-existence of statutory layout for the community	13.2	60.5	37.2
Weak institutional structures	82.2	59.2	70.6
Civil disorder	89.5	66.2	77.7
N	152	157	309

2.4 Health Outcomes of Environmental Risks in Nima and Maamobi

The causes of environmental risks as discussed impact meaningfully on the health of the residents in Nima and Maamobi. The major health outcomes include, cholera, diarrhoea, diarrhoea with blood, malaria, dysentery and dysentery with blood. Table 5 shows the level of responses to each of these health outcomes in Nima and Maamobi.

Table 5: Health Outcomes of Environmental Problems in Nima and Maamobi

Health Outcome	Locality		Combined Sample
	Nima	Maamobi	
Cholera	69.1	65.6	67.3
Diarrhoea	57.2	50.3	53.7
Diarrhoea with blood	28.9	8.3	18.4
Malaria	83.6	62.4	72.8
Dysentery	15.8	7.0	11.3
Dysentery with blood	13.2	1.9	7.4
N	152	157	309

The health outcomes are higher in Nima than Maamobi. In Nima malaria tops the list followed by cholera, and diarrhoea. In Maamobi the largest health outcome is cholera followed by malaria and diarrhoea.

These health outcomes are related directly to the causes of the environmental risks in each community. Table 6 shows the health outcomes that emanate from each cause of environmental risk in relation to the relative responses from each community.

Table 6: Environmental Risk Causes and Health Outcomes in Nima and Maamobi

Health Outcome of:	Locality		Combined Sample
	Nima	Maamobi	
Solid waste disposal on:			
Cholera	81.6	65.6	73.5
Malaria	96.1	68.2	81.9

Diarrhoea	73.0	52.9	62.8
Diarrhoea with blood	38.8	10.8	24.6
Dysentery	24.3	7.6	15.9
Free-range defecation on:			
Cholera	81.6	64.3	72.8
Diarrhoea	74.3	68.2	71.2
Diarrhoea with blood	46.7	8.9	27.5
Exposure to choked, stinking drains on:			
Cholera	81.6	68.8	75.1
Diarrhoea	75.0	65.0	69.9
Diarrhoea with blood	47.4	12.1	29.4
Exposure to unprotected food on:			
Cholera	82.2	85.4	83.8
Dysentery	31.6	50.3	41.1
Dysentery with blood	32.9	3.8	18.1
Diarrhoea	65.8	50.3	57.9
Diarrhoea with blood	46.1	7.6	26.5
Over-crowdedness on:			
Cholera	41.4	17.8	29.4
Respiratory problems	82.9	92.4	87.7
Physical discomfort	86.8	80.3	83.5
N	152	157	309

The relative responses in Table 6 are consistent with the relative responses in Table 5. In both tables, cholera, malaria and diarrhoea are the major health problems due to environmental risks in Nima and Maamobi.

2.5 Coping with Environmental Risks and Health Problems in Nima and Maamobi

In the survey, opinions of the communities were sought on how to cope with the environmental risks and health problems in Nima and Maamobi. Generally, the

opinions expressed by the respondents in Nima and Maamobi are expressed in Table 7.

Table 7: General Opinion of respondents in Nima and Maamobi on how to cope with Environmental Risks and Health Problem

General opinion	Locality	
	Nima	Maamobi
Provision of rubbish containers/Regular Collection of refuse	52.2	19.7
Adherence to Public Regulations	54.4	43.1
Provision of Public Toilets	12.2	15.3
Prohibition of Animal Husbandry in a free range manner	1.4	5.8
Encouragement of communal labour	2.0	4.4
Reconstruction of houses with toilet/bathing facilities	3.4	10.2
Stop charging people for disposal of waste into containers	1.4	1.5
N	147	157

In general terms, provision of rubbish containers and adherence to public regulations are the preferred options in Nima and Maamobi for coping with environmental risks and health problems.

The roles of the communities in Nima and Maamobi in coping with environmental risks and health problems are expressed in Table 8.

Table 8: Roles of communities in Nima and Maamobi in coping with environmental risks and health problems

General opinion	Locality	
	Nima	Maamobi
Encouragement communal labour	71.4	46.2
Adherence to Public Regulations/Laws	14.3	21.0
Promotion of Personal Hygiene	5.4	6.7
Involvement of Opinion Leaders	0.7	8.4
Public Education on Sanitation	6.1	15.1
Provision of Toilet Facilities in Houses	2.0	2.5
N	147	119

Encouragement of communal labour especially in Nima, adherence to public regulations and public education on sanitation especially in Maamobi are the major opinions expressed by the communities in Nima and Maamobi on the roles the communities should play to cope with the environmental risks and health problems.

Equally important to the communities in Nima and Maamobi is the Central Government's role in coping with environmental risks and health problems in the two communities. Table 9 indicates the views expressed by the two communities in this regard.

Table 9:

Communities views on government's role	Locality	
	Nima	Maamobi
Law Enforcement	43.0	16.0
Provision of Refuse Containers	13.4	11.1
Provision of more Public Toilets	9.9	18.1
Training of more Sanitary Officers	8.5	4.2
Intensive Public Educations	12.7	8.3
Government / Community Partnership	1.4	3.5
Provision of Logistic to Support Communal Labour	5.6	24.3
Mass Spraying of Mosquitoes	1.4	7.6
Provision of Affordable Houses	2.8	5.6
Demolishing of Unapproved Structured	1.4	1.4
N	142	144

Opinions in the two communities vary on the role the Central Government should play in coping with the environmental risks and health problems. In Nima, law enforcement, provision of refuse containers and intensive public education featured prominently in the opinions expressed on the Central Government's role in coping with environmental risks and health problems. In Maamobi, law enforcement, provision of more public toilets and provision of logistic support for communal labour are important roles that the Central Government should play in coping with environmental risks and health problems in their community.

APPENDIX I

DEMOGRAPHIC ANALYSIS OF NIMA-MAAMOBİ

Introduction

This section focuses on the main aspects of the population of Nima. The pertinent issues include the growth, distribution and characteristics of the population. The analysis is based essentially on analysis of population census reports. We first present a historical background of the community.

Historical Background

Nima which is imperceptibly linked with Maamobi comprise two suburbs within Accra, the capital city of Ghana, and covers an area of about 473 acres. It lies to the north of the Accra ring road approximately 5 miles from the city centre. To the east it shares a common boundary with the upper income Kanda Estate; to the west it is separated by the Odaw Stream from the middle income New Town Area; and to the north it is limited by the boundary wall of the Accra Girls Secondary School and Achimota. Until the 1940s Nima was held by the Futa family of the Fulani tribe for pasturing cattle prior to sale in Accra market. With the expansion of Accra during the 1940s, a demand for residential land was created within Nima. The Futa family had to allocate plots to people for settlement. The first to settle were Gold Coast Troops who were returning from the Second World War but later the area was

flooded by migrants mostly from other parts of Ghana mainly Northern Ghana and other West African countries. Hence by the mid 1960s the land had become fully occupied. Maamobi was settled later as a result of increasing demand for land in Nima.

Population Growth Trends

Population growth is the result of natural increase, the excess of births over deaths, coupled with the net migration, that is, the difference between out and in-migration. Available records on population growth in Ghana reveals that the population has been increasing at a very fast rate: about 2.7 % per annum between 1960 and 1970; 2.6% between 1970 and 1984, and 2.7% between 1984 and 2000. There seem to be some controversy with regards to the exact population of Nima-Maamobi. In the Ghana Urban Development Project (1976), the population of the area was estimated to be around 80,000. The then population census figures of 30,969 and 38,639 for 1960 and 1970 respectively, were suspected to have been grossly underestimated (Ghana Urban Development project 1976). The 1984 Census gave a figure of 70,311 and that of 2000, 113,186. Thus there has been a significant growth in the population between 1984 and 2000.

The Characteristics of the Population of Nima

Sex Composition

The sex distribution of a population is an indispensable factor in socio-economic development of a region. Generally, it determines the reproductive potential of the existing population; the labour force participation in an area; and migratory patterns of the people. For these reasons, the sex distribution of the population in Nima and Maamobi are examined. The total population reported in the 2000 population and housing census for Nima as indicated earlier was 69,044. The breakdown was 34,131 (49.4%) males and 34,913 (50.6%) females. The total population reported for Maamobi was 44,142, comprising of 21,761 males (49.3%) and 22,381 females (50.7%). From these figures, there are more females than males in both communities and this pattern is consistent with the national pattern, where females outnumber males.

The Age Structure of the Population

The age structure is one of the most important aspects of a population. Fig. 1 provides the data for the various age groups of the population of Nima and Maamobi based on the 2000 population census. Similar to the national pattern, the population of Nima is characterized by its youthfulness. About 40 percent of the population is found below 15 years of age compared to the national figure of 41 percent. However, only about 32 percent of the population of Maamobi are under the age of 15. This shows that the number of the youthful population in Maamobi is far lower than that of Nima.

Fig 1A Population pyramid for MAAMOBI

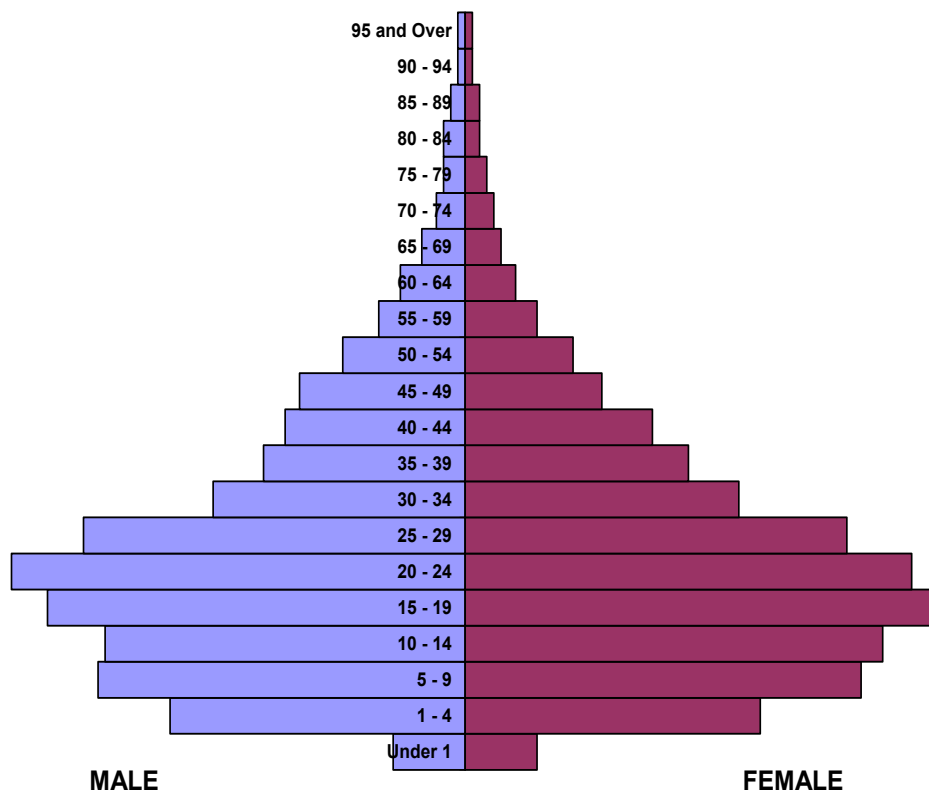
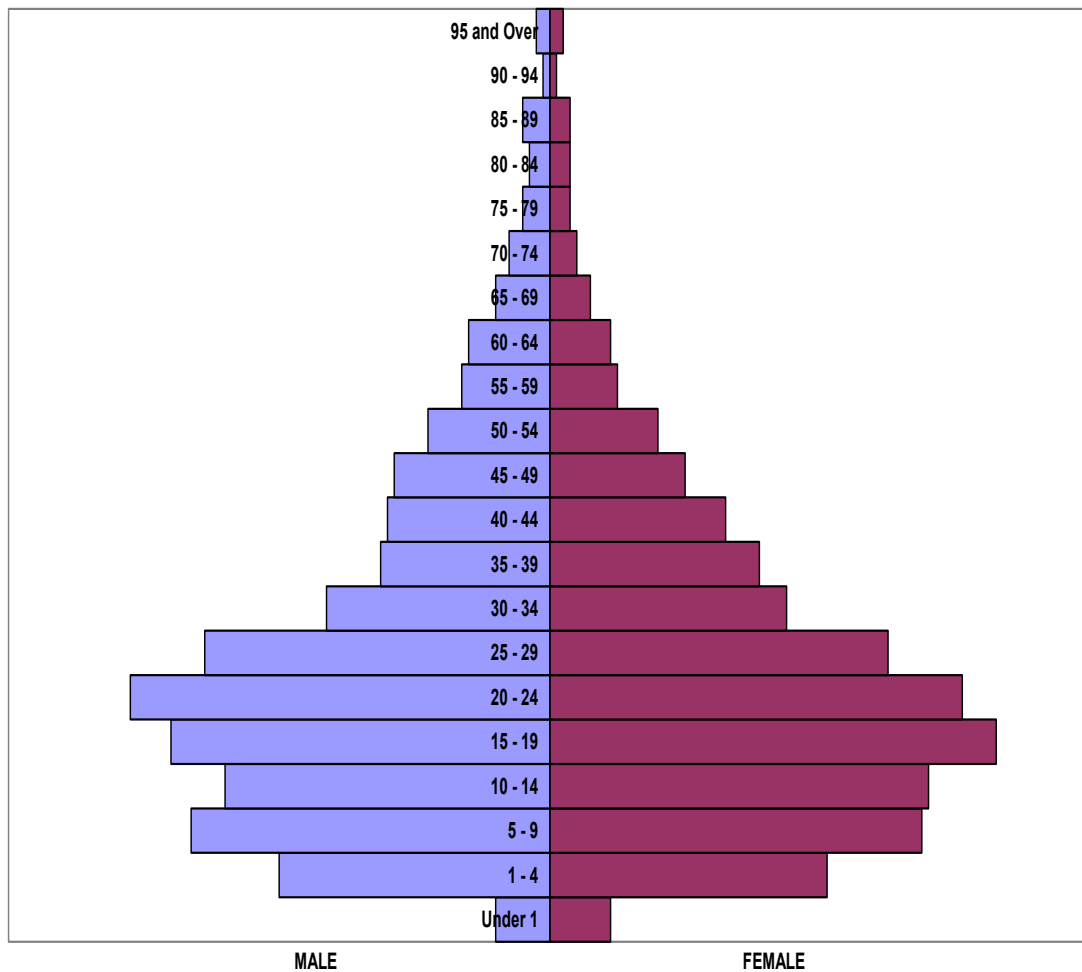


Fig 1B Population pyramid for NIMA



Ethnicity

The population of Nima and Maamobi are made up of several ethnic groups. Consistent with the national pattern, the Akans constitute the largest ethnic group in Nima (24.6%), followed by the Ewe (16.3%), Mole Dagbani (16.1%), Ga Dangbe (11.8%). A similar story can be told of Maamobi. The Akans still dominate (30.2%), followed by the Ewe (20.2%) and Mole-Dagbani (15.2%). Thus the ethnic composition of the two communities are similar even though there are more Mole-Dagbanis resident in Nima than Maamobi. Various smaller ethnic groups can also be found in the communities (see Table 3).

The relatively high percentage of Akans is quite interesting since Nima and Maamobi were initially inhabited by ethnic groups from Northern Ghana (ie Mole Dagbani). This demonstrates the growing heterogeneity of the population and the influx of other ethnic groups into the community. The Ghana population census reports also provide details of localities of birth place. Based on the 2000 census, about 63.6% of the population of Nima was born in the place of enumeration.

Table 3: Ethnic Composition of Nima and Maamobi, 2000

Ethnicity	Nima (in %)	Maamobi (in %)
Akan	24.6	30.2
Ga Dangbe	11.8	8.7
Ewe	16.3	20.2
Guan	6.9	5.3
Gurma	6.8	5.5
Mole-Dagbani	16.1	15.2
Grusi	5.6	5.5
Mande	4.5	5.2
All other Tribes	7.5	4.1
Total	100.0	100

Source: Ghana Population and Housing Census-Ghana Statistical Service

Places of birth

Most inhabitants were born in their respective locations, i.e. the places of enumeration in Nima and Maamobi. About 56% were born in Maamobi whilst in Nima the proportion was

about 64%. Other places of birth varied widely across the regions of the country. However it was interesting to note that quite a percentage were also born in the Volta and the Eastern Region. These areas constituted the next most important places of birth. In Nima for example, about 8% and 9% were born in the Volta and the Eastern regions respectively in Maamobi, the percentages of inhabitants born in the Volta and the Eastern regions were both 10% respectively

Religious affiliation

The religious affiliation in the communities shows an interesting picture. In both localities although the Islamic religion dominates, there are quite some appreciable proportions of other faith such as the Christianity. In both localities, that is Nima and Maamobi Moslems outnumber the Christians at 54% and almost 40% respectively. The next most important religious faith is Pentecostal/Charismatic, which was also represented in Nima and Maamobi by 17% and about 24% respectively. This is an indication of the seeming mushrooming of new churches in the country in recent times. Although the proportion of Christians in Maamobi is higher than that of Nima, given the typical Islamic composition of the two locations, the Christian representation is quite appreciable in the latter location (Table 4)

Table 4: Religious Affiliation of Population

Religious Affiliation	Nima	Maamobi
Catholic	10.5	12.4
Protestant	11.3	15.8
Pentecostal/Charismatic	16.7	23.5
Other Christians	4.2	5.4
Islam	54.3	39.8
Traditional	0.5	0.6
Other Religions	0.4	0.6
No Religion	1.9	2

Source: Ghana Population and Housing Census: Ghana Statistical Service

Educational Characteristics

The 2000 census also makes available information on educational levels of the population aged 6 and older. As shown in Table 3. In Maamobi, about 37% of the population have never been to school as compared with 34% at Nima. Majority of the population in the district has primary 25.8% and almost 19% for Maamobi and Mina respectively. For middle/JSS education, about 26.6 % are recorded for both localities. Only a few of the population have received post secondary (2.0 %) and tertiary education (1.8 %). In all less than 20% of the population in both locations have gone beyond the Middle/JSS School to the tertiary level of education in Nima. The scenario in Maamobi is no different with less than 10% (Table 5). The assumption that the higher one's education the better it is for the individual to placed in employment may hold valid in these communities. The foregoing educational statuses pre-suggest the reasons for the serious employment problems confronting the inhabitants in these localities.

Table 5: Educational Level (age 6 years and older).

Educational level	Total Nima	Total Maamobi	Percentage Nima	Percentage Maamobi
Total	137,284	65,028	100	100
None	50,384	22,224	36.7	34.2
Pre School	1,552	2,461	1.1	3.8
Primary	35,385	12,320	25.8	18.9
Middle/JSS	36,577	16,829	26.6	25.9
Secondary/SSS	6,268	6,051	4.6	9.3
Vocational/Technical/Commer	1,921	2,659	1.4	4.1
Post Secondary	2,785	1,085	2.0	1.7
Tertiary	2,412	1,379	1.8	2.1

Source: Census Office, Accra.

Employment status

The status of employment in the two localities reflects the relatively low levels of education in the areas. The percentage of inhabitants in the public and formal sector of economic activities was lower than those found to be in the private and informal sector of employment. In Nima, less than 30% were employed with the public sector as against close to 54% who are self-employed. In Maamobi, 35% were employed in the public sector while about 50% were self-employed in other economic enterprises. In addition to these statuses of employment, there were other economically active engagements of the inhabitants in the two localities were involved in. They included self-employment with employees, domestic employment, apprenticeship and

unpaid family contributions, which in all constituted insignificant proportions at less than 15% in these localities.

NATIONALITY

THE NATIONALITY OF THE INHABITANTS OF WHO ARE GHANAIS BY BIRTH IN NIMA WAS CLOSE TO 81%, WHILE IN MAAMOBİ THE PERCENTAGE WAS ABOUT 87%. THOSE WHO HAVE GHANAIAN NATIONALITY BY NATURALIZATION WERE 7.2 AND 6.3% IN NIMA AND MAAMOBİ RESPECTIVELY. OTHER ECOWAS AND AFRICAN NATIONALS RESIDENT IN THESE LOCALITIES CONSTITUTED THE REMAINING PROPORTION OF LESS THAN 10% (TABLE 6).

TABLE 6: NATIONALITY

Age of Mother	Nima (%)	Maamobi (%)
Ghanaian by birth	80.9	86.6
Ghanaian by naturalization	9.8	6.3
Other ECOWAS national	7.2	5.7
African other than ECOWAS	1.3	0.9
Non-Africans	0.9	0.5
Total	100	100

Children ever born and survived

The relationship between the age of mothers and the number of children ever born and survived also depicts interesting patterns. In Maamobi for example, there was high proportion of births recorded among age groups 40-44, 35-39, and 30-34 years. Incidentally these age groups also had the highest proportions of their children surviving (Table 1). The

picture in Nima also shows that among age groups 40-44, 35-39 and 30-34 the proportion of children ever born were about twice the proportion that were recorded in Maamobi. This is an indication of a relatively high fertility among mothers in Nima. It is also interesting to note that among teenage mothers i.e. age groups 15-19, although the number of children born as quite high, the level of survival was relatively low. This suggests a relatively high infant mortality among children in Nima over the period under review.

Table 1: Children ever born and survived, Nima and Maamobi, 2000

Age of Mother	Nima		Maamobi	
	<i>No of Children Born</i>	<i>No of Children survived</i>	<i>No of Children Born</i>	<i>No of Children survived</i>
12-14	8	3	1	-
14-19	480	294,	249	138
20-24	2,239	1,799	1,330	1,078
25-29	4,896	4,286	3,067	2,667
30-34	5,976	5,002	4,085	3,496
35-39	7,624	6,562	4,616	3,998
40-44	7,539	6,462	4,715	4,030
45-49	6,369	5,402	3,800	3,311
Total	34,489	29,254	21,614	18,503