

8/9 Mile Community Medical Research Study

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RESULTS - SUMMARY

A survey of the Eight- and Nine-Mile settlements was done by HOPE *worldwide* (PNG) staff from the Nine Mile Mobile Urban Clinic, from Sep 98 to Feb 99. 2960 dwellings were identified in the area, with a random selection of 10% surveyed. Four aspects were studied: 1) demography and environmental health, 2) nutrition status, 3) immunisation status, and 4) education status.

Demography and environmental health

- There are an estimated 20,220 people in the area: 12,470 in Nine Mile (including Moitaka Ridge and Macgregor Barracks, but excluding Bomana), and 7,750 in Eight Mile.
- 14% of the population are under 5 years and 36% under 15 years.
- Population growth is conservatively estimated at 7.2% per annum.
- Every province was represented, the most frequent Morobe at 21%, Simbu 18%, Eastern Highlands 15%, Central 11% and Gulf 10%.
- 79% of dwellings were of an informal construction. 40% were poorly ventilated. There was an average of 6.8 people in each house.
- 32% of dwellings do not have water coming to their block. 80% had pit toilets. 21% had electricity. Staple foods were rice, kaukau/potatoes, taro/cassava, tinned fish/meat, and greens. 50% of households had a backyard garden.

Adults

- 89% of adults were not born in the NCD.
- 63% of the adults over 20 years were unemployed. The youth (17-25) unemployment rate was 80%.
- 69% of the adults were literate (81% of males and 53% of females).

Children

- Of children 8-12 years old, 67% were in school, 32% had never schooled, and 1% had dropped out. In the whole area there are approximately 150 children in each year bracket who are not at school (representing a primary school of 1,350 pupils).

Under 5 years

- 87% were born in a hospital or health centre. 92% of children less than 2 years were breast-feeding. Of the children over six months, 24% did not get three meals each day.
- Around 80% of children were fully immunized. Individual disease immunization rates were good for BCG, polio, Triple Antigen, and Hepatitis B, and reasonable for measles.
- Nutrition assessment showed significant numbers of children under 5 are malnourished. On one index (weight for height) 17% were malnourished, and on another (mid-upper arm circumference) 12% were malnourished.

RECOMMENDATIONS – SUMMARY

- A new primary school for Nine Mile/Moitaka Ridge
- Support for school children from impoverished families
- Community-run adult literacy programs
- Expansion of non-formal education and training options
- Building of the fixed Nine Mile Clinic (about to commence).
- A new Health facility in Eight Mile
- Aggressive TB control
- HIV/AIDS programs
- Improvement in second measles injection and 4th Sabin dose administration.
- Nutrition program concentrating on education about meals, and targeting areas most at risk.
- Urban agriculture program to develop backyard garden possibilities.

IMPLICATIONS AND RECOMMENDATIONS

Infrastructure and Environmental Health

Both the Eight and Nine Mile settlements are extensive and growing rapidly. Informally constructed houses are springing up in a haphazard fashion on vacant land, far outstripping the provision of connections to the city water supply and electricity. Whole blocks have no power and very limited water connections. There are substantial health risks arising from lack of ready access to running water, overcrowded and poorly ventilated houses, indiscriminate rubbish disposal, and absent or inadequate toilet facilities. Once dwellings are established in the settlements, they almost invariably become permanent residence sites. Unless some control can be exerted on the building of new dwellings, this problem will worsen. Eventually all this area will need to be properly water-reticulated, sewered, and powered. This is a huge undertaking, but it should be steadily proceeded with.

Education

For those children in school, very few have been able to go through to more senior grades. The Education reforms, with Elementary and Top-Up, will help get younger children into school, and enable many more children to go Grade 8, and at least some extra children to progress on to Grade 9 and subsequent grades.

Of great concern is that 33% of 8-12 year old children are not in school. We estimate that there are 150 children in each year bracket of primary school age out-of-school, representing a primary school of 1,350 children. The new Elementary schools in Eight Mile (World Vision and also Catholic) and also an Elementary school in Nine Mile (United Church) will help more children to complete the three grades of Elementary, but then there is inadequate places for these children in Grade 3. Evedahana Primary School at Nine Mile is full, and already apparently has the largest enrolment in Port Moresby. The more distant Moitaka Wildlife and Bomana schools are also full. Either a new primary school needs to be promptly built in Nine Mile (or there is at least an idea to do this on Moitaka Ridge), or existing schools need to be expanded, or both.

Furthermore, there needs to be more encouragement and expectation within communities that all children should school, and some marginalised children (orphans, children living with a deserted wife, and children from impoverished families) need individual support at times for school fees and/or uniforms, otherwise these children generally do not school, or drop out quickly. In our opinion it is scandalous not to enrol, or to send children from these families home, for non-payment of fees or inadequate uniforms. If the child does not school, his/her future prospects are permanently damaged.

The literacy rate of 81% for males and 53% for females. These are reasonable when compared to national averages, but low considering we are part of the National Capital District, where resources and opportunities are most concentrated. Adult literacy programs run from within the community, and more school places are needed to redress this.

Youth unemployment, and access to vocational training

Youth unemployment is very high, particularly for under 20 year olds: 95% have no formal employment. For 20-24 year olds, 45% of males and 14% of females are employed. Thus

there are clearly limited employment opportunities, with a huge number of idle youth. Many of these will become disillusioned and discouraged, and some will turn to rebelliousness and crime. Very few were in vocational training.

More information needs to be made available on current vocational options (the Directory that HOPE *worldwide* (PNG) is about to release will assist here). Vocational schools should be established in the area (the closest at present are in Boroko), and non-formal education options should be developed.

Health

It is encouraging that 87% of infants were born in a hospital or health centre. People in Nine-Mile and Moitaka Ridge generally readily access the Nine-Mile Mobile Clinic. Patient acceptance and appreciation of the Mobile Clinic was high. The new fixed Nine-Mile Mobile Clinic will offer expanded facilities and should be able to cater to the growing population for some years. However most areas of Eight-Mile are distant from any clinic, with patients travelling in to Gordons. A health facility in Eight-Mile would be the optimal solution.

It is disturbing (given that only 10% of all dwellings were surveyed) that 7 deaths were attributed to tuberculosis (TB). The modified DOTS program successfully established at the Nine Mile Mobile Clinic (and more recently started at Gordons Clinic) should help control TB. The Government must make funds and staff and logistic resources available for this, as TB cases will rise with the AIDS epidemic. The one death recorded from AIDS is unfortunately likely to exponentially increase in the years to come. HIV/AIDS awareness campaigns, peer education programs, school reproductive health education, and increased condom availability are urgently needed. HOPE *worldwide* (PNG) is commencing a program to address these needs, and the NCDC is running an awareness campaign. Greater resources must be given to this area.

Immunisation

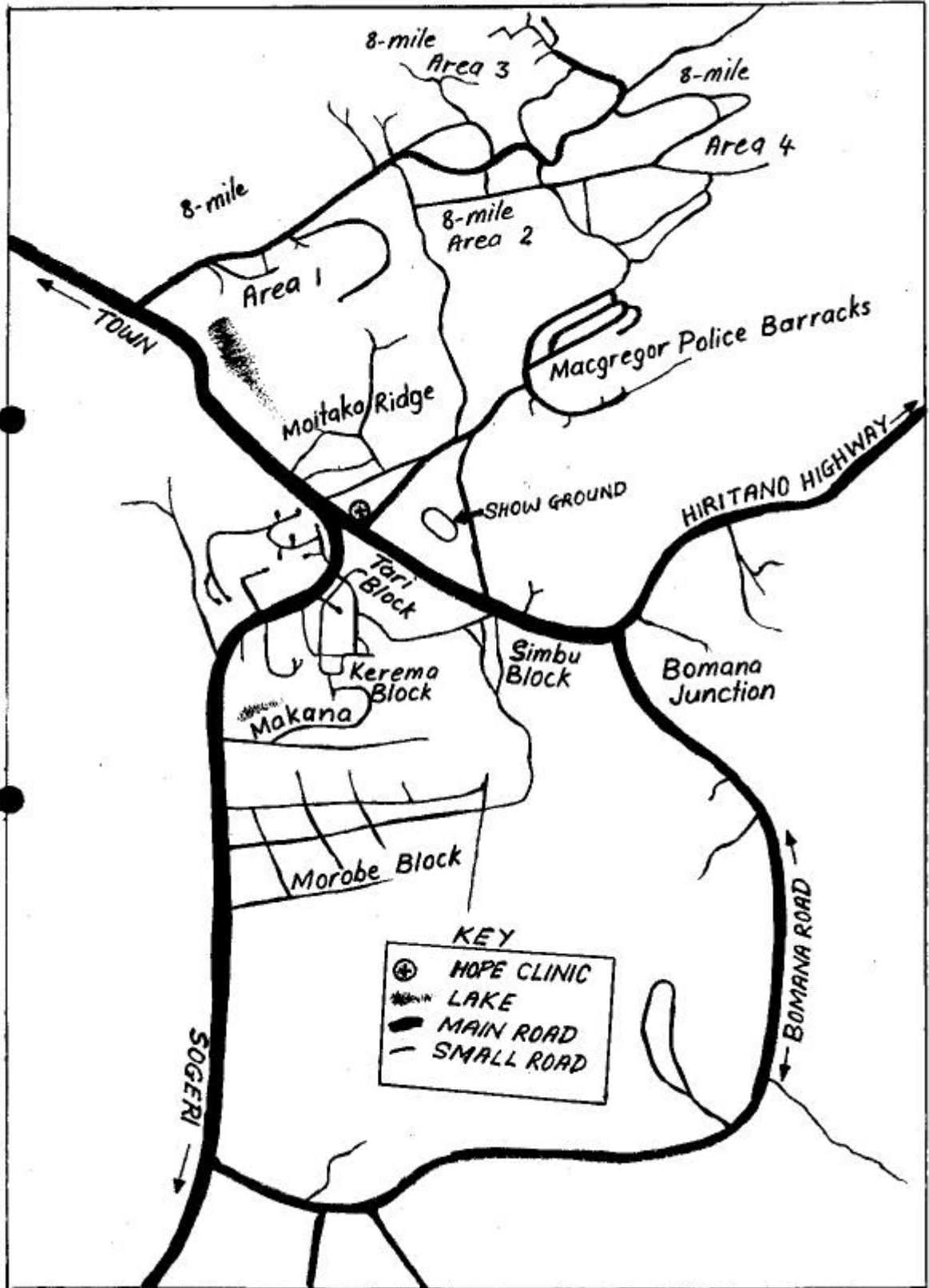
Overall, immunisation rates were acceptable, but continued efforts will needed to maintain these. Rates were lowest for measles, particularly the second dose. This is most easily missed because it is not given until after 9 months, by which time the focus of the health worker has moved off immunisations. Clinic education and practices are being altered to correct this.

Nutrition

Breast-feeding rates were high - 92% of infants less than two years. However, around 15% of children are under-nourished, and therefore at increased risk of disease and death from many causes. These children were scattered all over the area surveyed. This finding highlights the crucial importance of the well-baby nutrition clinics, and indicates that nutrition education should be expanded at our and other clinics. We will also dedicate a specific experienced nurse to support and follow these children.

It is also encouraging that half of the dwellings have some form of a backyard garden. Urban agriculture techniques should be promoted (HOPE *worldwide* (PNG) has such a program underway mainly in Moresby South, we plan to expand it into the Nine Mile/Laloki area).

AREA MAP



MAIN REPORT

INTRODUCTION

The Eight- and Nine-Mile squatter settlements lie on the edge of Port Moresby, the capital city of Papua New Guinea. HOPE *worldwide* (PNG), in conjunction with the Department of Health, has run a mobile Urban Clinic in this area since 1994. There is virtually no recent information on this rapidly growing population. Therefore we undertook a research survey to determine demographics, environmental health, and education, immunisation and nutrition status. The survey was carried out from September 1998 to February 1999.

Methods

- The area was defined and subdivided into 12 divisions using aerial photographs taken in 1997 (produced by Mapmakers Pty. Ltd.).
- A house-by-house survey on foot and by vehicle was then done to identify and map every dwelling in the area. This survey was supervised by a health surveyor.
- 2,960 dwellings were found in the total district, and were numbered sequentially in each division.
- Using a random number table, a random selection of 10% of dwellings were identified in each division (making a total of 296 dwellings).
- A questionnaire covering the four main areas to be studied (demography and environmental health, nutrition status, immunisation status, and education status) was developed. The questionnaire was tested and modified, and staff were trained in its administration.
- All identified homes were approached and invited to participate. Houses were revisited if no-one was home. All were successfully surveyed – participation rate was 100%.
- The interview was carried out with the senior member of the household (man or woman).

There were 2022 people in the houses surveyed, in the following age groups:

Age Group	Number	Percentage
Infants < 5 years	284	14.1%
Children 5-20 years	611	30.2%
Adults > 20 years	1127	55.7%

The estimated population for the area is thus 20,220. 36.4% were under 15 years. The following table shows the number of people in each area surveyed:

Division No.	Division Name	Houses surveyed	Pop.	Total Pop. (est.)
1	Macgregor Barracks	15	112	1120
2	Tari Block, 9 Mile	22	191	1910
3	Kerema Block, 9 Mile	30	259	2590
4	Makana Block, 9 Mile	18	118	1180
5	Morobe Block, 9 Mile	38	238	2380
6	Bomana Junction	10	51	510
7	Simbu Block, 9 Mile	19	108	1080
8	Moitaka Ridge	26	170	1700
9	Eight Mile Block	33	204	2040
10	Eight Mile Block 2	24	179	1790
11	Eight Mile Block 3 – near Macgregor	36	243	2430
12	Eight Mile Block 4 – near Power Station	25	149	1490
	TOTAL	296	2022	20,220

Therefore the estimated total population of Nine Mile (Divisions 1-8 – i.e. Nine Mile proper plus Bomana, Moitaka Ridge and Macgregor Barracks) was 12,470; and the estimated population of Eight Mile (Divisions 9-12) was 7,750.

PART A - DEMOGRAPHY AND ENVIRONMENTAL HEALTH

Province: There were people from every province as well as a few from Irian Jaya. Morobe had the highest proportion at 20.6 %, followed by Simbu with 17.9 %, Eastern Highlands with 14.9 %, Central 10.5 % and Gulf 9.8 % (see Table A in Appendix).

Language: Main language spoken was Tok Pisin (63.7%), followed by Tok Ples (various local languages – 34.2%), Motu (2%), and English (0.7%).

Religion: Commonest Lutheran, then Catholic, SDA, Pentecostal, and United Church (see Table B in Appendix).

House:

<u>Dwelling type</u>	<u>% of dwellings</u>
Handyman-built houses	73.6%
Formal constructed houses	13.3%
Planned project houses	7.4%
Simple shelters	5.7%

The mean number of rooms was 3.1, with a range 1-8 (see Table C in Appendix). House ventilation was judged as good in 60.5%, with the remaining 39.5% were poorly ventilated. The mean house area was 28 m² (see Table D), with 6.8 occupants (range 1-23) – (Table E in Appendix).

Water: 99% of the families collect the water from the City Water Supply while 1% from tank.

<u>Proximity of water</u>	<u>% of dwellings</u>
Water on tap in the house	9.8%
Water outside the house but within the block	57.8%
Water from within 100 meters	11.8%
Water over 100 meters away	20.6%

The proportion of houses in each division with water in house/on the block varied from 28% to 100%. Table F in Appendix shows the water supply in the various blocks.

Rubbish: Burnable rubbish was burned in 90.9%. For non-burnable rubbish, 37.8% of the households dispose of this rubbish indiscriminately. 30.4% bury it, 18.2% have an organised collection while the remaining 13.6% dispose using other means. (See Table G in Appendix for further details).

Toilet: 80.3% of dwellings had a pit toilet, 12.7 % septic tank, 1.0% (three houses) had ventilation improved pit toilets (VIPT), and 6% use other means, (e.g. going to backyard bushes).

Cooking: 57.8 % of the households cook food using firewood, 29.7 % by kerosene stove, 9.8 % gas stove and 2.7% electric stove.

Garden: 50.3% of the households had a garden. The commonest crop was bananas, followed by aibika, sugar cane, cassava, pumpkin, corn, and beans (Table H in Appendix).

“Luxury” items

Item	% of dwellings
Radio	54%
Car	21.3%
Electricity	21.3%
Refrigerator	16.6%
Television	15.9%
Generator	3.7%
Telephone	1.5%

The electrification rates for the various areas varied from 100% (in Macgregor Barracks) to 0% (three divisions). See Table I in the Appendix.

Common/staple foods: The frequency that the household consumes various staples is:

Food	Everyday	Most days	1-2 times/week	Rarely or never
Rice	64.5%	30.4%	4.7%	0.4%
Kaukau/potato	52.4%	35.5 %	7.8 %	4.3 %
Banana	59.1 %	26.7 %	13.2 %	1 %
Taro/cassava	51.4 %	33 %	13.2 %	2.4 %
Bread	41.2 %	22 %	23 %	11.8 %
Tin fish/meat	45.6 %	38.9 %	12.8 %	2.7 %
Chicken/pork/cow meat	3.0 %	16.3 %	49.0 %	31.7 %
Eggs	2.3 %	4.3 %	19.0%	74.4%
Lamb chops	2 %	12.3 %	49.0 %	36.7 %
Sea foods	1 %	5.7 %	22.7 %	70.6 %
Fruits	2.7 %	25.3 %	43.3 %	28.7 %
Pumpkin	3.1 %	18.3 %	32.2 %	46.4 %
Greens/kumu	95.3 %	4.1 %	0.3 %	0.3 %

Clinics used: the two main urban clinics used were 9-Mile Mobile (55.6%) and Gordons (21.5%). 15.9 % of the people used 6-Mile clinic, 3.5% went to a Private Clinic. The remaining 3.5% used other clinics.

Death rate: A total of 34 people from the surveyed dwellings died of various causes in 1997 (death rate of 16.8 people per 1,000), reportedly 7 TB, 4 MVA, 2 malaria, 2 AIDS plus other single reports (see Table J in Appendix).

Births: 53 in the area, giving a birth rate of 26.2/1,000. (Therefore an estimate can be made of 530 births in the total area last year). 82.1 % houses did not have any births in 1997 while 16.6 % of the households had one birth each and 1.3% had two births in 1997.

Population growth: 36.4% of the houses were definitely known to be less than 5 years old, indicating a minimum (as 22.0% were unknown) growth rate of 7.2% pa, and suggesting this as a minimum-estimate growth rate for the population in the area. House age is shown in Table K in the Appendix.

PART B - ADULTS

Age was unknown for 61.7% of adults (many did not know, and others were not present at the time of survey).

Ages	20 – 24	25 – 30	31 – 34	35 – 40	41 – 45	46 – 50	51 – 55	56 – 60	60+	Unk.
%	13	10.5	4.8	3.5	1.8	2.2	1	1.1	0.4	61.7

There were more males (57.8%) than females (42.2%).

Marital status: 78.6% of adults over 20 were married, 16.1% single, 3.2% divorced, 1.8% were widows/widowers, and 0.3% remarried.

Employment: 63.1% of the people were unemployed while 36.7% were employed. Of those employed, the salary was known and provided in 38% - with a mean salary of K179/fortnight.

Salary in Kina	Number of people	Percentage
20 – 100	56	5.0%
101 – 200	125	11.1%
201 – 300	40	3.6%
301 – 400	5	0.4%
401 – 500	4	0.4%
501 – 1500	5	0.4%
Unknown	176	15.6%
Unemployed	716	63.5%
Total	1127	100%

For youth employment rates, see next section.

Literacy rate: 69.2% of the adults were literate and 29.5% were illiterate, with 1.3% unknown. 80.8% of males were literate, and 53.3% of the females. 37.7% of the population were literate in Tok Pisin, 32.7% in their Tok Ples (various local languages), 33.3% in English, and 12% in Motu. Table L in the Appendix shows the literacy rates for various combinations of languages.

Place of birth: 88.8% of them were not NCD born while 11.2 % were.

PART C – CHILDREN 5 - 20 YEARS

- There were a total of 611 children aged 5-20 years in the interviewed dwellings, giving an estimated 5-20 year old population for the area of 6,110.
- Males (54.7%) outnumbered females (45.3%). Table M in the Appendix shows the age distribution. Only 3 individuals under 20 were married (it is possible there were also some young adults whose age was not known but were actually under 20 who were also married).
- 58.8% of the children were born in NCD and the other 41.2% were not.

Schooling in 1998

- Of all the 5-20 year olds, 258 (42.2%) were in school, 80 (13.1%) had completed school/dropped out, and 273 (44.7%) had never schooled. (Some of these latter groups were too young to school).
- Of those that are in school, 21.9% were in El Prep. 14.3% in Grade 1, 14.0% in Grade 2, 10.5% in Grade 3, 5.8% in Grade 4 and 8.1% in Grade 5, 7.0% in Grade 6, 6.2% in Grade 7, 5.0% in Grade 8, 3.5% in Grade 9, 3.1% in Grade 10, 0.4% in Grade 11, and 0.4% in Grade 12 (see Table N in Appendix).
- Of the 165 children 8.0-11.99 years old (chosen because by this age one would expect all children who will start school to be in school, and not yet to have dropped out), 111 (67.3 %) were in school and 52 (31.5%) had never schooled, and 2 (1.2%) had dropped out (see Table P in Appendix).
- For the 52 children aged 8.0-11.99 years who were not schooling, 20 children had not been enrolled, 13 children did not have school fees, 5 children “refused” to school (!) and the remainder were for other reasons. Obviously, some of these reasons may have overlapped (see Table P in Appendix).
- Of the 80 who had dropped out of school, three left at Elem. Prep., three left at Grade one, five at Grade two, three at Grade three, five at Grade four, seven at Grade five, 32 at Grade six, four at Grade seven, eight at Grade eight and ten children at Grade ten. Of these 80 drop-outs, 18 had left because of lack of school fees, 30 were Grade 6 or 8 dropouts, 7 children refused to school, 6 were Grade 10 graduates, and the remaining 19 left due to other reasons (see Table P in Appendix).
- Only four adolescents <20 were employed with a salary. They earned (per fortnight) K200.00 (Salesman), K140.00 (House-girl) and K60.00 (Shop Assistant), and another salesman’s salary was unknown.
- Very few adolescents were in vocational or other training: Two children in the area had training after school, in both cases a salesman course. Six children are currently in training for various jobs: two students in Computing Courses, one training in Heavy Diesel Filter, another in Welding, one in Plumbing and bricklaying, and one in a Technician course.

Employment

- Youth unemployment was high, particularly for those under 20. Overall, for those out-of-school aged 17-25.0, the employment rate was 20.4% (males 27.9% and females 11.0%).
- For those out of school aged 17-20.0, the overall employment rate was 5.2% (males 5.2% and females 5.1%). Employment rates jumped markedly from age 20, so that the 20-25.0 employment rate was 30.4% (males 44.9%, females 14.3%) (see table below).

Age	<u>Males</u>			<u>Females</u>			<u>Males and Females</u>		
	No.	Employed	Empl %	No.	Employed	Empl %	No.	Employed	Empl %
17	14	1	7.1	13	0	0.0	27	1	3.7
18	14	0	0.0	14	1	7.1	28	1	3.6
19	30	2	6.7	12	1	8.3	42	3	7.1
20	17	7	41.2	15	1	6.7	32	8	25.0
21	11	4	36.4	15	2	13.3	26	6	23.1
22	16	8	50.0	18	1	5.6	34	9	26.5
23	23	10	43.5	10	3	30.0	33	13	39.4
24	11	6	54.5	12	3	25.0	23	9	39.1
17-20.0	58	3	5.2	39	2	5.1	97	5	5.2
20-25.0	78	35	44.9	70	10	14.3	148	45	30.4
17-25.0	136	38	27.9	109	12	11.0	245	50	20.4

PART D - INFANTS 0 - 5 YEARS

- There were a total of 284 infants aged 0-5.0 years old in the dwellings studied, giving an estimated 0-5 years population of 2,840.
- 52.5 % were male and 47.5% female. Table O in the Appendix gives the age distribution by 6-month intervals.
- 83.8% of the infants were born in the NCD.

Adoption rate: 7.4% were adopted.

Child Health Record Book: 78.9% of the parents/guardians could locate the Child Health Record Book at the time of research, 21.1% could not. Of the 21.1% (60 children) who could not, four were < 1 year old, nine were 1-2 y, 12 were 2-3 y, 18 were 3-4 y, and 17 were 4-5 years old. Of the 60, 8 (13.3%) were adopted, and 16 (26.7%) were not born in the NCD. Adopted children were more likely not to have a CHRb than non-adopted children ($p<0.05$), as were children born outside the NCD compared to those born in the NCD (also $p<0.05$). At least some of the children with lost CHRb had used up and then lost the first book, which would suggest these at least were likely to be fairly well immunized.

Place of birth: 86.6% were born in the hospital, 11.3% at home, and 2.1% unknown.

Birth weight: The birth weight was known in 73.9% of cases. The mean BW was 3.022 kg, with a SD of 0.592 kg, minimum of 1.20 kg and maximum of 4.60 kg. 31/209 (14.8%) were < 2.5 kg. The birth weights that were known were as follows:

Wt	1200-1990g	2000-2500g	2510-2990g	3000-3500g	3510-3990g	4000-4600g
%	4.3%	10.5%	27.2%	33.5%	21.0%	3.8%

Feeding

Of the infants less than two years, 91.6% were breast-feeding and 8.4% were not. These latter 10 infants weaned at the following ages in months: 2, 5, 6, 7, 8, 13, 14, 14, 16 and 20. They were weaned for the following reasons: mother expecting (5), adopted (2), child refused (1), mother died (1), mother working (1).

Of the children over six months of age, 76.0% had at least three meals per day, and 76.8% did snack between meals.

Immunisations

- 1) **BCG:** 78.5% (223) of the infants had their BCG vaccine while 0.4% (1) did not and 21.1% (60) were unknown.

2) TA/Sabin/Hepatitis B

Immunization	By 4 months	4 – 12 months	> 12 months	Not given	Not known
Sabin 3	14.9	56.3	0.7	7.1	20.9
TA 3	11.2	60.4	0	7.5	20.9
Hepatitis 3	10.8	57.5	0	10.8	20.9

50% of infants over 3 months had received a 4th Sabin, 28.4% had not, 21.3% were unknown. Those who received the 4th dose received it at the following ages:

Age in months	3	4	5	6	7	8	9	10	11	12+	No	Unk
No.	10	33	24	17	7	14	6	3	8	13	76	57
%	3.7	12.3	9.0	6.3	2.6	5.2	2.2	1.1	3.0	3.9	28.4	21.3

3) Measles

- Adequate measles vaccination was defined as an injection after nine months. For those greater than one year, 62.6% were adequate, 11.9% unimmunised (50% of these had a dose between 6 and 9 months but no second dose), and 25.6% were unknown.
- For those over 6 months, 47.8% had their first injection 6-7 months, 13.1% 7-8 months, 3.2% 8-9 months, 2.8% between 9-12 months, 2.0% between 12-15 months, 0.4% later than 15 months, 8.4% had not received it, and 22.3% were unknown.

F. Overall immunization coverage

For infants over 12 months, 58.9% were fully immunized (defined as BCG, 3 x Hepatitis B, 3 x Sabin, 3 X Triple Antigen, and 1 x measles after nine months), 15.5% were not fully immunized, and 25.6% were unknown. As the percentage of lost child health record books (CHRBs) increased with a child's age, the sub-group of 99 children aged 1.00 to 2.99 was separately analyzed, with two possible scenarios:

- 1) assumption that the children with lost CHRBs had the same rate of immunizations as those with the books (an optimistic estimate), and
- 2) the children with lost CHRBs were 50% unimmunised (a quite pessimistic estimate).

The immunisation rates were then as follows:

	<u>Assuming lost CHRBs similar to others</u>	<u>Assuming 75% BCG and 50% other immunization rate in lost CHRBs</u>
BCG	100%	95.7%
Hepatitis	94.9%	87.1%
Sabin	97%	88.8%
TA	96%	87.9%
Measles	83.8%	77.9%
All five	82.8%	77.1%

Nutrition

- **Mid-upper arm circumference (MUAC)**

Of the 218 infants over 1 year where the MUAC could be measured, in 191 (87.6%) of cases it was 13.5 cm or more, and in 27 (12.4%) <13.5 cm (20 were 12.5-13.4cm, 7 <12.5cm).

- **Weight for age**

Weight for age could be measured in 253 (89.1%) of children. The mean weight SD was – 1.19 +/- 1.49. In 28.5% of cases, it was under 2.00 SD.

Compared to the NCHS 50th centile, the mean percentile for the study population was 87.4%. 48 (19.0%) were over 100%, 115 (45.5%) 80-100%, 80 (31.6%) 60-80%, and 10 (4.0%) <60th.

- **Length and Height for age**

The length for age mean +/- sd length for age mean +/- sd was –1.77 +/- 1.75. The height for age mean +/- sd was –1.61 +/- 1.42.

- **Weight for height**

Weight for height could be calculated in 115 children. The mean sd was –0.77. 17.4% were <-2.00 sd.

APPENDIX

Table A: Province of origin

Province	Percentage
Morobe	20.6
Simbu Province	17.9
Eastern Highlands	14.9
Central	10.5
Gulf Province	9.8
Southern Highlands	6.4
East Sepik	5.4
Enga	4.1
Western Highlands	3.7
Oro Province	2
Irian Jaya	1
East New Britain	1
Manus	0.7
Milne Bay	0.7
West Sepik	0.4
Western Province	0.3
North Solomon	0.3
Madang	0.3

Table B: Religion

Religion	Percentage
Lutheran	24.8
Catholic	18.0
Seventh Day Adventists	17.0
Pentecostal	16.7
United Church	11.7
Baptist	4.0
Other Church	3.0
Anglican	2.5
Non-Christian/none	2.3

Table C: Rooms in house

Number of Rooms	Percentage
1	10.5
2	22.6
3	33.1
4	19.9
5	11.2
6	2.4
8	0.3
Total	100

Table D: House area

House Area (m ²)	0-9 m ²	10-19 m ²	20-29 m ²	30-39 m ²	40-49 m ²	50-59 m ²	60-69 m ²	70-120 m ²	Unknown
(%)	4.0%	25.0%	30.3%	20.0%	12.7%	4.3%	2.0%	1.0%	0.7%

Table E: Water supply

Water Distance to the nearest source						
Area	In house	On block	<100metres	>100 meters	Total	In house/ on block %
1	15	0	0	0	15	100.0
2	4	15	2	1	22	86.4
3	3	26	1	0	30	96.7
4	1	16	1	0	18	94.4
5	0	17	2	19	38	44.7
6	0	6	0	4	10	60.0
7	1	16	1	1	19	89.5
8	0	14	7	5	26	53.8
9	0	13	6	14	33	39.4
10	2	17	2	3	24	79.2
11	3	24	7	2	36	75.0
12	0	7	6	12	25	28.0

Table F: Number of occupants per house

Occupants	No. of rooms	Percentage
1	1	0.3
2	15	5.1
3	20	6.8
4	34	11.5
5	45	15.2
6	47	15.9
7	27	9.1
8	27	9.1
9	29	9.8
10	16	5.4
11	13	4.4
12	6	2.0
13	7	2.4
14	1	0.3
15	3	1.0
16	1	0.3
17	1	0.3
20	1	0.3
21	1	0.3
23	1	0.3
TOTAL	296	100
Mean	6.8	
Median	6.0	
Std. Dev.	3.3	

Table G: Rubbish disposal**i) Burnable rubbish**

Burned	Organised collection	Left to decompose	Buried	Water tipping
90.9%	2%	2.7%	2%	2.4%

ii) Non-burnable rubbish

Disposed indiscriminately	Buried	Organised collection	Land Filled & Water tipping
37.8%	30.4%	18.2%	13.6%

Table H: Garden

Type of crops	No. of Households
Banana	102
Aibika	60
Sugar cane	52
Cassava	50
Pumpkin	38
Corn	33
Bean	23
Kau-kau	23
Taro	17
Cabbage	17
Greens	8
Onion	7
Pineapple	5
Yam	4
Tomato	3
Lettuce	2
Cucumber	2
Sorghum	2

Table I: Electricity supply

Area	% dwellings with electricity
1	100.0
2	59.1
3	33.3
4	38.9
5	2.6
6	0.0
7	36.8
8	0.0
9	12.1
10	0.0
11	11.1
12	8.0

Table J: Type of deaths

No.	Cause/type of death
7	Tuberculosis
4	Car accident
2	Malaria
2	AIDS
1	Liver disease
1	Asthma
1	“Police shooting”
1	“Kicked”
1	Heart attack
1	Neonatal
1	Perinatal
1	“Head disease”
1	Gastroenteritis
1	Murdered
9	Unknown

Table K: Age of house

Age (years)	Number	Percentage
1	37	12.5%
2	25	8.4%
3	22	7.4%
4	24	8.1%
5	23	7.8%
6	31	10.5%
7	12	4.1%
8	8	2.7%
9	8	2.7%
10	5	1.7%
11	4	1.4%
12	4	1.4%
13	0	0.0%
14	4	1.4 %
15	2	0.7%
16	2	0.7%
17	1	0.3%
18	1	0.3%
19	15	5.1%
20	0	0.0%
21	0	0.0%
22	0	0.0%
23	3	1.0%
Unknown	65	22.0%

Table L: Literacy languages

The following table shows the adults who were able to read any of these languages: (E) English, (P) Tok Pisin, (M) Motu and (T) Tok Ples.

Language can be read	No. of Household	Percentage
E	1	0.1%
E,P	45	4.0%
E,P,M	26	2.3%
E,P,M,T	199	17.7%
E,P,T	395	35.0%
E,M,T	3	0.3%
E,T	2	0.2%
P	36	3.2%
P,M	1	0.1%
P,M,T	10	0.9%
P,T	50	4.4%
M	1	0.1%
M,T	2	0.2%
T	10	0.9%
Illiterate	346	30.7%
Total	1127	100%

Literate in specific languages:

Languages can be read	No. People	Percentage
E	671	33.2%
P	762	37.7%
M	242	12.0%
T	662	32.7%
Illiterate	346	17.1%

Table M: Age distribution of 5-20 year olds

Age	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Un	Tot
No.	62	56	65	50	38	45	32	34	36	24	25	31	27	28	42	16	611
%	10.1	9.2	10.6	8.2	6.2	7.4	5.2	5.6	5.9	3.9	4.1	5.1	4.4	4.6	6.9	2.6	100