

**SOCIO-ECONOMIC DIFFERENCES**  
**in**  
**HEALTH, NUTRITION, AND POPULATION**  
**in**  
**MADAGASCAR**

Davidson R. Gwatkin, Shea Rustein, Kiersten Johnson,  
Rohini Pande, and Adam Wagstaff

for the

**HNP/Poverty Thematic Group**  
**of**  
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## Introduction

The figures presented in this publication describe the health, nutrition, and population (hnp) status and service use among individuals belonging to different socio-economic classes. The figures are intended to provide World Bank operational staff, the government officials with whom they work, and others with basic information for use in preparing country analyses and in developing hnp activities for the disadvantaged.

The publication is one of a series covering forty-four countries, commissioned by the World Bank's hnp and poverty thematic group. The figures presented in the series have been tabulated from data collected through the multi-country Demographic and Health Survey (DHS) program. Lant Pritchett and Deon Filmer developed the asset index used in dividing the population into quintiles on the basis of wealth. Eduard Bos, Deon Filmer, Jeffrey Hammer, Lant Pritchett, Venanzio Vella, and other members of the World Bank's hnp/poverty thematic group provided technical advice. Financial support came from the Governments of Norway and Switzerland, and from the World Bank's own resources.

Additional copies of this and other publications in the series are available at no charge from the World Bank's Health and Population Advisory Service (The World Bank, 1818 H Street, N.W., Washington, D.C. 20433-0001, USA; telephone 202-473-2256; fax 202-614-0657; e-mail [healthpop@worldbank.org](mailto:healthpop@worldbank.org).) The information presented will also soon be available through the World Bank's hnp website: [www.worldbank.org/hnp](http://www.worldbank.org/hnp).

Any questions, comments, and suggestions would be very welcome. They may be addressed to Rohini Pande (telephone 202-458-7600; fax 202-522-3234; e-mail [rpande@worldbank.org](mailto:rpande@worldbank.org)).

**Madagascar 1997**  
**Health, Nutrition, Population and Poverty:**  
**Total Population**

Indicator	Summary Definition (*)	Quintiles					Population Average	Poor/Rich Ratio	Concentration Index	Conc. Index std. error
		Poorest	Second	Middle	Fourth	Richest				
<b>HNP Status Indicators</b>										
<b>IMR</b>	Deaths under age 12 months per thousand births	119.1	118.3	103.2	76.2	57.5	99.3	2.071	-0.12207	0.0480
<b>U5MR</b>	Deaths under 5 years per thousand births	195.0	186.1	175.0	129.6	101.4	163.9	1.923	-0.10941	0.0432
<b>Children Stunted (%)</b>	Below -2 sd z-score, height for age, children under 3 years	49.3	45.7	52.1	50.1	42.5	48.3	1.160	-0.00895	0.0192
<b>Children Underweight (% moderate)</b>	Below -2 sd z-score, weight for age, children under 3 years	45.2	40.0	39.1	39.1	31.8	40.0	1.421	-0.05238	0.0218
<b>Children Underweight (% severe)</b>	Below -3 sd z-score, weight for age, children under 3 years	16.0	12.9	12.6	11.6	8.2	12.8	1.951	-0.10156	0.0371
<b>Low Mother's BMI (%)</b>	Body Mass Index < 18.5	24.3	22.8	18.4	18.9	15.1	20.6	1.609	-0.08443	0.0206
<b>Total Fertility Rate</b>	Births per woman age 15-49	8.1	6.3	6.8	5.7	3.4	6.0	2.382	-0.14307	0.0550
<b>Age Specific Fertility Rate (15-19 years)</b>	Births per 1000 women age 15-19	271.0	215.0	206.0	141.0	78.0	180.0	3.474	-0.21122	0.0685
<b>HNP Service Indicators</b>										
<b>Immunization coverage (%):</b>	Children age 12-23 months, by vaccination card or mother's report									
-- Measles		32.1	34.4	38.7	60.8	78.9	46.0	0.407	0.18613	0.0382
-- DPT3		32.3	37.7	41.4	65.3	81.1	48.4	0.398	0.18905	0.0333
-- All		22.0	25.2	27.1	54.7	66.0	36.2	0.333	0.23711	0.0299
-- None		29.5	26.2	24.5	8.4	3.6	20.1	8.194	-0.26080	0.1219
<b>Medical Treatment of Illnesses</b>										
<b>Treatment of Diarrhea (%):</b>										
-- Prevalence	% Ill in the preceding 2 weeks	29.2	21.8	26.1	31.3	26.2	27.1	1.115	0.00410	0.0299
-- ORT use	ORS, RHF, or increased liquids	60.2	61.0	59.5	66.7	92.7	65.7	0.649	0.06444	0.0461
-- Seen Medically	Brought to a health facility if ill	38.9	35.4	31.9	40.7	55.7	39.5	0.698	0.05035	0.0539
-- % Seen in a Public Facility	Among those medically treated	27.0	21.2	23.7	31.8	24.2	26.1	1.116	0.01298	0.0360
<b>Treatment of Acute Respiratory Infection (%):</b>										
-- Prevalence	% Ill in the preceding 2 weeks	27.3	25.6	25.0	21.4	16.0	23.9	1.706	-0.07921	0.0364
-- Seen Medically	Brought to a health facility if ill	35.1	33.5	32.1	36.9	59.3	36.6	0.592	0.05651	0.0654
-- % Seen in a Public Facility	Among those medically treated	26.4	25.4	25.7	32.3	36.8	28.0	0.717	0.05387	0.0286
<b>Antenatal Care Visits (%):</b>										
-- to a Medically Trained Person	Doctor, nurse, or nurse-midwife	67.1	71.8	75.2	85.8	95.6	76.8	0.702	0.06795	0.0161
-- to a Doctor		15.2	15.2	21.8	25.6	20.2	19.0	0.752	0.09757	0.0241
-- to a Nurse or Trained Midwife	Nurses and nurse-midwives	51.9	56.7	53.4	60.2	75.4	57.8	0.688	0.05810	0.0300
-- 2+ visits		69.1	71.5	75.5	84.5	91.8	76.6	0.753	0.05574	0.0124
<b>Delivery Attendance (%):</b>										
-- by a Medically Trained Person	Doctor, nurse, or nurse-midwife	29.6	37.0	40.5	65.0	88.5	47.3	0.334	0.21798	0.0464
-- by a Doctor		6.8	8.0	12.6	21.0	19.7	12.4	0.345	0.24544	0.0244
-- by a Nurse or Trained Midwife	Nurses and nurse-midwives	22.7	28.9	27.9	44.0	68.7	34.9	0.330	0.20896	0.0638
-- % in a Public Facility		24.3	28.8	33.3	44.3	38.4	32.4	0.633	0.11527	0.0193
-- % in a Private Facility		0.8	0.6	1.3	2.2	5.5	1.7	0.145	0.40770	0.0884
-- % at Home		73.7	69.7	64.3	52.7	54.9	64.8	1.342	-0.06773	0.0121
<b>Use of Modern Contraception (%):</b>	Currently married persons using a modern method									
-- Females		2.3	3.0	7.3	12.4	23.8	9.7	0.097	0.44058	0.0765
<b>Knowledge of HIV/AIDS Prevention (%):</b>	Knows sexual transmission routes of HIV/AIDS									
-- Females		42.2	40.9	47.1	58.4	80.7	55.0	0.523	0.14645	0.0271
<b>Number of Household Members</b>		7050	7169	6883	7074	7050	35226			

(\*) see annex for full definition

**Madagascar 1997**  
**Health, Nutrition, Population and Poverty:**  
**By Gender**

Indicator	Summary Definition (*)	MALE Quintiles					FEMALE Quintiles				
		Poorest	Second	Middle	Fourth	Richest	Poorest	Second	Middle	Fourth	Richest
<b>HNP Status Indicators</b>											
<b>IMR</b>	Deaths under age 12 months per thousand births	125.8	131.0	112.4	88.5	63.8	112.4	104.6	93.6	63.0	51.1
<b>U5MR</b>	Deaths under 5 years per thousand births	206.0	201.1	184.7	145.6	106.0	184.0	169.7	165.0	112.6	96.7
<b>Children Stunted (%)</b>	Below -2 sd z-score, height for age, children under 3 years	53.5	45.1	52.4	56.8	49.4	45.2	46.2	51.7	42.7	35.2
<b>Children Underweight (% moderate)</b>	Below -2 sd z-score, weight for age, children under 3 years	45.6	41.3	40.4	45.2	35.2	44.8	39.0	37.5	32.4	28.2
<b>Children Underweight (% severe)</b>	Below -3 sd z-score, weight for age, children under 3 years	18.6	15.5	11.1	17.7	10.4	13.6	10.5	14.3	4.9	5.8
<b>HNP Service Indicators</b>											
<b>Immunization coverage (%):</b>	Children age 12-23 months, by vaccination card or mother's report										
-- Measles		32.8	32.5	39.5	64.4	81.6	31.5	36.2	37.9	56.5	76.3
-- DPT3		33.5	36.9	40.3	64.2	79.5	31.1	38.4	42.6	66.7	82.6
-- All		22.1	25.6	28.9	56.7	66.9	21.8	24.9	25.2	52.3	65.1
-- None		29.0	33.6	26.4	7.9	4.9	29.9	19.5	22.6	8.9	2.4
<b>Medical Treatment of Illnesses</b>											
<i>Treatment of Diarrhea (%):</i>											
-- Prevalence	% Ill in the preceding 2 weeks	28.5	23.3	27.7	32.7	26.5	29.7	20.5	24.4	29.6	25.8
-- ORT use	ORS, RHF, or increased liquids	58.9	67.0	56.9	66.2	88.8	61.3	54.9	62.8	67.4	96.6
-- Seen Medically	Brought to a health facility if ill	38.1	39.7	27.9	38.0	53.6	39.6	30.9	37.0	44.0	57.7
-- % Seen in a Public Facility	Among those medically treated	28.0	24.8	21.3	28.9	19.9	26.1	17.4	26.9	35.5	28.6
<i>Treatment of Acute Respiratory Infection (%):</i>											
-- Prevalence	% Ill in the preceding 2 weeks	26.3	23.0	28.2	21.7	16.3	28.3	27.9	21.3	20.9	15.6
-- Seen Medically	Brought to a health facility if ill	37.5	30.9	28.1	32.2	(59.9)	33.1	35.5	38.2	42.3	(58.7)
-- % Seen in a Public Facility	Among those medically treated	30.1	20.7	20.9	25.6	(30.5)	23.3	29.0	33.0	40.2	(43.2)

(\*) see annex for full definition

Notes: ( ) indicate large sampling errors due to small number of cases.

\* indicates results not shown due to very small number of cases.

**Madagascar 1997**  
**Health, Nutrition and Poverty:**  
**By Urban-Rural Residence**

Indicator	Summary Definition (*)	URBAN Quintiles					RURAL Quintiles				
		Poorest	Second	Middle	Fourth	Richest	Poorest	Second	Middle	Fourth	Richest
<b>HNP Status Indicators</b>											
<b>IMR</b>	Deaths under age 12 months per thousand births	*	*	*	(69.2)	60.5	121.2	116.4	105.0	77.9	(50.2)
<b>U5MR</b>	Deaths under 5 years per thousand births	*	*	*	(122.5)	103.8	200.5	184.0	178.6	131.4	(95.7)
<b>Children Stunted (%)</b>	Below -2 sd z-score, height for age, children under 3 years	51.7	53.8	43.4	47.3	39.5	49.0	44.7	52.9	50.8	48.9
<b>Children Underweight (% moderate)</b>	Below -2 sd z-score, weight for age, children under 3 years	50.0	45.5	36.7	29.4	31.3	44.6	39.4	39.3	41.4	32.8
<b>Children Underweight (% severe)</b>	Below -3 sd z-score, weight for age, children under 3 years	17.0	15.2	8.7	8.0	8.1	15.9	12.6	13.0	12.4	8.3
<b>Low Mother's BMI (%)</b>	Body Mass Index < 18.5	22.7	17.1	(14.7)	24.4	16.4	24.4	23.6	18.8	17.4	12.2
<b>Total Fertility Rate</b>	Births per woman age 15-49	*	*	*	*	3.1	8.2	6.2	6.8	5.8	*
<b>Age Specific Fertility Rate (15-19 years)</b>	Births per 1000 women age 15-19	*	*	*	*	73.0	280.0	216.0	211.0	126.0	*
<b>HNP Service Indicators</b>											
<b>Immunization coverage (%):</b>	Children age 12-23 months, by vaccination card or mother's report										
-- Measles		(31.8)	*	*	(59.0)	81.2	32.2	35.5	38.1	61.3	(72.6)
-- DPT3		(26.9)	*	*	(53.0)	79.9	33.0	37.3	41.5	69.0	(84.3)
-- All		(16.4)	*	*	(45.9)	64.5	22.8	26.0	26.4	57.3	(70.0)
-- None		(35.7)	*	*	(10.8)	3.0	28.6	27.1	24.9	7.6	(5.2)
<b>Medical Treatment of Illnesses</b>											
<i>Treatment of Diarrhea (%):</i>											
-- Prevalence	% Ill in the preceding 2 weeks	41.7	26.0	26.4	29.3	28.3	27.7	21.3	26.1	31.8	21.2
-- ORT use	ORS, RHF, or increased liquids	(65.2)	*	*	(70.1)	92.4	59.3	61.7	60.4	65.9	*
-- Seen Medically	Brought to a health facility if ill	(43.0)	*	*	(51.1)	59.0	38.2	38.4	33.4	38.2	*
-- % Seen in a Public Facility	Among those medically treated	(32.6)	*	*	(37.6)	27.7	26.0	23.0	25.5	30.5	*
<i>Treatment of Acute Respiratory Infection (%):</i>											
-- Prevalence	% Ill in the preceding 2 weeks	36.1	16.8	29.6	21.0	15.7	26.3	26.6	24.5	21.4	16.5
-- Seen Medically	Brought to a health facility if ill	(39.4)	*	*	*	56.7	34.4	34.3	31.6	33.5	*
-- % Seen in a Public Facility	Among those medically treated	(28.5)	*	*	*	32.7	26.1	25.5	25.5	29.0	*
<b>Antenatal Care Visits (%):</b>											
-- to a Medically Trained Person	Doctor, nurse, or nurse-midwife	60.2	74.8	79.3	82.3	96.0	67.9	71.4	74.8	86.7	94.6
-- to a Doctor		9.1	13.0	15.8	5.8	17.9	16.0	15.4	22.4	30.6	25.6
-- to a Nurse or Trained Midwife	Nurses and nurse-midwives	51.1	61.8	63.6	76.5	78.1	52.0	56.0	52.4	56.0	69.0
-- 2+ visits		70.2	77.9	80.7	82.7	91.7	69.0	70.7	75.0	85.0	91.9
<b>Delivery Attendance (%):</b>											
-- by a Medically Trained Person	Doctor, nurse, or nurse-midwife	27.7	45.7	43.3	74.2	90.3	29.8	35.9	40.2	62.7	84.1
-- by a Doctor		2.0	3.1	8.9	6.6	14.3	7.4	8.7	12.9	24.7	32.4
-- by a Nurse or Trained Midwife	Nurses and nurse-midwives	25.7	42.6	34.5	67.6	76.0	22.4	27.2	27.2	38.0	51.7
-- % in a Public Facility		20.0	41.2	33.0	43.1	38.4	24.8	27.2	33.4	44.6	38.4
-- % in a Private Facility		2.2	0.0	2.4	1.2	6.6	0.7	0.7	1.2	2.4	2.9
-- % at Home		74.2	58.8	64.6	54.9	53.3	73.6	71.1	64.3	52.1	58.7
<b>Use of Modern Contraception (%):</b>	Currently married persons using a modern method										
-- Females		2.9	3.1	13.1	11.5	24.1	2.2	3.0	6.7	12.6	23.0
<b>Knowledge of HIV/AIDS Prevention (%):</b>	Knows sexual transmission routes of HIV/AIDS										
-- Females		36.4	28.2	45.8	66.0	82.6	42.9	42.5	47.2	56.4	74.2
<b>Number of Household Members</b>		758	755	675	1318	5117	6292	6414	6208	5756	1933

(\*) see annex for full definition

Notes: ( ) indicate large sampling errors due to small number of cases.

\* indicates results not shown due to very small number of cases.

## **TECHNICAL NOTES AND REFERENCES**

## Technical Notes

### Indicator Definitions

The definitions of the indicators used in the preceding tables are presented below. In general, they follow closely the definitions used by the Demographic and Health Surveys program.

#### **Health, Nutrition and Population Status Indicators**

Infant Mortality Rate: The number of deaths to children under 12 months of age per 1,000 live births. Figures used in the preceding tables are based on births in the 10 years preceding the survey.

Under-Five Mortality Rate: The number of deaths to children under five years of age per 1,000 live births. Figures used in the tables are based on births in the 10 years preceding the survey.

Percent of Children Stunted: Percent of children whose height measurement is more than two standard deviations below the median reference standard for their age as established by the World Health Organization, the U.S. Centers for Disease Control, and the U.S. National Center for Health Statistics. The figures in these tables are based on a sample of living children under three, four, or five years of age, depending on the country.

Percent of Children Underweight: Percent of children whose weight measurement is more than two standard deviations (moderately underweight) or more than three standard deviations (severely underweight) below the median reference standard for their age as established by the World Health Organization, the U.S. Centers for Disease Control, and the U.S. National Center for Health Statistics. The figures in the tables are based on a sample of living children under three, four, or five years of age, depending on the country.

Percent of Mothers with Low Body Mass Index (BMI): Percent of women whose BMI is less than 18.5, where BMI – an indicator of adult nutritional status – is defined as weight in kilograms divided by the square of height in meters. In some countries BMI is presented for all sample women, while in other countries the figure is available only for mothers of children under five years old. For each country, the relevant denominator is noted in Annex A.

Total Fertility Rate (TFR): The average number of births a woman could expect to have during her lifetime if she followed observed levels of fertility for her age group at every age. The TFR is calculated as the sum of average annual age-specific fertility rates for all reproductive age groups (usually at least 13 and at most 50 years old) during the three years preceding the survey. For most countries, the TFR is based on the number of women of reproductive age in all marital statuses. For some countries, however, the TFR is calculated based on a sample of ever-married women and then extrapolated by DHS to women of all marital statuses for that country.

Adolescent Fertility Rate (Age-Specific Fertility Rate for Women 15-19 Years Old): The average number of births among women aged 15-19, per 1,000 women in that age group. The figures appearing in the tables are based on births during the preceding three years, expressed as an annual average. In most countries, the adolescent fertility rate is calculated from a sample of women in all marital statuses, but in some countries where the sample covers only ever-married women, the results are extrapolated to all women by DHS.

## **Health, Nutrition and Population Service Indicators**

Immunization Rate: Percent of surviving children age 12-23 months who received measles vaccine (line a); three doses of DPT (line b); all vaccinations, namely BCG, three doses of DPT and oral polio, and measles (line c); no vaccines at all (line d). The figures are a combination of information recorded on the child's vaccination card, or, in cases where a card was not seen by the interviewer, as reported by the mother.

### Diarrhea:

- *Prevalence*: Percent of surviving children under three, four, or five years old (depending on the country) who had diarrhea in the two weeks preceding the survey (line a), based on mothers' reports concerning the presence of loose stools.
- *Treatment*: Percent of children with diarrhea in the past two weeks who received oral rehydration therapy (ORT) which includes oral rehydration salts, recommended home fluids or increased liquids (line b); percent who were taken to any medical facility for treatment, defined as a private doctor, mission/hospital clinic, other private hospital/clinic, pharmacy, or a public facility (line c); and percent of those seen medically who were taken only to a public facility, defined as a government hospital, government health center, or government dispensary (line d).

### Acute Respiratory Infection (ARI):

- *Prevalence*: Percent of surviving children under three, four, or five years old (depending upon the country) who had a cough accompanied by rapid breathing in the two weeks preceding the survey, as defined and reported by the mother (line a).
- *Treatment*: Percent of children with a cough and rapid breathing in the preceding two weeks who were taken to any medical facility for treatment (line b); and percent who were taken to a public facility (line c). Definitions for facilities are the same as for treatment of diarrhea.

Antenatal Care: Percent of births in the five years before the survey for which a woman received at least one antenatal care consultation from a medically trained person, defined as a doctor, nurse or nurse-midwife (line a); at least one antenatal care consultation from a doctor (line b); at least one antenatal care consultation from a nurse or nurse-midwife (line c); two or more antenatal care consultations from a medically trained person (line d). Note that lines (b) and (c) sum to line (a).

Delivery Attendance:

- Percent of births in the five years prior to the survey that were attended to by a medically trained person, defined as a doctor, nurse or nurse-midwife (line a); a doctor (line b); a nurse-midwife (line c). Note that lines (b) and (c) sum to line (a).
- Percent of all deliveries in the five years prior to the survey occurring in a public medical facility, defined as a government hospital, government health center, government maternity center and other country-specific public sector facilities (line d); a private medical facility, defined as a mission hospital/clinic, other private hospital/clinic (line e); at home, defined as own or any other home (line f). Note that lines (d), (e) and (f) sum to 100 percent (with some allowance for rounding of numbers).

Use of Modern Contraception: Percent of married women (line a) and men (line b) who report using any modern means of contraception, defined as male/female sterilization, oral contraceptive pill, contraceptive injection, intrauterine device, male/female condom, diaphragm, cervical cap, or contraceptive jelly or foam. (Information on male contraceptive use is not available for all countries.)

Knowledge of HIV/AIDS Prevention: Percent of women (line a) or men (line b) who report that they know of HIV/AIDS and know of at least one of the following means for preventing HIV/AIDS through interruption of its sexual transmission route: abstinence, using a condom, avoiding multiple sex partners, avoiding sex with prostitutes, and avoiding unprotected homosexual sex. In most cases, all survey respondents regardless of marital status are asked this question; where a particular survey has only an ever-married sample, the data pertain only to those ever married. (This information is not available for men in some countries, and not available for either men or women in some countries.)

## **Data and Methodology**

### **Source of Data**

The data are from the Demographic and Health Surveys (DHS) program conducted by Macro International, with support by the U.S. Agency for International Development. The DHS are large-scale household sample surveys carried out at periodic intervals in approximately fifty countries across Asia, Africa, the Middle East, Latin America and the former Soviet Union. (Annex D provides a list of countries covered by the DHS for which hnp/poverty information booklets such as this one are currently available.)

In each country, the DHS program collects information about a large number of health, nutrition, population and health service utilization measures, as well as data on respondents' demographic, social and economic characteristics. It does so through a standard set of questionnaires, similar in all countries, to collect data at individual, household and community levels. The data presented here draw on responses to the individual and household questionnaires.

### **Measurement of Socio-Economic Status**

#### **Asset Approach**

In the tables presented here, socio-economic status is defined in terms of assets or wealth, rather than in terms of income or consumption. The asset information is gathered through the DHS household questionnaire. This questionnaire includes questions, typically posed to the head of each surveyed household, concerning the household's ownership of a number of consumer items ranging from a fan to a television and car; dwelling characteristics such as flooring material; type of drinking water source and toilet facilities used; and other characteristics that are related to wealth status.

#### **Asset Index**

Each household asset for which information was collected through the DHS was assigned a weight or factor score generated through principal components analysis. The resulting asset scores were standardized in relation to a standard normal distribution with a mean of zero and a standard deviation of one.

These standardized scores were then used to create the break points that define wealth quintiles as follows. Each household was assigned a standardized score for each asset, where the score differed depending on whether or not the household owned that asset (or, in the case of sleeping arrangements, the number of people per room). These scores were summed by household, and individuals were ranked according to the total score of the household in which they resided. The sample was then divided into population quintiles -- five groups with the same number of individuals in each.

Annex B provides further detail about the standardization procedure used, as well as information about the particular assets included in the asset index, the asset factor scores, household asset scores, and the unweighted means and standard deviations for each asset. In general, these assets were similar from country to country. However, the factor scores for any given asset varied greatly across countries, reflecting inter-country variations in the overall presence and inter-household distribution of the asset in question.

For each country, a single asset index developed on the basis of data from the entire country sample was used in all the tabulations presented. Separate asset indices were not prepared for rural and urban population groups on the basis of rural or urban data, respectively.

### **Definition of Wealth Quintiles**

Wealth quintiles are expressed in terms of quintiles of individuals in the population, rather than quintiles of individuals at risk for any one health indicator. (Thus, for example, the quintile rates for infant mortality refer to the infant mortality rates per 1,000 live births among all people in the population quintile concerned, as distinct from quintiles of live births or newly born infants, who constitute the only members of the population at risk of mortality during infancy.)

This approach to defining wealth quintiles has the advantage of producing information directly relevant to the principal question of interest, namely, the health status or access to services for the poor in the population as a whole. This choice also facilitates comparisons across indicators for the same quintile, since the quintile denominators remain unchanged across indicators. However, some types of analysis may require data for quintiles of individuals at risk. Accordingly, annex A presents, for each quintile of the population, the number of individuals at risk with respect to each indicator shown in the preceding tables (number of live births for infant mortality, number of women 15-19 years of age for the adolescent fertility rate, etc.)

### **Calculation and Presentation of Rates**

#### Weighting Scheme

Rates for all health, nutrition and population indicators are calculated after applying the DHS sampling weights so that the resulting numbers are generalizable to the total population. (DHS surveys often over-sample certain small sub-groups of interest --

a particular ethnic group, for example -- so as to get statistically meaningful sample sizes for analysis. The DHS sampling weights are used to compensate for such over-sampling so that final results are representative of the country's population as a whole and not just of the DHS sample.)

For each hnp indicator in these tables, the total or population average presented is the weighted sum of the quintile rates for that indicator, where the weight assigned to each quintile rate is the proportion of the total number of individuals at risk in that quintile. The total rates for indicators produced by this weighting scheme are representative of the total population, as they take into account the fact that the numbers of individuals at risk may vary across wealth quintiles (which, as noted earlier, are defined on the basis of individuals in the population). Similarly, each quintile rate itself can be reproduced as a weighted average of urban/rural rates (weighted by proportions urban/rural) or the male/female rates (weighted by the proportion male/female). As a result of this weighting scheme, the population average for a given indicator presented in the tables here will usually differ from a simple mean of the population subgroups. The numbers of individuals at risk used in the weights are shown in annex A.

### Sampling Errors and Sample Sizes

The tables do not show standard errors for the quintile specific (or gender- or residence-specific) rates presented. Instead, where standard errors are likely to be unacceptably high due to small sample sizes, rates are presented in parentheses or replaced by an asterisk:

<u>Indicator</u>	<u>Unit of Measure</u>	<u>Presentation of Rate</u>		
		<u>Without Parentheses</u>	<u>Within Parentheses</u>	<u>Replaced by Asterisks</u>
Infant and Child Mor- tality	Number of Deaths	>500	250-499	<250
Total and Adolescent Fertility	Number of Births	>250	125-249	<125
Other Indicators	Number of Individuals	>50	25-49	<25

The above sample sizes refer to the number of sample observations before DHS sampling weights are applied.

The sample sizes presented in the last row of the tables for the total population and by urban-rural residence refer to the number of household members in the DHS sample for each quintile, and not to the total population of the country in each quintile.

## Measurement of Inequality

Accompanying each of the rates presented in the total population table are the values for two statistical indicators of inequality:

- *Poor/Rich Ratio.* This is the ratio between the rate prevailing in the poorest population quintile and that found in the richest quintile. Thus, a poor-rich ratio of 2.0 for, say, infant mortality, would mean that the infant mortality rate in the poorest quintile is twice the rate in the highest. This is a rather crude index since, among other things, it provides no information about the middle three quintiles. It does, however, provide a general order or magnitude of differences between the poorest and the richest 20 percent in their access to better hnp status or services.
- *Concentration Index.* The concentration index, whose value can vary between  $-1$  and  $+1$ , is similar to the Gini Coefficient frequently used in the study of income inequalities. It measures the extent to which a particular health status variable is distributed unequally across all five asset quintiles – that is, the concentration of inequality. The closer is the index to zero for any one health indicator, the less concentrated is the wealth inequality for that indicator; conversely, the further away is the index from zero, the greater is the inequality. The sign on the index (negative or positive), and the meaning of the sign with respect to health inequality, reflect the expected direction of the relationship of an indicator with poverty and inequality. For example, there is typically an inverse relationship between infant mortality and wealth, so that a negative concentration index implies a regressive situation as concerns wealth inequality. Conversely, the relationship between immunization and wealth is typically direct, so that in this case a positive concentration index implies a regressive relationship. Standard errors for the concentration index are presented to show the statistical significance of the measured inequality (Wagstaff et al., 1997).

## Discussion

The work presented here represents an initial effort to provide basic information about health, nutrition, and population conditions and service use by socio-economic class within countries. What follows is a discussion of the most significant of the numerous technical issues encountered in preparing the information.

### **Descriptive Nature of the Relationships**

The first issue concerns the attribution of causality. The hnp-poverty relationships shown in these tables are only descriptive, and should not be taken to imply any direct causal relationships.

One reason for this is the possibility that it is not wealth or asset possessions *per se* that determine a person's health characteristics. Rather, the determining factors may be other characteristics (such as education or ethnic background) that are simultaneously associated both with asset ownership *and* with hnp status.

It is also possible that the health-poverty relationships shown are driven primarily by a few of the assets used in the index such as, say, water and sanitation. Were this to be the case, improvements in hnp conditions among the poor may be more effectively brought about by focusing on changing those particular components of the asset index rather than by a general effort to increase wealth as measured by the index as a whole.

### **Implications of an Asset Approach**

#### Assets as a measure of socio-economic status

The use of assets as a measure of socio-economic status has several implications. Two of the more important are:

- *Use of Assets rather than Income or Consumption.* Reliance on an asset index to measure socio-economic status is somewhat unconventional in research about economic disparities, which tends to define economic status in terms of consumption or income. The main reason for the choice of the asset index is pragmatic rather than conceptual: the DHS surveys do not provide consumption or income data but do have detailed information on household ownership and access to a variety of consumer goods and services. Thus an asset approach presents the only way to examine, from an economic perspective, the distributional aspects of the uniquely detailed DHS health, nutrition and population information. Though there is some argument about the relative merits of using asset, consumption or income data to measure socio-economic status, recent research suggests that the asset-consumption relationship is quite close. (Filmer and Pritchett, 1998; Montgomery et al., 1997; Wagstaff et al., 1991; Rutstein, 1999). To the extent this is correct, asset ownership can be taken as a

reasonably satisfactory proxy for consumption, in addition to an indicator of economic status in its own right.

- *Economic Definition of Socio-Economic Status:* Like consumption or income, an asset index defines disparities in terms that are primarily economic. This is by no means the only way to define inter-group disparities. Other possibilities, not taken into account by the index, include gender, education, ethnic background, or other factors associated with social exclusion. Thus the index provides only a partial view of the multi-dimensional concepts of poverty, inequality and inequity.

### Choice of Assets

Use of an asset approach requires a decision of which assets to select from those available in the data set being used. Second, a choice has to be made about whether to use the same set of assets for all countries, or to design country-specific asset indices. The asset index used here includes all items in the DHS Household Questionnaire that relate to household ownership of consumer goods, and that deal with household access to services and resources such as electricity, water and sanitation facilities. The same set of assets, by and large, is used for all countries. (The complete list of assets is presented in Annex B.)

The decision to include all asset variables, and to use the same types of asset variable across all countries, has advantages and disadvantages:

- Use of a relatively larger number of assets increases the variation across household asset scores and facilitates a more regular distribution of households across quintiles.
- An index that comprises the same list of assets for each country facilitates comparisons across countries. Such an index is also easy to compute since the DHS has a standard list of assets that are included in questionnaires for all surveyed countries. (Some countries have country-specific assets that are, in most cases, also included. In such cases, the asset index is not strictly the same as for other countries; however, such cases are relatively few.)
- Including all the available assets, and using the same types of assets across all countries, to calculate the asset index lessens the subjectivity likely to be involved in selecting only some variables for inclusion, or in choosing different variables for different countries.
- On the other hand, including all variables entails a lack of discrimination with respect to the variables' differing natures. For instance, it is not clear whether access to water, sanitation, electricity or other publicly-provided resources should be included in an index that purports to measure private household wealth. Moreover, variables such as water and sanitation (for instance, whether a household uses a private tap) are not solely indicators of household wealth. Rather, they are also likely to be direct determinants of the health status of household members.

- Creating one index that includes all asset variables limits the types of analysis that can be performed. In particular, the use of a unified index does not permit a disaggregated analysis to examine which particular asset variables in the index are more or less important in their association with hnp status or service use, a question that can have important policy implications. Also, certain types of variables included in the index may themselves be seen as hnp-related services for which inequalities are of great potential interest, but which cannot be separately included in these tables. For example, including water and sanitation in the asset index precludes inclusion of information about access to water and sanitation by wealth quintile in the tables presented here, because access to water and sanitation is an element in the definition of wealth.
- Certain household asset variables may reflect household wealth better in some countries than in others, or may reflect differing degrees of wealth in different countries. Taking such information into account and creating country-specific asset indices with a country-specific choice of asset variables might produce a more effective and accurate index for a particular country. The asset index used in the preceding tables does not have this flexibility.

### Economies of Scale in the Asset Index

Calculation of the values for a household asset index requires a decision concerning economies of scale that exist at the household level. The asset index developed here is calculated assuming complete economies of scale. In other words, the addition of one more person to the household is assumed to not change the weight of a variable for any of the other individuals in that same household. This assumption appears reasonable for many of the asset items, but there are exceptions (such as the number of persons sleeping per room). Alternative approaches would be to assume no or partial economies of scale (Wagstaff et al., 1991).

### **Closing Word**

As noted at the outset, this is an initial effort. While most findings reported are in line with expectation, there are exceptions and anomalies that require further investigation. In addition, it is quite possible that the findings from any future attempts to examine intra-country health, nutrition, or population differences by socio-economic class will produce results differing significantly from those presented here. This might happen for any of several reasons: use of some basis other than assets for defining socio-economic status; adoption of tabulation conventions other than those employed here; sampling errors; and the like. Readers should be prepared for this possibility in deciding how to employ the figures presented in the preceding tables. Any analysts preparing estimates of their own are encouraged to share their findings and suggestions with the authors of the current work and with others, in order to stimulate the discussion and debate on methodological issues that will be required for progress in this important area of hnp inequality research.

## References

Filmer, Deon and Lant Pritchett. September 1, 1988. Estimating Wealth Effects without Expenditure Data-or Tears: An Application to Educational Enrollments in States of India. World Bank Policy Research Working Paper No. 1994. Washington, DC: Development Economics Research Group (DECRG), The World Bank.

Kakwani, N., A. Wagstaff, and E. van Doorslaer. 1997. "Socioeconomic inequalities in health: Measurement, computation and statistical inference." Journal of Econometrics 77(1): 87-104.

Montgomery, Mark R., Kathleen Burke, Edmundo Paredes. September 1997. Measuring Living Standards With DHS Data. Mimeo, Research Division, The Population Council, New York.

Rutstein, Shea. 1999. Wealth versus Expenditure: Comparison Between the DHS Wealth Index and Household Expenditures in Four Departments of Guatemala. Unpublished.

Wagstaff, A., P. Paci, and E van Doorslaer. 1991. "On the measurement of inequalities in health." Social Science and Medicine 33(5): 545-557.

Wagstaff, Adam and Naoko Watanabe. 1999. "Inequalities in childhood malnutrition and mortality: Does the measure of living standards matter?" Mimeo, The World Bank.

## **ANNEXES**

**Madagascar 1997**  
**Annex A: Sample Sizes**

Indicator	Sample Definition	Quintiles					Total
		Poorest	Second	Middle	Fourth	Richest	
<b><u>HNP Status Indicators</u></b>							
<b>Mortality Rates</b>	base: births in the last 10 years						
All		3,407	2,472	2,259	2,165	1,721	12,024
Urban		374	268	206	448	1,208	
Rural		3,033	2,204	2,053	1,717	513	
Female		1,713	1,184	1,102	1,050	859	
Male		1,694	1,288	1,156	1,115	862	
<b>Children's Nutritional Status</b>	base: living children under 3 years, weighed and measured						
All		836	625	605	605	409	3,080
Urban		83	64	55	117	280	
Rural		753	561	550	488	129	
Female		427	330	281	289	200	
Male		409	295	324	316	209	
<b>Maternal Nutritional Status</b>	base: mothers of children under 3 years weighed and measured						
All		725	553	485	479	363	2,604
Urban		59	63	47	102	250	
Rural		666	489	438	377	112	
<b>Total Fertility Rate</b>	base: all women ages 15-49						
All		4,078	3,852	3,418	3,855	4,597	19,801
Urban		442	425	316	827	3,545	
Rural		3,636	3,428	3,102	3,028	1,052	
<b>Age-Specific Fert. Rate 15-19</b>	base: all women age 15-19						
All		951	968	807	894	1,043	4,664
Urban		112	130	78	192	831	
Rural		839	839	729	702	212	

**Madagascar 1997**  
**Annex A: Sample Sizes**

Indicator	Sample Definition	Quintiles					Total
		Poorest	Second	Middle	Fourth	Richest	
<b>HNP Service Indicators</b>							
<b>Immunization coverage:</b>	base: living children age 12-23 months						
All		324	241	233	251	160	1,209
Urban		41	20	20	58	117	
Rural		283	221	213	193	43	
Female		167	125	114	115	82	
Male		157	115	119	137	78	
<b>Prevalence of Diarrhea and ARI:</b>	base: living children under 3 years						
All		1,003	716	697	653	468	3,537
Urban		104	76	66	132	326	
Rural		899	641	631	522	141	
Female		527	376	326	307	237	
Male		477	340	371	346	230	
<b>Treatment of Diarrhea:</b>	base: living children under 3 years with diarrhea in the past 2 weeks						
All		292	156	182	204	122	957
Urban		44	20	17	39	92	
Rural		249	136	165	166	30	
Female		156	77	79	91	61	
Male		136	79	103	113	61	
<b>Treatment of Acute Respiratory Infection:</b>	base: living children under 3 years with ARI in the past 2 weeks						
All		274	183	174	140	75	845
Urban		38	13	20	28	51	
Rural		236	170	155	112	23	
Female		149	105	70	64	37	
Male		125	78	105	75	38	
<b>Antenatal and Delivery Care:</b>	base: live births in the last 3 years						
All		1,113	807	762	703	509	3,893
Urban		119	92	71	142	357	
Rural		995	715	691	560	152	
<b>Contraceptive Prevalence:</b>	base: currently married persons						
Female		1,005	888	765	840	936	4,434
Urban		114	106	64	165	684	
Rural		891	782	701	676	252	
<b>Knowledge of HIV/AIDS Prevention:</b>	base: all respondents						
Female		1,436	1,377	1,214	1,374	1,659	7,060
Urban		158	152	109	288	1,281	
Rural		1,279	1,225	1,106	1,086	378	

(\*) see annex for full definition

## Annex B: Assets and Factor Scores

The first table in this annex presents information about the assets used in the calculation of the asset index and wealth quintiles. The first column on the left-hand side provides a brief description of each asset. The following two sets of columns present descriptive statistics for the assets, namely the unweighted proportion of all sample households that owns each asset (and the standard deviation for that proportion); and the percentage of the sample population in each wealth quintile of the population (and total) that owns each asset.

The column labeled “Asset factor scores” presents the raw factor scores for each asset generated by principal components analysis, as explained in the technical notes. The right-hand pair of columns presents the calculated standardized household asset scores. These are presented for each asset, based on the formula below:

Household asset score =

$$\left( \frac{\text{value of asset variable} - \text{unweighted mean of asset variable}}{\text{unweighted standard deviation of asset variable}} \right) \times \text{"raw" asset factor score}$$

For dichotomous variables (i.e., variables that take a value of 1 if the household owns the asset and 0 if the household does not own the asset), there are two household scores for each asset -- one for households that own the asset and one for households that do not own the asset. For assets that are not dichotomous, such as the number of persons per sleeping room, the asset score is calculated according to the formula presented here.

Standardized household scores were added up for each household, and each individual was assigned the total household asset score for her/his household. Individuals were ranked according to their total scores, and divided into five quintiles or groups of equal size. The quintile cut-off points are presented in the second table in this annex.

The asset factor scores and standardized household asset scores are provided as an illustration for interested readers who may wish to use a similar methodology to create asset indices for the study of poverty. Annex C provides an illustrative questionnaire for alternative uses of the asset index presented in these tabulations.

**Madagascar 1997**  
**Annex B: Assets and Factor Scores**

**1. List of Assets and Factor Scores**

Asset variable	Unweighted		Quintiles					Total	Asset factor score	Household score if:	
			Poorest	Second	Third	Fourth	Richest			has asset	does not have asset
	Mean	Std. Deviation	Percentage of Population								
Has electricity	0.154	0.361	0.0%	0.0%	0.1%	0.4%	55.1%	11.1%	0.15080	0.35405	-0.06422
Has radio	0.417	0.493	0.9%	33.3%	31.4%	56.5%	86.4%	41.7%	0.10360	0.12243	-0.08765
Has television	0.094	0.291	0.0%	0.0%	0.0%	0.2%	33.8%	6.8%	0.13631	0.42387	-0.04383
Has refrigerator	0.020	0.138	0.0%	0.0%	0.0%	0.0%	6.3%	1.3%	0.08574	0.60761	-0.01210
Has bicycle	0.052	0.223	0.2%	1.7%	3.6%	8.0%	17.4%	6.2%	0.04035	0.17152	-0.00949
Has motorcycle	0.006	0.075	0.0%	0.0%	0.0%	0.0%	2.9%	0.6%	0.04297	0.56660	-0.00326
Has car	0.016	0.125	0.0%	0.0%	0.0%	0.0%	5.2%	1.0%	0.07643	0.60131	-0.00971
Has telephone	0.009	0.096	0.0%	0.0%	0.0%	0.0%	2.9%	0.6%	0.06839	0.70954	-0.00659
If household works own or family's agric. land	0.500	0.500	98.6%	70.6%	64.5%	56.9%	12.0%	60.5%	-0.09713	-0.09717	0.09708
Number of members per sleeping room	3.725	2.123	5.8	4.8	4.8	4.0	3.4	4.6	-0.05370	**	**
If piped drinking water in residence	0.059	0.236	0.0%	0.0%	0.0%	0.7%	19.4%	4.0%	0.11394	0.45393	-0.02860
If has piped water outside residence	0.018	0.134	0.0%	0.0%	1.4%	2.3%	5.7%	1.9%	0.01861	0.13587	-0.00255
If uses a public faucet (piped)	0.149	0.356	0.0%	0.4%	4.3%	10.6%	40.7%	11.2%	0.08025	0.19150	-0.03362
If has borehole with pump in residence	0.011	0.103	0.0%	0.0%	0.4%	1.1%	4.3%	1.2%	0.01642	0.15757	-0.00171
If has borehole with pump outside of residence	0.018	0.133	1.3%	3.0%	2.3%	0.8%	1.0%	1.7%	-0.01110	-0.08166	0.00151
If gets water from a tanker truck	0.005	0.071	0.2%	0.9%	1.3%	0.2%	0.2%	0.6%	-0.00265	-0.03729	0.00019
If has a well in residence	0.028	0.166	0.0%	0.7%	2.3%	6.4%	8.9%	3.7%	0.01202	0.07041	-0.00205
If has well outside of residence	0.038	0.191	0.0%	1.7%	3.7%	5.4%	3.1%	2.8%	-0.00205	-0.01033	0.00041
If gets water from an open well/hole/cesspool in residence	0.035	0.183	0.0%	1.8%	4.6%	7.9%	7.5%	4.3%	0.00524	0.02767	-0.00099
If gets water from open well/hole/cesspool outside residence	0.095	0.293	6.4%	17.6%	15.4%	5.3%	2.4%	9.4%	-0.02915	-0.08998	0.00944
If rain for drinking water	0.000	0.017	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	-0.00163	-0.09762	0.00003
If uses river, canal or surface water for drinking	0.542	0.498	92.2%	73.9%	64.2%	59.3%	6.7%	59.3%	-0.10437	-0.09593	0.11354
Other source of drinking water	0.001	0.026	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.00177	-0.06691	0.00005
If uses own flush toilet	0.037	0.189	0.0%	0.0%	0.0%	0.3%	11.0%	2.3%	0.09723	0.49630	-0.01904
If uses a traditional pit toilet	0.334	0.472	0.0%	0.0%	26.8%	61.7%	75.7%	32.8%	0.08954	0.12636	-0.06344
If uses a VIP latrine	0.042	0.200	0.0%	0.8%	5.9%	7.5%	7.9%	4.4%	0.00948	0.04538	-0.00198
If uses bush,field as latrine	0.587	0.492	100.0%	99.2%	67.2%	30.5%	5.4%	60.5%	-0.12692	-0.10656	0.15116
If other type of latrine	0.000	0.017	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00208	0.12450	-0.00003
If has dirt, sand, dung as principal floor in dwelling	0.071	0.258	0.0%	6.3%	10.8%	13.7%	5.8%	7.3%	-0.00042	-0.00150	0.00012
If has wood, plank principal floor in dwelling	0.140	0.347	0.0%	0.3%	12.5%	25.6%	19.4%	11.5%	0.03547	0.08807	-0.01429
If has cement principal floor	0.142	0.349	0.0%	0.0%	1.4%	11.4%	50.7%	12.7%	0.08999	0.22147	-0.03656
If has parquet or polished wood floors	0.048	0.214	0.0%	0.0%	0.2%	2.4%	16.7%	3.9%	0.07280	0.32332	-0.01639
If has tiles for main flooring material	0.003	0.055	0.0%	0.0%	0.0%	0.0%	1.0%	0.2%	0.03367	0.60695	-0.00187
If has palm or bamboo for floor materials	0.591	0.492	100.0%	93.4%	75.1%	46.4%	4.8%	64.0%	-0.12683	-0.10548	0.15250
If has carpeted flooring	0.003	0.058	0.0%	0.0%	0.0%	0.3%	1.4%	0.3%	0.01799	0.31049	-0.00104
If has other type of flooring	0.000	0.017	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	-0.00141	-0.08460	0.00002

\* For each variable, missing values are replaced with the variable mean.

\*\* Household score for number of members per sleeping room is calculated as follows: {#people per room - unweighted mean}/unweighted std. deviation}\*asset factor score; see Annex C

**2. Cut-off Points for Wealth Quintiles**

Wealth Quintile	Asset Index Value	
	Lowest	Highest
Poorest	lowest	-0.81093
Second	-0.81093	-0.60068
Third	-0.60068	-0.26565
Fourth	-0.26565	0.37056
Richest	0.37056	highest

## Annex C: Asset Questionnaire

This annex presents an asset questionnaire, based on the factor scores shown in annex B. The questionnaire is designed for use by investigators wishing to assess the effectiveness of specific health, nutrition or other interventions in reaching the poor. The questionnaire, or others like it, can be used in assessing either facility-based interventions or outreach and other types of programs conducted independently of facilities.

### Facility-Based Interventions

In assessing interventions based in facilities (say, a particular type of health post), the questionnaire can be administered to a sample of facility users. (In most cases, the preferable time for administering the questionnaire will be after the receipt of services – that is, through an exit survey – in order to lessen the possibility of inaccurate responses to questions posed prior to service receipt because of the perceived financial benefit of appearing poor.)

Once all the questions have been answered, each answer can be assigned a numerical value, using the score for each possible response indicated on the questionnaire. (These scores are the same as the standardized household factor scores shown in the right-hand columns of annex B, table 1.) Summing the numerical value produces a total household asset score for the individual. This score can be compared with the totals appearing in annex B, table 2 in order to identify the wealth quintile to which the individual belongs.

The individual placements just described can be aggregated to produce a socio-economic profile of the clientele of the facility in question, expressed in terms of the percentage of total facility clients belonging to each wealth quintile of the population. This profile can then serve as a basis for determining how well or poorly the facility in question is reaching the poor. For example, one would normally expect well over twenty percent of the clients in a facility that is effectively serving the poor to belong to the lowest population wealth quintile, and well under twenty percent to be from the richest quintile.

Since the factor scores incorporated in the questionnaire are derived from a representative country-wide population sample, the procedure just described works best in assessing a facility-based program that is national in scope, and where the sample of patients interviewed is representative of the program as a whole. When used to assess a program with a more limited coverage, the findings produced through such a procedure must be interpreted with caution since asset scores based on a national population may not be applicable to sub-populations. The point can be illustrated with reference to application of the procedure and of the factor scores presented here to the assessment of a

facility program covering only one, particularly poor province. A finding that the clients of such a program were predominantly impoverished might well be of interest. However, the finding would refer to poverty defined according to a national rather than a provincial standard. Given the higher-than-average poverty level prevailing in the province concerned, the program in review might still be serving people who are disproportionately among the better-off within that province.

This example illustrates the broader point that if the interest is how well a sub-national program reaches the poorest people within its particular catchment area, there is need for a set of asset factor scores specific to that catchment area. In some cases, it might be possible to calculate area-specific factor scores from a subset of the national-level data presented here. This would be most likely when the catchment area in question is a large province or a set of provinces, or the program of interest is oriented toward a country's entire rural or urban population. For small areas or population groups, however, the reliability of results produced in this way would be highly questionable.

#### Facility-Based or Other Interventions

This kind of questionnaire can also be used for household surveys rather than facility-based patient exit surveys. A household survey is particularly relevant for outreach initiatives involving field personnel who visit households, and mass media health/nutrition/population education programs, both of which do not involve client visits to facilities.

This option would feature the development of a simple questionnaire including the asset questions presented on the following page, plus questions about use of or contact with the service of interest. (In this latter connection, one might wish to consider whether those interviewed had, say, recently received a visit from a field worker concerned with a particular kind of health program, had heard a particular health message, and/or had visited a particular type of facility, etc.)

Once the data have been collected, the asset questions could be used to develop an asset index specific to the sample population by applying principal components analysis to the responses received. The resulting factor scores could serve a basis for ranking individuals by wealth, as explained in the technical notes and annex B. The socio-economic profile of the individuals who do and do not use or have access to the services or facilities of interest could be developed and assessed through a procedure analogous to that described in the preceding section.

In the event that the necessary statistical expertise is lacking, an alternative procedure would be to use the same factor scores as shown on the attached questionnaire, along with the same quintile dividing lines presented in annex B, table 2. This, however, would be considerably less precise, and subject to the significant, previously-noted limitation of applying factor scores from a representative national sample to a specific, sub-national sample.

**Sample Asset Questionnaire:  
Madagascar**

Question	Score if response is "yes"	Score if response is "no"	Item Score
<i>In Your Dwelling, Is There:</i>			
Electricity	0.354	-0.064	_____
A radio	0.122	-0.088	_____
A television	0.424	-0.044	_____
A refrigerator	0.608	-0.012	_____
A bicycle	0.172	-0.009	_____
A motorcycle	0.567	-0.003	_____
A car	0.601	-0.010	_____
A telephone	0.710	-0.007	_____
Do members of your household work on their own or the family's agricultural land	-0.097	0.097	_____
<i>What is the principal household source of drinking water?</i>			
Piped drinking water in residence	0.454	-0.029	_____
Piped water outside residence	0.136	-0.003	_____
Public faucet (piped)	0.192	-0.034	_____
Borehole with pump in residence	0.158	-0.002	_____
Borehole with pump outside of residence	-0.082	0.002	_____
Tanker truck	-0.037	0.000	_____
Well in residence	0.070	-0.002	_____
Well outside of residence	-0.010	0.000	_____
Open well/hole/cesspool in residence	0.028	-0.001	_____
Open well/hole/cesspool outside residence	-0.090	0.009	_____
Rain for drinking water	-0.098	0.000	_____
River, canal or surface water for drinking	-0.096	0.114	_____
Other source of drinking water	-0.067	0.000	_____

**Sample Asset Questionnaire:  
Madagascar**

Question	Score if response is "yes"	Score if response is "no"	Item Score
<i>What is the principal type of toilet facility used by members of your household?</i>			
Own flush toilet	0.496	-0.019	_____
Traditional pit toilet	0.126	-0.063	_____
A VIP latrine	0.045	-0.002	_____
Bush,field as latrine	-0.107	0.151	_____
Other type of latrine	0.125	0.000	_____
<i>What is the principal type of flooring in your dwelling?</i>			
Dirt, sand, dung as principal floor in dwelling	-0.001	0.000	_____
Wood, plank principal floor in dwelling	0.088	-0.014	_____
Cement principal floor	0.221	-0.037	_____
Parquet or polished wood floors	0.323	-0.016	_____
Tiles for main flooring material	0.607	-0.002	_____
Palm or bamboo for floor materials	-0.105	0.152	_____
Carpeted flooring	0.310	-0.001	_____
Other type of flooring	-0.085	0.000	_____
In your dwelling, how many members are there per sleeping room (score is per member)	$\left( \frac{\# \text{members} - 3.725}{2.123} \right) \times -0.054$		_____
<b>Total Household Asset Score</b> (sum of individual item scores)			_____

Notes:

1. The asset scores listed here are based on the 1997 Demographic and Health Surveys national sample of households

## Annex D: List of DHS Countries with HNP and Poverty Tabulations

<u>Country</u>	<u>DHS</u> <u>Rnd.</u>	<u>Year</u>	<u>Country</u>	<u>DHS</u> <u>Rnd.</u>	<u>Year</u>
<u>AFRICA – 22 Countries</u>					
Benin	III	1996	Mali	III	1995/6
Burkina Faso	II	1992/3	Mozambique	III	1997
Cameroon	II	1991	Namibia	II	1992
Central Afr. Republic	III	1994/5	Niger	III	1998
Chad	III	1996/7	Nigeria	II	1990
Comoros	III	1996	Senegal	II	1997
Côte d'Ivoire	III	1994	Tanzania	III	1996
Ghana	III	1993	Togo	III	1998
Kenya	III	1998	Uganda	III	1995
Madagascar	III	1997	Zambia	III	1996
Malawi	II	1992	Zimbabwe	III	1994
<u>ASIA/NEAR EAST/NORTH AFRICA – 13 Countries</u>					
Bangladesh	III	1996/7	Nepal	III	1996
Egypt	III	1995/6	Pakistan	II	1990/1
India	III	1992/3	The Philippines	III	1998
Indonesia	III	1997	Turkey	III	1993
Kazakhstan	III	1995	Uzbekistan	III	1996
Kyrgyz Republic	III	1997	Vietnam	III	1997
Morocco	III	1993			
<u>LATIN AMERICA/CARIBBEAN – 9 Countries</u>					
Bolivia	III	1998	Haiti	III	1994/5
Brazil	III	1996	Nicaragua	III	1997/8
Colombia	III	1995	Paraguay	II	1990
Dominican Republic	III	1996	Peru	III	1996
Guatemala	III	1995			