Development Centre Studies

Education and Health Expenditure and Poverty Reduction in East Africa

MADAGASCAR AND TANZANIA

INTERNATIONAL DEVELOPMENT

OECD

Edited by Christian Morrisson

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FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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MADAGASCAR ET TANZANIE

Foreword

This volume on Madagascar and Tanzania was produced in the context of the research project "Empowering People to Meet the Challenges of Globalisation" which is part of the Development Centre's 2001/2002 work programme. A companion volume looks at the case of health and education spending in developing countries, based on the experience of Indonesia and Peru. Both are part of the Development Centre's research on poverty reduction.

Acknowledgements

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Preface

The reduction of poverty in all of its forms is central to the concerns of the international community interested in social and economic development. This community obviously includes governments, intergovernmental institutions such as the United Nations, the World Bank, the International Monetary Fund and the OECD. It also increasingly includes business associations, trades unions, parliaments and civil society, made up of NGOs, universities and the media.

Traditional players, such as the member countries of the OECD Development Assistance Committee, have defined seven objectives for international development including four which concern this study in particular: reducing extreme poverty, providing universal primary education, lowering infant and maternal mortality, and transmitting health. One of these echoes a United Nations Millennium Summit commitment — halving the number of people living in extreme poverty by the year 2015.

The programme of work at the OECD Development Centre dovetails with the international concern so clearly expressed by the DAC objectives. Its methodology of specific comparison makes it possible to improve dialogue on development policies in the most wide-ranging economic and social contexts. This is particularly true of the recently concluded Development Centre project *Developing Human Resources and the Fight Against Poverty* that studies four countries, including two poorer ones, Madagascar and Tanzania, and two less poor ones, Indonesia and Peru.

The four DAC objectives are, unfortunately, entirely timely in Madagascar and Tanzania, the two countries looked at here. In Madagascar, more than two-thirds of the population live in extreme poverty on less than $1 per day, one-half of all children in Madagascar suffer from serious malnutrition, and nearly one-third of them have no access to primary school. The situation is no better in Tanzania. The thorough analyses presented are useful well beyond the borders of these two countries to all the poor countries of sub-Saharan Africa.

Two conclusions merit particular attention, and these relate to policy coherence and good governance. Socialist and volontarist education and health policies aimed at overcoming poverty quickly failed in both countries because of lack of coherence

(schools were built without teachers, health posts without medicines), and because of unsustainable macroeconomic policies. In addition, the administrative machinery was not up to the task of implementing such policies in health and education.

Donors must help these countries to improve their governance. If they fail to do so, the health and education services essential for combating poverty will not reach the poorest people living in rural areas. It is much easier for a donor to finance the construction of a school than to increase administrative efficiency; this is nonetheless the condition if the international development community is to reach its objectives in the poorest countries, those precisely with the most serious governance difficulties.

Jorge Braga de Macedo
President
OECD Development Centre
July 2002

Summary

This volume is one of a group of works on health and education spending and on poverty and malnutrition, in the context of the report on *Human Resource Development and the Fight Against Poverty*. The introduction recalls the analyses of the 1990 and 2000 *World Development Reports* of the World Bank that focused on poverty, and presents the approach taken by the two studies on Madagascar and Tanzania. The traditional approach towards describing poverty, education and health services, and the incidence of spending in these sectors in terms of household revenues, has been used in this volume. In addition, however, the authors have analysed the demand for these services, and the benefits and the externalities that they procure as these are now recognised as being essential for refining effective policies to combat poverty.

Chapters 1 and 2 on Madagascar and Tanzania are linked because they examine two similar experiences. The governments wanted to bring about a rapid end to poverty by providing universal education and health services. Indeed, they achieved virtually universal primary school enrolment in a few years. But the project was doomed by economic failure (per capita income dropped by one-quarter). Neither government had the means to run schools or health care centres. Quality deteriorated, attendance rates plummeted, the private sector had to be called in, and these countries are now classified among the last in Africa in terms of per capita health and education spending.

The study on Madagascar describes this deterioration and shows how the situation of poor people is even more unfavourable than national averages would suggest it to be. In health centres attended by the poorest people (first quintile), medication is half as available and satisfactory equipment is four times less available than in health centres attended by households in the fifth quintile. The children of the poorest people go to schools with half as many teachers per class as the schools attended by children in the fifth quintile. The poorest people, therefore, have access to health care centres where there is often neither a nurse nor medication, and to schools where there are not enough teachers.

An analysis of the incidence of social spending compares the distribution of education spending from primary to higher education, and the distribution of health spending from basic health care centres to dispensaries and then to hospitals. It shows that in these two sectors, progressivity decreases just as it does in other countries. Moreover, the distribution of spending for high school and for higher education is

regressive in that it is more unequal than the distribution of consumption. Using unit costs, the authors aggregated health and education spending, both of which have a redistributive effect because their distribution is less unequal than that of consumption. This effect is overestimated, however, because it is based on constant unit costs whereas poor people often have access only to the poorest quality services that clearly cost less.

An in-depth analysis of demand shows how sensitive parents are to the price and quality of primary education. Poor quality has a significant impact on demand. Price elasticity is high for poor people whereas it is almost nil for rich people. Any increase in school costs would therefore reduce poor people's attendance in schools. Yet this effect could be avoided if quality were increased along with costs. The same is true for the demand for health care: price elasticity is far higher for poor people than it is for the rich.

The chapter on Madagascar also shows the direct and indirect effects of education and health services. An additional year of schooling increases an hourly salary by 10 per cent; people who suffer from some form of handicap have a clearly lower rate of activity and when they do work, they are less well paid. Moreover, many indirect effects are also brought to light: a mother's education very clearly influences her demand for prenatal health care. The same is true for the impact of parents' education on their demand for their children's health care. Finally, a mother's level of education has a decisive influence on infantile and juvenile mortality rates and on their nutritional state, which influences school performance. This leads the authors to propose a model of transmission from one generation to another of the education and poverty variables.

Chapter 2, on Tanzania, describes the same evolution in health and education services. In Tanzania, however, the changes in health services took place in a context that was aggravated by the AIDS pandemic: 1 million children have been orphaned by AIDS, and life expectancy has been reduced by five years in just one decade. The analysis of the incidence of health and education spending showed the same hierarchy as in other countries. Statistics on the quality of education (providing schoolbooks, uniforms, etc.) and on that of health services (i.e. medical care of pregnant women) reveal the same bias as in Madagascar: rich households have access to higher quality services. The progressivity of spending based on attendance rates is therefore overestimated.

The analyses of demand confirm the analyses made in Madagascar: households react to variations costs (by going to the private sector if the public sector fees increase) and the quality of health care. For education, transportation was the only element that was available in terms of cost, and was estimated by distance: pupils living furthest from school go to school later and for shorter periods of time. Moreover, the demand for education proves to be particularly sensitive to the quality of teaching mathematics.

Chapter 2 also considers the indirect effects of education and health services. Educated mothers enrol their children earlier in school, whereas the children of illiterate parents go to school less than other children. These choices have an impact, in turn,

on the income of children since formal sector education returns reach 8 per cent. Demographic and health data confirm the effects observed in Madagascar: children are taller if their mothers had medical supervision during their pregnancy or if the parents went to secondary school.

Chapter 3 draws the conclusions from these studies and makes recommendations so that education and health policy can more effectively combat poverty. The first conclusion is a warning: the wilful policies in Madagascar and Tanzania led to failure. Policy needs to be realistic and accept the fact that universal access for poor people to education and health care will take time. However, poor people have a right to services of a quality equal to those available to other people in order to escape once and for all from the cycle of poverty.

The second conclusion concerns equity. The redistributive impact of social spending can be increased in several ways. Developing a private fee-based sector for rich families would liberate spaces for poor people in schools and in hospitals. Improving rural transportation networks would give many more poor people access to public services. Targeted spending like literacy and vaccination campaigns have a redistributive effect because of a self-selection process: intermediary and rich households know how to read and have already been vaccinated. Finally, providing access for the whole population to a service, i.e. a coverage rate of 100 per cent, is very efficient since experience shows that the prime beneficiaries of such a service are always non-poor households. Increasing coverage from 60 to 100 per cent will always benefit the poor above all.

Decentralisation and local control can be recommended because they contribute to the efficiency and equity of education and health spending. Unfortunately, field studies reveal the real difficulties of this strategy. In Madagascar, rural districts are often unable to run primary schools or basic health centres. It is therefore essential to improve administrative capacity in these districts so that local management can target benefits for the poor.

The last recommendation concerns the coherence of public interventions in a long-term perspective. A group of unco-ordinated spending programmes risks having little effect on poverty. A network of health centres with nurses, but without provision of free medication for the poor, will be of little help to them. There is no point in having these centres offer contraceptives to women if girls have not been educated or at least benefited from literacy campaigns. The result of a co-ordinated set of education and health services is higher than the sum of the effects of each service. Without a coherent strategy, the benefits of these increasing returns of social spending are lost and poverty is reduced less. This strategy must be conceived in a long-term perspective so as to stop the transmission of poverty from generation to generation. Indeed, children's health and education and their school performance depend partly on the health and education of their parents. Therefore, education and health spending as a means to reduce the perpetuation of poverty should be a priority.

Introduction

The 1990 *World Development Report* from the World Bank focuses on poverty. The chapter on "Social Services and the Poor" states that investment in human capital through education and health is "one of the keys to poverty reduction". The authors justify their thesis by the effects of education on productivity, not only of salaried workers, but also of small agricultural workers and workers in the informal sector. At the same time, they showed all the favourable effects that better health has on productivity and, for children, on the acquisition of knowledge. Consequently, the report recommended that the government make these two social services accessible to all poor people. Certain remarks were made to temper this conclusion concerning the interest of having recourse to the private sector in certain cases and the need to decentralise basic health and primary school services. Moreover, the report already mentions a demand problem: poor people cannot use these services even if they are free of charge, either because they do not see their value or because they include a cost, such as the loss of household income when a child goes to school.

The *2000 World Development Report* also focuses on poverty and it addresses the same theme in Chapter 5, "Expanding Poor People's Assets". The basic idea is the same: the accumulation of human capital through health and education can reduce poverty. The approach, however, claims to be original. In the past, this accumulation was conceived of solely in terms of supply, and the state was either partly or entirely responsible for procuring services. Today, however, we know that demand counts as much as supply. Moreover, not everything depends on the state. In the absence of any supervision, teachers can be paid without worrying about teaching well. Medication can be provided to public health centres but can disappear and be resold on the black market. The report then gives several examples of ineffective health and education spending that correlates poorly with performance (knowledge acquired by pupils at the end of primary school, for example). Local management and monitoring were put forth as the most satisfying solutions for resolving the problem.

This report also strongly emphasises the role of demand, by showing that it is essential to reduce costs so that all poor families can have access to these services. For example, in certain cases the parents must receive a subsidy to compensate them for

the loss of revenue because their daughters go to school. Several case studies showed that the demand of poor people is sensitive to the quality of service, and is, at the same time, much more elastic with respect to cost than the demand of rich households.

If the texts of the two reports are compared, the originality of these analyses on demand and local control requires some nuance. The authors of the 1990 Report were already aware of the problems. The change from one report to the next has more to do with the respective weight of the themes. Ten years ago, the different aspects of supply weighed more heavily and those of demand and the monitoring of services weighed far less. This change is linked to the experience of local policies targeted to poor people and to the literature that has been published since 1990. We now have far more documentation on the insufficiencies of supply policies and the 2000 Report uses this documentation to show that policies on the accumulation of human capital by poor people need to be revisited. *Public Spending and the Poor* (Van de Walle and Nead, 1995), an important publication from the mid-1990s, already indicated this shift with respect to the traditional analyses of the 1970s of the distribution of the benefits of social spending among households but that ignored their behaviour and reactions and the real impact of social spending on the human capital of poor people.

The choice between traditional and new analyses is not academic. It is also important for donor countries. Indeed, if the recent analyses are pertinent, aid policy needs to change. If we agree that local authorities are better informed about poor people, should be accountable to their constituents and can better target interventions, then donor countries can replace government aid with direct aid to these organisations. If the price elasticity of demand is high for poor households, less aid should be spent on building schools and hospitals and more on financing programmes of the Food for Education type, like those created in Bangladesh that sent 2 million children to school in 1996 (food rations were distributed to households on the condition that their children attended class).

This publication focuses on the relationship between education and health spending and poverty in Madagascar and in Tanzania, and is part of this literature. It is less ambitious than Van de Walle and Nead's 1995 publication, because it focuses solely on health and education spending rather than examining all transfers made to poor people, including subsidies for food products, financial aid, public works programmes for the unemployed. Moreover, only two countries are addressed here whereas Van de Walle's publication covers middle-income countries as well as Central and Eastern European countries in transition. By focusing on these countries, however, we were able to make broader case studies than those presented in the four chapters of "Public Spending and the Poor" concerning education and health in Peru, Pakistan, and Indonesia.

Each case study takes the same approach. First, the basic data on poverty are presented. Poverty in this context is not relative or subjective poverty, but absolute poverty, and we use the poverty thresholds referring to the consumption of calories or to the traditional thresholds of $1 and $2/day. Information concerning access to

education and to health services, particularly among poor people, complete the picture. Next, the authors summarise the provision of education and health services in financial terms and in terms of numbers of beneficiaries. When possible, information about the quality of services makes it possible to appreciate better the changes that statistical series describe only imperfectly. Even if the traditional analyses of the incidence of social spending have elicited considerable criticism, it seemed necessary to estimate the distribution of each service by households classified according to per capita income (or consumption). Even if unit costs of services are not known, the distribution of pupils (in primary school, junior high school or high school) and visits (to a basic health care centre or hospital) by income are sufficient for making an informative comparison of the concentration of a service and of income. In addition to a descriptive comparison using concentration curves, dominance tests allow us to make more rigorous conclusions.

The following sections present the most stimulating developments, thanks to studies of demand and to the analyses of the benefits of health and education services and the externalities that they procure. It is useful to examine results because social services are only the means to an end. For poor people to be able to cross the poverty threshold, what counts is not how much money is spent but what results are obtained. For example, what has a child learned after six years of primary school, how much more salary can s/he hope for later compared to an illiterate worker? Finally, having considered education and health services, it would have been unfortunate to ignore the interactions between the two. Therefore, a child's state of health proves more satisfying, all other things being equal, if the mother has gone to primary school. By showing these interactions, we can demonstrate that the results of joint efforts in the two sectors is greater than the sum of the benefits that can be expected from isolated investments in each sector.

An overview of these is useful before turning to the case studies, because the authors occasionally use diverse sources and choose different years. Table I.1 refers to the same year and to figures from the same publications, which gives a set of coherent statistics. Madagascar and Tanzania are among the poorest countries, 160th and 156th respectively, of 174 countries for per capita PNB, with purchasing power parity, and 147th and 172nd on the PNUD human development index. Table I.1 shows that the incidence of poverty would be far smaller in Tanzania than in Madagascar, but these data, which depend on fragile estimates of income distribution, are to be considered with caution. The two countries are very close for all other data. As these countries have adopted the same policies and obtained the same results, are in the same region and have rather equivalent populations (the spread is from 1 to 2), a comparative analysis is of particular interest for evaluating poverty reduction policies in particularly difficult contexts.

Table I.1. **Summary of Basic Data for Madagascar and Tanzania**

	Year	Madagascar	Tanzania	(a)	(b)
1. Population (million)	1997	14	30		
2. Land area (thousand sq. km)	1997	582	884		
3. GNP ($billions)	1996	3.4	5.2		
4. GNP per capita ($)	1996	250	170		
Average annual GNP per capita growth	1965-96	-2	n.a.		
5. GNP per capita (PPP)	1996	900	n.a.		
6. Gross domestic investment (% of GDP)	1996	10	18		
7. Current revenue (% of GDP)	1995	8.4	n.a.		
8. Total debt (% of GDP)	1996	123	142		
9. Population below $1 a day (%)	1993	72.3	10.5		
10. Population below $2 a day (%)	1993	93.2	45.5		
11. Net primary enrolment ratio	1995	n.a.	48		
(as % of relevant age group)	1980	n.a.	68		
12. Net secondary enrolment ratio	1995	n.a.	n.a.		
(as % of relevant age group)	1980	n.a.	n.a.		
13. Adult illiteracy rate (men/women)	1995	n.a.	21-43	21	49
14. Adult illiteracy rate	1970	n.a.	63	43	69
15. Gross enrolment ratio, all levels (%)	1995	33	34	64	47
	1980	60	44	51	37
16. Life expectancy at birth	1997	57	48	67	50
	1970	45	45	57	43
17. Infant mortality rate (per 1000 live births)	1997	96	92	51	106
	1970	184	129	101	147
18. Under-5 mortality rate	1997	158	143	72	169
	1970	285	218	152	
19. Underweight children under 5 (%)	1990-97	34	27	19	45
	1995	30	25	30	60
20. Population without access to safe water (%)	1990-96	71	62	26	43
	1975-80	n.a.	61		

Notes:
(a) countries at a medium level of human development.
(b) countries at a low level of human development

Sources: World Development Indicators 1998 for 1 to 13; *Human Development Report* 1998, 1999 for 14 to 20.

Chapter 1

Poverty, Education and Health: The Case of Madagascar

Denis Cogneau, Jean-Christophe Dumont, Peter Glick, Mireille Razafindrakoto, Jean Razafindravonona, Iarivony Randretsa and François Roubaud

Introduction

Like Tanzania, the other country studied in this volume, Madagascar is one of the poorest countries in the world (see the Introduction, Table I.1). The two countries went through similar socialist experiments during which special efforts were made in the field of public social spending. During the 1970s and until the mid-1980s, these policies brought substantial progress in education and health care. In Madagascar, however, per capita income has fallen almost continually since the mid-1970s, and health and education conditions have greatly worsened over the last 20 years. In 1997, Madagascar ranked 160th of 174 countries in the UNDP ranking of GDP per capita in purchasing power parity terms, and 147th in the Human Development Index (HDI)[1] (UNDP, 1999).

This chapter seeks to clarify the links among three dimensions — income, education, and health — of poverty in Madagascar. It also reviews the government's efforts to improve education and health. In the context of a revival of such efforts since 1997, the chapter aims to contribute to the development of new poverty reduction strategies. The first section presents past trends and the current situation of Malagasy households in terms of income, education and health dimensions of poverty. The second assesses the public provision of health and education services. The third studies the distribution of public health and education spending among households. The fourth undertakes to model household behaviour in connection with school enrolment and access to health care, as well as presenting simulations of various alternative policies. The fifth explores the inter-relationships among the three forms of poverty. The sixth and last section summarises the results and offers policy recommendations.

Current Situation and Evolution of the Various Forms of Poverty since 1960

Macroeconomic Developments and Monetary Poverty

Nearly 15 years ago, Madagascar embarked on a process of economic adjustment. A first adjustment phase emphasised financial stabilisation, but the limitations of such a policy quickly became apparent. Since then, the country has been focusing on liberalisation and opening up to the world economy.

Despite an initial reluctance, the authorities have undertaken a broad range of reforms to accomplish this. Among the measures taken, the following are the most important:

— elimination of export taxes;

— sharp cuts in import duties and taxes;

— liberalisation of marketing channels and prices;

— introduction of a duty-exempt regime for export enterprises;

— establishment of a floating exchange rate system;

— withdrawal of the central government from the banking sector and other public enterprises (air transport, oil, etc.).

Although there are some remaining obstacles to the continuation of sectoral reforms in certain areas (privatisation of public enterprises, reform of the civil service, etc.), the steps that have already been taken reflect a high degree of commitment to the introduction of market mechanisms and trade liberalisation. In fact, since the early 1990s Madagascar has simultaneously been pursuing two transition processes: economic, of course, but also a political transition. The country has succeeded in terminating a socialist experiment which had lasted two decades, in favour of a democratic system (free elections, freedom of the press, emergence of civil society, etc.). On the strength of this progress, Madagascar in 1996 was restored to the good graces of the international financial community, which allowed it to obtain many loans and remissions of debt (SAL, ESAF, Paris Club, etc.).

Despite the scale of the reform programme, Madagascar's economy stagnated during the first half of the 1990s. The chronic political instability that reigned during this period was largely responsible for the absence of growth in this period of adjustment (Razafindrakoto and Roubaud, 1998). A pickup in growth has been observed only since 1997, when GDP per capita rose slightly (increasing by 1 per cent for the first time in many years). Since then, the process has been picking up speed, and GDP growth should be nearly 5 per cent in 1999. Viewed against the background of Madagascar's economic history, this is an exceptional upturn. Conditions have not been this good since the late 1960s. Inflation is under control, after the episode of 1994-96 brought on by exchange rate liberalisation. Real remuneration of urban labour saw an unprecedented rise (increasing 33 per cent from 1995 to 1998), and at the same time per capita consumption by urban households increased by 30 per cent in real terms (Razafindrakoto and Roubaud, 1999).

Several factors suggest, however, that this recovery should be put in perspective. First, the current growth process is not robust, and it is accompanied by structural disequilibria that are likely to compromise its viability. The supply-side response to the pickup in demand has been much too small on both the domestic and the export markets, leading to a slide in the trade balance. Fiscal performance remains unconvincing, despite the various reform programmes, at a time when spending policy is easing and the foreign debt problem is completely unresolved. Lastly, the countryside, where the pockets of poverty are concentrated, is not benefiting from the recent return to growth, which heightens the inequalities between urban and rural areas.

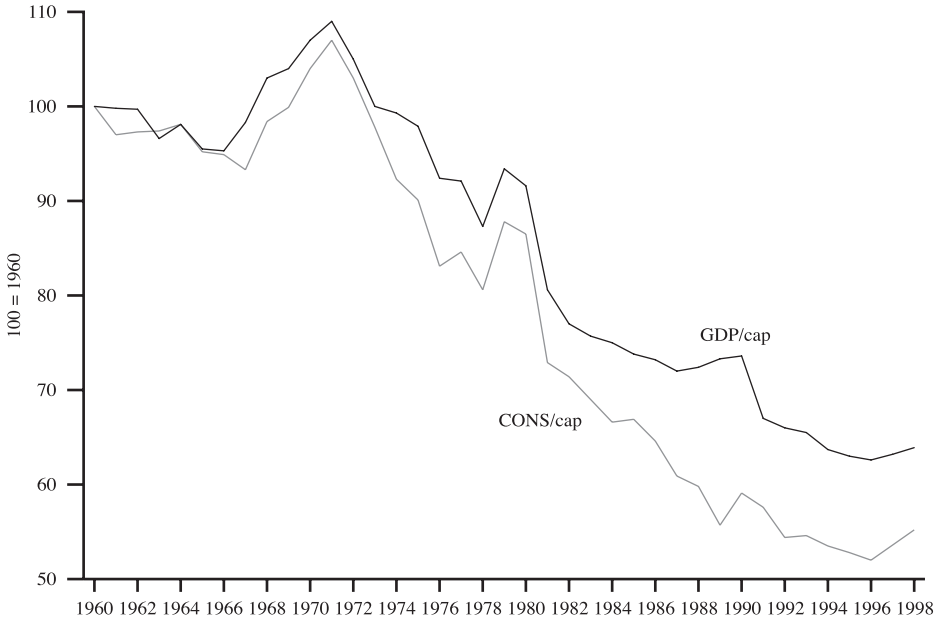
From a long-term perspective, Madagascar is characterised by an inexorable fall in household living standards, which in 1996 reached its lowest level since independence (Figure 1.1). The majority of the population alive today has never known a lasting period of income growth. From 1960 to 1996, GDP per capita fell by 37.3 per cent and household consumption by 47.6 per cent — an annual average decrease of 1.8 per cent. If we consider the sub-period 1971-96, in which 1971 was the best year, per capita consumption fell by half. Two points are worth noting:

— First, despite the uncertainties surrounding official statistics, detailed analysis of household consumption survey data confirms that this downward trend was quite real, and not the result of measurement errors such as failure to factor in the informal sector, multiple job-holding, subsistence farming or transfers (Ravelosoa and Roubaud, 1996).

— Second, cross-country comparison shows that Madagascar's economic decline was exceptional in both scale and duration. Although many countries in sub-Saharan Africa seem to have experienced the same recessionary climate as from the 1980s, Madagascar stands out because its recession began much earlier, in the early 1970s. From 1960 to 1996, Madagascar's GDP per capita fell by 37 per cent, whereas in Côte d'Ivoire and Senegal the decrease over the same period was only 10 per cent, and Cameroon and Mauritius posted increases of 20 per cent and 210 per cent respectively.

It is more difficult to reconstruct past trends in the level of poverty. For 1962 and 1980, we relied on the work of Essama-Nsah (1997) and on the data reconstructed by Pryor (1990). The poverty line used by Pryor, which is defined in terms of the total consumption of a household, has been extrapolated for 1993 and 1997 (see Appendix III). It can be seen that at the household level[2], all indicators show a dramatic increase in poverty from 1980 to 1993, regardless of whether the households lived in urban or rural areas (Table 1.1). Poverty at the end of the period was also much greater than in 1962.

Figure 1.1. **Change in GDP and Private Consumption Per Capita, 1960-98**



Source: INSTAT, authors' calculations.

Table 1.1. **Change in Monetary Poverty of Urban/Rural Households, 1962-97**

	1962	1980	1993	1997
Pryor's poverty line [a)]				
Urban areas				
P0	13.3	18.5	30.5	42.5
P1	2.7	6.7	8.8	15.7
P2	0.7	3.3	3.6	8.1
Rural areas				
P0	46.6	42.2	63.5	63.5
P1	10.5	15.2	24.9	23.5
P2	3.1	7.5	12.7	11.6
All				
P0	43.0	38.3	56.6	58.7
P1	9.6	13.9	21.6	21.7
P2	2.9	6.8	10.8	10.8

Note:

a) Fmg 47 400 (1962 Fmg), based on total real consumption by the household, in contrast to the following tables (see Appendix III).

Sources: Essama-Nsah (1997) for 1962 and 1980, EPM93 and EPM97 (see Appendix II), authors' calculations.

The 1993-97 period was marked by the floating of the Malagasy franc and its precipitous depreciation beginning in1994, as well as the considerable inflationary bump that resulted: 159.2 per cent in four years[3]. The increase in the real consumer price of staple foodstuffs suggests that small farmers more or less preserved their purchasing power, a result consistent with the results of the two national surveys, which found poverty to be stable (Tables 1.1 and 1.2). An accommodating policy was followed for urban wages, resulting in the maintenance of the purchasing power of the mean civil service wage and an 18.6 per cent rise in that of the private non-agricultural minimum wage. These two indicators are hard to reconcile with the manifest increase in urban poverty shown by the surveys[4] (Tables 1.1, 1.2 and 1.A2). One would have to assume either that there was a very large increase in urban unemployment and under-employment, or that informal workers bore the brunt of the income losses. At least where the capital city is concerned, results from different surveys invalidate these possibilities (MADIO, 1995, 1996, 1997*d*). Still according to the two national surveys, the Gini coefficient fell by over 6 percentage points, indicating a considerable reduction in inequality — a reduction much greater than the change usually observed in a country over such a period[5]. Given the size of the reduction in inequality, and the fact that it contradicts the trends in real wages and relative prices, this result must be taken with some scepticism. The same reservation applies to the differing trends in the three poverty indices P0, P1 and P2[6].

Table 1.2. **Incidence of Monetary Poverty (P0 index) in Urban/Rural Areas**

	1993	1997
National calorie-based poverty line [a)]		
Urban areas	44.1	50.3
	–	*+6.2*
		(2.1)
Rural areas	74.4	75.0
	-	*+0.6*
		(1.2)
$1 per capita per day poverty line [b)]		
Urban areas	54.9	59.1
	–	*+4.2*
		(2.0)
Rural areas	81.7	84.2
	–	*+2.5*
		(1.0)

a) Fmg 248 000 (1993 Fmg).
b) In 1985 dollars and PPP: Fmg 306 626 (1993 Fmg).
Standard deviations in parentheses.

Sources: EPM 1993 and 1997 (see Appendix II), authors' calculations.

Non-monetary Poverty (1): School Enrolment and Literacy Training

Madagascar's educational system is currently in great difficulty. It has suffered for many years from the country's catastrophic economic performance, under the two-fold pressure of a 45 per cent drop in the purchasing power of households since independence and a persistent imbalance in public finance. The crisis of the school system is not a phenomenon specific to Madagascar, since most sub-Saharan African countries are facing such crises, but it is particularly acute there. In contrast to many other countries on the sub-continent, the school system in Madagascar is not a recent creation but a centuries-old historical tradition that predates the colonial period. The importance attributed to education may even be considered as a common theme establishing continuity across the authorities that have presided over the country since the 19th century, from the Merina kingdom to the various governments of the independent republic, with the missions and the colonial administration in between. Although the actual measures and objectives varied, this constant priority given to schools had enabled Madagascar to develop a recognised comparative advantage in terms of the skills of its labour force. This comparative advantage is now being lost.

The fact is that although a tremendous effort had been made since independence to increase enrolment in both primary and secondary education — gross enrolment rates rose from 50 per cent and 4 per cent respectively in the 1960s to 100 per cent and 30 per cent around 1980 — the subsequent recession undermined these achievements. As in Tanzania, enrolment rates have been declining since the early 1980s, with the situation only growing worse in the early to mid-90s. Gross enrolment in primary education fell from 128 per cent in 1982 to 72 per cent in 1993. Thus, Madagascar is one of the six countries, of the 44 countries in sub-Saharan Africa, that recorded a decline in primary school enrolment during the 1980s. The same phenomenon is observed at the secondary level, where the enrolment rate dropped from 34 per cent in 1984 to 18 per cent in 1993. This decline in school enrolments has cost Madagascar the comparative advantage in education that it enjoyed in the early 1980s. Today, the island's enrolment rates stand at levels comparable to the average rates for sub-Saharan Africa: higher in primary education (and even here the difference is very slight, as the net primary school enrolment rate is 45 per cent in Madagascar and 47 per cent on the sub-continent), but lower at the post-secondary level.

The crisis of the education system is not merely a quantitative problem of falling enrolment rates; it has also severely compromised the quality of the education provided. Madagascar's repetition and dropout rates are quite high with respect to the standards of other countries, most especially at the primary level (Table 1.A3). However, the quality of the education provided, as measured by the pupils' progress during the year, is somewhat higher than in the other French-speaking countries (Michaelowa, 2000).

Confronted with the state's growing inability to educate pupils, the private sector (denominational and secular) has tried to pick up the slack, but obviously has not completely succeeded in view of the drop in overall enrolment rates. The number of

children enrolled in state schools has dropped considerably at all levels, as has the number of primary school teachers. Moreover, over 1 500 primary schools closed between 1986 and 1990. Historically, private education has always been an important factor in Madagascar. In the 19th century, the first schools were founded by Protestant missions, and subsequently Catholic missions. The first secular schools appeared only with colonisation. The public education system gradually gained ground, becoming the majority provider around the 1920s. In 1930, for example, approximately 100 000 of a total of 185 000 primary school pupils were enrolled in the public sector. The school enrolment drive conducted under the First Republic raised the public sector share to two-thirds by the late 1960s. Didier Ratsiraka's arrival in power in 1975 had the effect of accentuating the "secularisation" of the school system. In 1983, the private education sector accounted for only 13 per cent of primary school enrolments, whereas only eight years earlier its share was still nearly one-fourth. Since that time, the trend has reversed in favour of the private sector: 23 per cent of primary school pupils attended a private school in 1993/94, as against only 13 per cent in 1984/85. For lower and upper secondary students, the private-sector share was over 40 per cent in 1993/94, as against 33 per cent in 1987/88 (World Bank, 1996). However, the private sector is spread unevenly over the country's territory. Private schools are very numerous in cities, particularly the capital, but rural areas are much less well covered. Moreover, geographic location is a major factor of inequality of access to schooling, as attendance rates in rural areas are uniformly lower than in urban ones (Table 1.3).

In this context of recession, one source of satisfaction is the progress made in female education. The differentials between boys and girls have always been low by international standards, but now they are tending to shrink or even to be reversed. Today, enrolment rates for girls are higher than those for boys at all educational levels (Table 1.3). Part of the explanation for this lies in the high proportion of women in the teaching force, which seems to work in favour of girls' performance and hence attendance (Michaelowa, 2000), but this proportion itself is the result of the same phenomenon — i.e. high enrolment rates for girls — one generation earlier.

Table 1.3. **Gross Enrolment Rate by Urban/Rural Area, Sex and Type of School Attended, 1993**
(percentages)

	Location		Sex		Public school share
	Urban	Rural	Boys	Girls	
Primary	74.4	39.4	43.0	46.2	76.7
Lower sec.	27.6	6.1	9.7	10.8	59.1
Upper sec.	11.7	1.4	2.4	4.7	55.3
Higher	3.1	0.3	0.7	1.0	91.3

Sources: EPM93, INSTAT, authors' calculations.

The two EPM household surveys, conducted in 1993 and 1997, enable us in theory to measure change in access to schooling between these two dates (Figure 1.A1). In four years, the enrolment rate for 4-25 year olds rose by over 10 percentage points, from 30 to 41 per cent. School attendance rates were higher for all age groups in 1997. This phenomenon is particularly marked in the early school years and gradually decreases thereafter. The analysts who have examined this trend attribute it to the impact of projects in support of education (UNDP, 1999). There are nevertheless grounds for questioning the validity of these figures. Comparison of the two surveys clearly shows that the inconsistencies in the enrolment rate stem from the numerator (school attendance), and not from the denominator (structure by age), which is measured in a generally satisfactory manner[7]. Once we had diagnosed the source and impact of the measurement errors, a certain number of assumptions and adjustments were made. In what follows, it is advisable to bear these limitations in mind; they mainly affect comparisons in terms of level, whereas distributional comparisons may be presumed to be acceptable.

There is no doubt as to the negative relationship between poverty and human capital accumulation through schooling[8]. All available indicators agree on this. The literacy rate among poor adults is 10 to 15 percentage points lower than that for the non-poor, which supports the idea that educational attainment in the past strongly influences earning opportunities, and hence standards of living, in the present. For the next generation, the school attendance rate of children from poor households is 15 to 20 percentage points lower than that of other children, and this gap increases with the level of education considered (Table 1.4). The difference in educational level between the poor and non-poor is systematically greater in urban areas, owing in particular to widespread under-investment in rural areas, where the inadequacies of provision would tend to reduce schooling at all income levels. The dependence of rural people on the public school system indicates the scarcity of private alternatives in rural areas.

Table 1.4. **Enrolment, Literacy and Monetary Poverty, 1993-97**

	Adult literacy rate (over 22 years old)		Enrolment rate for 5-22 year olds		Public school share (%)		Education expenditure per child (Fmg)	
	1993	1997	1993	1997	1993	1997	1993	1997
Urban	84.8	79.9	61.9	67.3	58.5	54.9	30 300	90 000
Poor	*77.2*	*70.7*	*49.0*	*56.8*	*76.0*	*68.4*	*9 500*	*29 600*
Non-poor	*89.3*	*86.6*	*73.7*	*80.5*	*47.9*	*43.1*	*49 100*	*165 200*
Rural	55.0	47.7	29.7	44.6	81.6	79.3	4 600	18 600
Poor	*52.3*	*43.1*	*27.9*	*43.0*	*84.4*	*81.7*	*2 900*	*10 800*
Non-poor	*60.6*	*57.8*	*36.4*	*50.4*	*73.6*	*72.1*	*10 700*	*47 100*
Total	61.9	55.5	36.8	49.3	73.1	72.4	10 200	33 400
Poor	*55.9*	*47.6*	*31.0*	*45.1*	*82.5*	*79.1*	*3 850*	*13 800*
Non-poor	*71.0*	*68.5*	*51.6*	*61.0*	*58.6*	*58.6*	*26 400*	*88 500*

Notes: Literacy: ability to read and write a simple text. The poverty line used is the first such line defined in the preceding section, i.e. Fmg 248 000 per capita, at 1993 prices.

Sources: EPM93, EPM97, INSTAT, authors' calculations.

To examine the issue from a broader perspective, school attendance rates increase strongly with standard of living (Figure 1.A2). In 1993, for example, the gross enrolment rate (GER) in primary school was 43 per cent for the first decile (D1), as against 110 per cent for children in the top decile (D10). Inequality of access to schooling is still more marked in the net enrolment rates, reflecting the poor performance of poor children (late entry in the school system, repetition, etc.), and these inequalities increase with the educational level. At the primary level, for example, the net enrolment rate (NER) of the poorest children (D1) is one-third of that of the wealthiest (D10), at 25 per cent and 76 per cent respectively; at the upper secondary level, no D1 children in the sample are enrolled at all, whereas the NER for D10 stands at 50 per cent.

Not only are more children from wealthy households enrolled in school, but private spending on education rises strongly with household living standards (Figure 1.A3). For example, children from the highest decile who are in school enjoy on average 13 to 17 times more school-related spending by their households than enrolled children from the poorest decile. The difference is still greater if we consider expenditure per child (regardless of whether the child attends school): a ratio of 1 to 39 and 1 to 34 respectively in 1993 and 1997. Although these differences are partly due to the fact that enrolment in the more expensive private education system increases with household living standards, and to the longer duration of schooling (since the costs rise sharply with the education level), it is nevertheless true that, for a given level and type of school, rich households systematically allocate larger amounts of money to their children's education. Obviously, all these factors combine to ensure that children from wealthy households perform better in school, and thus have better chances of succeeding in the workforce later on.

The financial burden that the poorest families bear in order to educate their descendants is far from negligible, however. Although the share of the household budget devoted to education does tend to increase with household income, the difference is not very large: budget coefficients ranged from 1.2 per cent for D1 to 2.2 per cent for D10 in 1993. Hence the relative burden on poor households is greater.

Non-monetary Poverty (2): Health Status and Access to Health Care

The demographic and health situation of Madagascar's population is mediocre, reflecting the country's poor economic performance over the last 25 years. This situation is comparable to that of sub-Saharan Africa as a whole, though one should bear in mind that unlike Madagascar many of the countries in the region went through wars during the period; it is far below the average for the low-income developing countries. International statistical yearbooks report that life expectancy at birth is approximately 58 years, which would mean a gain of about 12 years since the early 1970s. This would be a higher rate of increase than in sub-Saharan Africa as a whole: if the continent had started from the same level, life expectancy there would be only 52 years today. However, this good relative outcome should be regarded with caution owing to the uncertainty of the data. For example, the most recent census of the population, in 1993, found life expectancy to be 52 years rather than 58 years.

The rate of infant mortality remains very high, nearly 10 per cent, and deaths in childbirth exceed six for every 1 000 births. On this front as well, we can see the impact of the deterioration in health care due to the economic crisis. According to the Demographic and Health Surveys for 1997 (EDS97, see Appendix II), infant mortality rose strongly between the mid-1970s and the mid-1980s (from 95 to 117 per thousand births), and subsequently fell back to 96 per thousand in the four years preceding the survey (the years surrounding 1995). Government policies that might have affected the infant mortality rate have been largely ineffective where both health care and infrastructure are concerned. The rate of DPT vaccination in Madagascar is just 40 per cent, compared to 55 per cent in sub-Saharan Africa, and the proportion of households having access to drinking water is 32 per cent (45 per cent in sub-Saharan Africa). Child malnutrition is another good indicator of the overall health status of the population. Approximately one child in two is stunted (height for age more than two standard deviations below the international norm). Among the 26 African countries for which we have data, Madagascar's rate of malnutrition is second only to that of Ethiopia (64 per cent) and is equivalent to that of Rwanda (49 per cent) — and these are countries which have experienced humanitarian disasters linked to armed conflict (World Bank, 1999*b*). Madagascar is also still prone to epidemics of some of the most serious infectious diseases, such as malaria, tuberculosis, leprosy, plague and cholera. Although thus far Madagascar has been largely spared by AIDS, which is much less prevalent there than on the continent (see the chapter on Tanzania), the prevalence of sexually transmitted diseases means that the country is favourable ground for the disease to spread rapidly.

The health situation is not only alarming, it has deteriorated still further in the 1990s. The two EDS surveys conducted in 1992 and 1997 allow us to form a fairly precise and reliable idea of this trend. The prevalence of early childhood diseases has risen, causing the infant mortality rate to rise again (from 93 to 96 per thousand). In addition, vaccination campaigns are less effective and the rate of coverage is falling. Paradoxically, malnutrition indicators are giving ambiguous results: a slight drop in stunting (height for age) and an increase in the more short-term indicators of wasting (weight for height). At any rate, in 1997 nearly one child in two was stunted (two standard deviations below the norm), and one in three severely stunted (three standard deviations below the norm), making Madagascar one of the sub-Saharan African countries that suffers the most from malnutrition.

As in the case of education, access to the health care system is strongly correlated with household living standards (Table 1.5). Paradoxically, the incidence of disease is higher among the non-poor. Of course, this result does not indicate that the poor are in better health (see anthropometric indicators); rather, it reflects a smaller propensity to report themselves ill or, given that they seek medical care less frequently, to be diagnosed as ill. All surveys of this type have yielded similar results. Considering that the health of the poor is at best equivalent to that of the non-poor, and probably worse, the fact that the rate of medical visits is systematically lower among the poor indicates that the latter have less access to the health system. Similar to what was seen for education, the differences between poor and non-poor are smaller in rural areas, because health care is in very short supply.

As in the case of school attendance, the poor are more dependent on public institutions, particularly basic health centres. The non-poor more often consult private physicians, but the leading providers for the poor are basic health centres (health stations and nursing stations). The poor also turn more often to traditional healers, although the latter account for only about 10 per cent of all consultations.

Not only do the poor seek health care less often, they spend much less money when they do consult a health care provider. The average expenditure per non-poor household was 2.4 times that of the poor, in both 1993 and 1997. Unable to pay for care, they seek a low-cost solution, either by treating themselves or by choosing providers of poor quality. However, the budget share they devote to health is equivalent to that of the non-poor, at approximately 3 per cent in both cases.

Table 1.5. **Health Status, Access to Care and Poverty, 1993 and 1997**

	Incidence of illness		**Medical consultation rate**		**Public sector share**		**Expend. per household**	
	1993	1997	1993	1997	1993	1997	1993	1997
Urban	14.4	n.a.	8.1	7.2	62.3	59.6	61 800	93 900
Poor	*12.4*	*n.a.*	*5.6*	*5.5*	*65.7*	*65.0*	*25 700*	*41 200*
Non-poor	*16.0*	*n.a.*	*10.0*	*9.0*	*60.8*	*56.3*	*81 100*	*130 100*
Rural	13.7	n.a.	4.8	6.4	67.7	55.6	31 800	70 000
Poor	*12.5*	*n.a.*	*4.3*	*5.8*	*70.3*	*57.7*	*22 700*	*50 900*
Non-poor	*17.3*	*n.a.*	*6.4*	*8.1*	*62.5*	*53.9*	*47 300*	*107 600*
Total	13.9	n.a.	5.5	6.5	66.0	56.5	38 000	75 500
Poor	*12.5*	*n.a.*	*4.5*	*5.7*	*69.5*	*58.8*	*23 100*	*49 400*
Non-poor	*16.8*	*n.a.*	*7.8*	*8.4*	*61.7*	*53.0*	*58 000*	*115 400*

Sources: EPM93, EPM97, INSTAT, authors' calculations.

Logically, low standards of living and less access to the health system should result in poorer health, particularly among children. Some studies of cross-sectional data at the aggregate (country) level attest to the link between income poverty and child malnutrition, and lead their authors to suggest new poverty measures based on the latter indicator (Morrisson *et al.*, 2000*a*). Microsurvey data, which offer the immense advantage of providing both indicators of living standards and anthropometric measurements for children under five years of age at the individual level, generally confirm this hypothesis (Table 1.6). Children from poor households show more deficiencies than those from non-poor households, most particularly in urban areas. However, the differences are not strongly marked. In 1997, for example, 59 per cent of children from poor households showed signs of stunting (height for age), as against 56 per cent for the non-poor. Where wasting (weight for height) is concerned, a mere percentage point separated the poor and non-poor in 1993 (16 per cent and 15 per cent respectively). Not only are the differences small, but the non-poor do not systematically come out on top. For example, in rural areas, more non-poor children were stunted than poor children in 1997 (respectively 63 per cent and 55 per cent). These results show that the link between poverty and malnutrition is tenuous, at least in the case of Madagascar[9].

Table 1.6. **Child Malnutrition and Monetary Poverty, 1993 and 1997**

	Stunting		Severe stunting		Wasting		Severe wasting	
	1993	1997	1993	1997	1993	1997	1993	1997
Urban	49.7	53.9	28.0	36.7	12.6	14.8	3.8	6.2
Poor	*56.1*	*58.9*	*32.7*	*42.1*	*13.7*	*14.9*	*5.1*	*6.5*
Non-poor	*42.7*	*47.2*	*22.8*	*29.1*	*11.3*	*14.5*	*2.3*	*5.6*
Rural	53.4	56.8	32.2	37.6	16.9	17.9	5.8	7.2
Poor	*55.3*	*55.3*	*33.0*	*36.5*	*16.8*	*19.3*	*5.6*	*7.7*
Non-poor	*45.7*	*63.3*	*29.2*	*41.7*	*17.2*	*11.8*	*6.4*	*5.0*
Total	52.7	56.4	31.4	37.4	16.1	17.4	5.4	7.0
Poor	*55.4*	*55.7*	*32.9*	*38.1*	*16.5*	*18.8*	*5.6*	*7.5*
Non-poor	*44.7*	*58.6*	*27.0*	*37.2*	*15.2*	*12.6*	*5.0*	*5.2*

Note: For children from three months to five years of age. Stunting: height/age ratio two standard deviations below the international norm (three standard deviations for severe stunting). Wasting: weight/height ratio two standard deviations below the international norm (three standard deviations for severe wasting).

Sources: EPM93, EPM97, INSTAT, authors' calculations.

In terms of change over time, the analyses that can be conducted on the basis of these two indicators (rate of income poverty and malnutrition rate) lead to similar conclusions: a slight increase in poverty from 1993 to 1997. Between these two dates, children's health situation deteriorated in terms of both types of anthropometric measures. The decline in health is still clearer in the data on acute forms of malnutrition. The observed improvement in income distribution has thus not offset the drop in living standards.

Provision of Health and Education Services

Historical Background and Reforms

The preceding assessment indicates the size of the challenge to be met in terms of improving the education and health of the Malagasy population. A brief review of the various social policy options adopted since independence is necessary in order to provide a better understanding of why the country is in such a poor situation today.

Priority to Education?

Madagascar was long regarded as having a relatively good education system, in comparison to other countries in sub-Saharan Africa. The school system dates back to the pre-colonial period. The first schools were opened during the reign of Radama I (1810-28). As early as 1881, the Merina kingdom enacted a law making schooling mandatory for children from seven to 16 years of age. By that time, there were 1 155 Protestant schools with over 130 000 pupils enrolled and nearly 2 900 teachers, but these schools were mainly concentrated in the high plateau region. When Madagascar became a French colony in 1896, there was a movement to secularise education. In addition to denominational schools, which continued to operate but were placed under the supervision of the French authorities, "official" schools were founded. By 1911, there were 580 such

schools. The number of children enrolled in school then grew steadily, rising from 236 000 in 1950 to 458 000 in 1960. In addition, the geographical distribution of schools improved, with schools located in 23 regions covering the entire island.

The education system, which until independence had been mainly geared to serving the interests of the colonial government, was re-examined just after independence. It was not until 1975, however, with Didier Ratsiraka's arrival in power and the beginning of the period in which the country closed itself off and broke its ties with France, that we observe sweeping reforms based on three key ideas: democratisation, decentralisation and "Madagascarisation". On the one hand, the state set a target of providing each *fokontany* (of which there are 11 000) with at least one elementary school, each *firaisana* (about 1 400) with a secondary school, each *fivondronana* (111) with an upper secondary school and each *faritany* (6) with a university. On the other hand, the content of school programmes was reoriented; the decision was taken to use Malagasy as the basic language of instruction, in order to break with the system of the neo-colonial period in which the influence of the French language was a defining characteristic. Apart from its symbolic value, this reform was supposed to make schooling more accessible to the population as a whole by ensuring that a command of French was not necessary to good school performance and by making the education system more relevant to the actual economic, cultural and social conditions in the country.

Although the measures taken under the Second Republic had the merit of bringing about a considerable increase in primary school enrolment (the gross enrolment rate rose from 47 per cent in 1962 to 75 per cent in 1979), their limitations quickly became apparent. First, while many public schools were indeed opened throughout the island, the resources that such a system needed to function (to pay teacher salaries, operating costs, etc.) were not forthcoming. Second, the hastily implemented "Madagascarisation" policy had to be applied without textbooks and without the teacher training needed to make it a success. The results in terms of school system coverage and/or rediscovered national identity were obtained at the expense of educational quality.

The economic crisis that hit the country made the situation even worse. The first phase of structural adjustment, implemented in the second half of the 1980s, was characterised by severe budget constraints. Priority was given to financial stabilisation and the development of the social sectors was placed on the back burner for nearly a decade. Not until the first half of the 1990s was the need once again to rehabilitate the education system recognised, this time in the context of poverty reduction strategies. Following the failure of "Madagascarisation" and with the aim of countering the fall in educational quality, French was reintroduced as the language of instruction. Donors applied pressure to ensure that a sizeable share of the budget was allocated to the social sectors, particularly education. The social share of the budget has been rising since 1997, after a long period of uninterrupted decline. However, the government's current policy stance is still vague. It seems to amount to no more than a few objective criteria, such as increasing enrolment rates at each level, but without a clear statement of the actual measures to be taken to achieve the expected results. Overall, according to the government's various statements of intent, and reflecting the influence of the

donors which finance support programmes, the current strategy is aimed at achieving universal primary education (which requires that the overall education budget be rebalanced in favour of the primary sub-sector); improved teacher training and better geographical distribution of teachers; participation by parents and local communities, particularly where costs are concerned; and the printing of adequate numbers of textbooks for both teachers and pupils. For the moment, however, the scarcity of public resources, the cumbersome bureaucratic procedures governing budget and personnel management, and the lack of real determination to improve the situation have prevented significant progress on these fronts.

Towards Recognition of the Scale of the Country's Health Problems

The main turning points in the country's history are also reflected in the history of its health policy. The first initiatives were taken just after independence, with the introduction of the principle of free care for all, membership in the WHO and the adoption of a public health code. Beginning in 1976, under the Second Republic, a rather ambitious policy on primary health care was launched in response to the desire for democratisation and the elimination of geographic inequalities. The goal was to create many dispensaries and to provide each district with at least one basic health centre. At the same time, an extensive vaccination programme was launched. Unfortunately, this reform had only a modest positive impact, owing to inadequate funding and serious mismanagement. Lastly, the broad health policy options announced by the government were not translated into concrete measures that might have improved the country's health situation. The health system then found itself in the same bind as the education system in the late 1980s: the situation worsened sharply as a consequence of the economic crisis, and the emphasis on financial stabilisation relegated social spending to secondary status.

As in the education sector, the establishment of an effective health system re-emerged as a major policy objective only in the mid-1990s. An example of the real progress achieved, as distinct from mere official pronouncements, was the establishment of a central purchasing organisation for vital drugs and medical consumables in February 1995. In a situation of chronic shortages, this organisation is supposed to facilitate the re-supply of public health facilities and private facilities operating on a not-for-profit basis or adhering to government price schedules. Decentralisation has also taken a step forward: a decree was passed in 1998 providing that 111 recently formed health districts (corresponding to the *fivondronana* administrative divisions) would be allocated funding proportional to their populations for management of basic health centres. Lastly, the principle of recovering the cost of drugs has been introduced in public health institutions.

Although some measures have been taken, they are insufficient to deal with the country's health situation, and even more important, they have proved difficult to implement. The central purchasing organisation still does not function properly. The funds allocated to districts do not necessarily reach their targets, and there is some question as to how they are actually used[10]. Lastly, the cost recovery system is really operational in only a few districts. Forecasts show that user participation will remain limited, covering only a small proportion of costs (World Bank, 1999*a*).

Madagascar is thus not yet on the road to rectifying the ineffectiveness of its health system, and the system remains grossly inadequate. The current reappearance of cholera and plague epidemics indicates the scale of the challenges that must be met. And yet, apart from *ad hoc* initiatives in response to a risk of serious, large-scale epidemics, the predominant impression is one of lack of commitment, and even of giving up in the face of the efforts needed to obtain significant improvement in the country's health situation. Despite growing awareness of the problem, and in particular the rise in the social sectors' share of the central government budget since 1997 (see Figure 1.3), the measures taken to date have had only a limited impact.

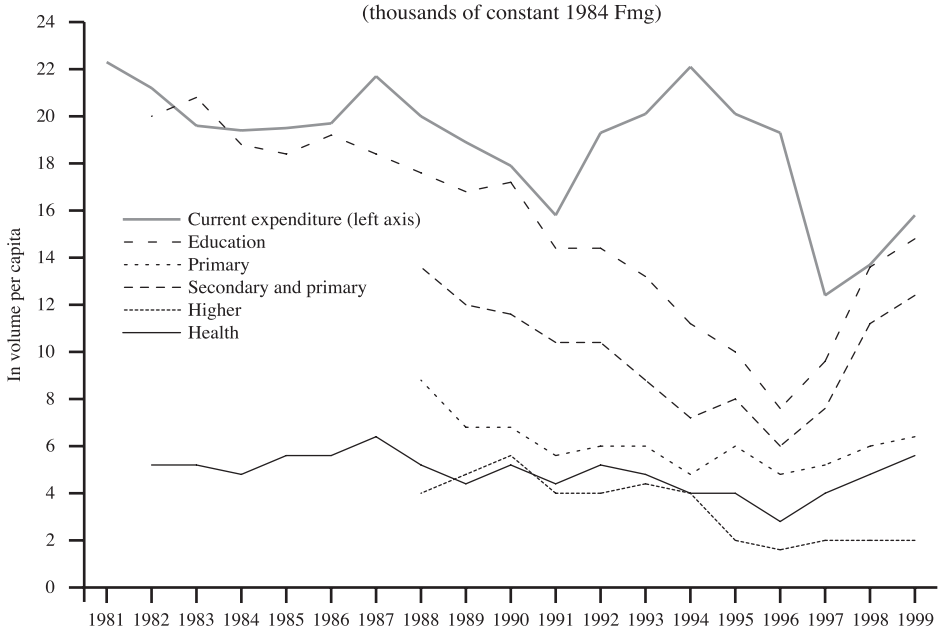
Budget Structure

The abysmal performance of the education and health systems is due in significant measure to budgetary restrictions. The deadlock of Madagascar's public finances, and in particular the government's inability to increase its meagre tax take, has brought about a steady decline in public spending per capita, which fell 19 per cent in real terms from 1982 to 1999. Current spending per capita that is not supported by external financing has been even more affected, falling by 26 per cent in real terms.

The social sectors have been hit particularly hard by this situation. Until 1996, spending on these sectors was subjected to heavy cuts. Spending on education and health did not merely decrease proportionally with the reduction in the size of the overall budget; rather, the respective shares of these sectors were cut as well. Despite some uncertainties concerning the data[11], the overall situation is clear. Whereas total current expenditure per capita fell by 9 per cent in volume from 1982 to 1996, current per capita spending on education fell by 62 per cent and on health by 41 per cent over the same period. The fact that social spending fell more than total spending is due on the one hand to the increased budget share devoted to servicing the debt, and on the other to the large share of the wage bill in the budget of the social sectors, since wages fell substantially over the period[12].

In the case of the education sector, the fall in spending per pupil has been less drastic than spending per capita, but this reflects the fact that an increasing number of children have been excluded from the school system. The number of children in school remained stable or declined slightly through the mid-1990s. From 1988 to 1994, the number enrolled in primary school fell from 1 263 000 to 1 202 000, a drop of 4.8 per cent. The decline is still greater in secondary education (from 234 000 to 209 000, a drop of 10.7 per cent) and higher education (from 36 000 to 31 000 students, or a drop of 14.8 per cent). Real expenditure per pupil decreased by 36 per cent in primary education, 17 per cent in secondary and 24 per cent in higher education over the same period. This regressive process was still more marked in 1995 and continued in 1996, owing in particular to rising inflation and pressure to reduce the fiscal deficit (Table 1.A4). Hence up to this point the declared policy of the government and donors — in favour of redirecting public spending to the social sectors, with education a leading priority — remained a matter of words rather than deeds.

Figure 1.2. **Change in Current Public Spending on Education and Health, in volume per capita**
(thousands of constant 1984 Fmg)

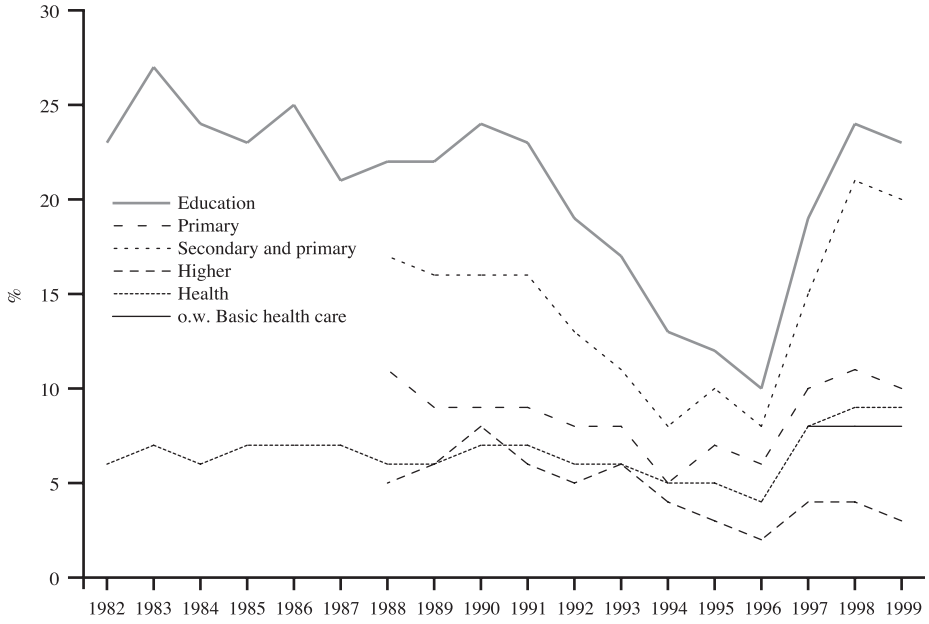


Note : To obtain volumes, we use the public consumption deflator used in the national accounts.
Source: OGT, Ministry for Secondary and Elementary Education (MINESEB), Budget Ministry (MBDPA), Budget Act (for 1999), authors' calculations.

This trend was not reversed until 1997, with a clear rise in the shares and volumes of the social sector budgets, reflecting at last a willingness to place education and health among the country's priorities. In addition, the funding allocated to primary and secondary education, which previously amounted to only 70 per cent of total education spending, now exceeds 80 per cent, a proportion above the average for sub-Saharan Africa (around 75 per cent) and for the least advanced African countries. The same may be said for the health sector, where 85 per cent of spending is now devoted to basic health care.

Social spending nevertheless remains far below the levels of the early 1980s. Current education spending was evaluated at about $5 per capita in 1998, as against $11 in 1982. Health spending amounts to about $2 per capita today, compared to $3 in the early 1980s. For purposes of comparison, the theoretical cost of financing primary health care is estimated at $12 to $14 per capita annually in the least advanced African countries (Guimier and Halajko, 1996). It is thus clear that even if we factor in participation by households, which will necessarily be limited, current levels of spending cover only a trifling proportion of requirements.

Figure 1.3. **Share of Education and Health in Current Public Expenditure**



Source: OGT, Ministry for Secondary and Elementary Education (MINESEB), Budget Ministry (MBDPA), Budget Act (for 1999), authors' calculations.

Trends in public investment spending cannot be analysed fully, as the sectoral breakdown is available only since 1994, the year that saw the restoration of relations with the international donors and lenders which finance the bulk of investment. The year 1994 also marks the beginning of the period in which the government, under pressure from donors, started to show renewed genuine interest in the social sectors. The sharp rise in the share of capital expenditures in the overall education and health budgets (respectively, from 2 per cent to 21 per cent, and from 13 per cent to 48 per cent over the 1987-98 period) is evidence of a positive trend that is particularly marked from 1996.

Although the trend in both investment spending and current spending has been positive in the last three years, the overall spending increase is still modest in comparison to the decrease observed over the preceding 15 years. The GDP share of the overall education budget is still around 2.5 per cent today, as against 4.3 per cent in sub-Saharan Africa as a whole in the early 1990s, and 6.5 per cent in Madagascar itself in 1971. An even smaller share is devoted to health: only 1.5 per cent of GDP, a level much lower than that of Tanzania, where current health expenditures alone amounted to 2.5 per cent of GDP in 1995 (Lambert and Sahn, in this volume). This under-financing of the social sectors is probably due more to the low GDP share of overall public spending (17 per cent in 1998) than to the size of the shares allocated to education and health in the general government budget.

To offset the shortage of public resources, at least in part, the current policy is aimed at making users pay part of the cost of services[13]. An effort to rehabilitate the education and health systems could indeed attract some households which have turned away from public providers because they had considered them to be ineffective. These households currently use the private sector, meaning they are willing to pay for services. It must be emphasised, however, that the households that are willing to pay are relatively well-off households, generally residing in the wealthiest areas (cities), and that user participation will necessarily be limited owing to the poverty of most households. The fact is that, concomitantly with the drop in public education spending, households have also reduced their private expenditures on education. In the capital — the only city for which long-term data are available — the average annual spending per capita that households allotted to education was Fmg 72 000 in 1961 (in 1995 Fmg). This figure had fallen to only Fmg 13 000 in 1995, a drop of 82 per cent in real terms (Ravelosoa and Roubaud, 1996). Households spent just under 2 per cent of their annual budgets on health in 1994, or about Fmg 2 600 (current Fmg) per capita (less than $2), according to data from the national survey of households (World Bank, 1996). Another estimate of health spending, conducted in 1996, came up with a result of approximately $4 per capita (Guimier and Halajko, 1996). These amounts are far below what is needed to operate a quality health system. Lastly, it is not clear that households are willing to participate directly in the financing of inefficiently managed public services. A survey of users in nine districts elicited inconsistent responses on this point. Although 79 per cent approved of the principle of cost recovery, only 6 per cent were willing to pay for medical visits and 13 per cent to pay for medicine. The fact is that they choose public health services mainly because these services are provided free of charge. The majority of users (56 per cent) in fact opt for participation through fund-raising at local level rather than through direct fees. This option makes it possible to reduce the contributions of the poorest people. In addition, funds collected in this way are probably regarded as easier to control.

To obtain better targeting to the actual needs of the population, particularly the poorest groups (rural areas), a substantial share of the operating budget of the social sectors is now managed by local authorities on a decentralised basis. In the health sector, basic health centres and district hospitals have been managed at district level since 1997. In education, school districts are responsible for primary schools, which have been placed under their authority since 1998. The budget allocated at the level of school districts and health districts amounts to about 40 per cent of the respective operating budgets (excluding the wage bill) of the education and health ministries. This decentralisation process is facing difficulties, however, owing to gaps in information flow, cumbersome and slow bureaucratic procedures, and the limited absorption capacity of certain local administrations. In this respect, it should be pointed out that whereas some health districts had already committed their entire appropriations for 1997 by August of that year, others had committed barely 12 per cent. Although the budget implementation ratio averaged 94 per cent in 1998, it exceeded 100 per cent in one-fourth of primary schools (mostly in urban areas) (MADIO, 1999*b*). The proportion of school supplies actually received by primary schools, with respect to

those purchased and declared at the school district level, is 82 per cent in urban areas and 76 per cent in rural areas. Thus, in addition to the problems stemming from the low level of resources allocated to the social sectors, problems related to the management of these resources still need to be resolved.

Condition of Infrastructure and Geographical Distribution

The above assessment shows that Madagascar's population is very badly off where schooling and health status are concerned. Yet Madagascar is far from being truly disadvantaged in terms of infrastructure and even human resources, at least in comparison with the other countries in sub-Saharan Africa.

With over 13 600 schools in 1997 (public and private), each of Madagascar's 11 000 *fokontany* has at least one primary school. Although the pupil/teacher ratio is slightly above the averages for sub-Saharan Africa and for the low-income countries (41 in 1995), it is not at the alarming levels reached in countries such as Senegal (58), Burkina Faso (58), Gabon (52) and Togo (51) (World Bank, 1999*b*).

Where health infrastructure is concerned, Madagascar had approximately 2 700 public and private health facilities in 1999: 2 569 basic health centres and 121 district hospitals (Table 1.A5). If we count only public infrastructures, there are 2 349 basic health centres, of which 1 960 are operational, and 109 public hospitals, of which 97 are operational. Each *fivondronana* (district) therefore has at least one health facility. Madagascar is relatively well endowed in terms of human resources, with ratios of 12 300 people per physician and 4 100 per nurse (compared to 18 500 and 6 500 respectively for sub-Saharan Africa as a whole).

This fairly positive assessment of education and health infrastructure is only partial, however, and it needs to be qualified. First, the general information provided by the ministries does not necessarily reflect the actual situation on the ground. For example, a more detailed analysis of the geographical distribution of infrastructures, based on community survey data matched with EPM data, reveals an inegalitarian distribution favouring areas that are better off in terms of per capita consumption (Figure 1.A5).

Where education infrastructures are concerned, the question is whether the schools counted in the ministry's statistics are operational. Nearly a third of public primary schools have been closed, notably because no teacher has been assigned to them. Given that the flow of information is far from perfect, and that some teachers refuse to take up their posts in rural areas (or are regularly absent), the number of schools that actually function, or function well, is probably much lower. By way of illustration, the 1997 rural community survey found that 10 per cent of public primary schools are not operational in all of the areas belonging to the poorest quintile of rural communities, measures by average community per capita consumption. The equivalent percentages are 6 per cent for the second quintile and from 0 to 4 per cent for the other quintiles (Table 1.7).

According to the same survey, moreover, in 29 per cent of the surveyed areas (*fokontany*), people have to travel more than 10 km to the nearest health care facility. In 47 per cent of cases, the distances range from 2 to 10 km. Difficulty of access to health and education infrastructures increases with the level of poverty of the area. In 64 per cent of the areas falling into the poorest quintile, more than half an hour is needed to reach the nearest health centre, as against 3 per cent for the richest quintile (Table 1.7).

Table 1.7. **Access to Education and Health Infrastructures by Surveyed Area**

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile
Health centre					
- Travel time to nearest > ½ hour (%)	64	57.7	43.3	12.5	3.1
- The fokontany* has at least one basic health centre (%)	48.1	52	58.8	62.3	62.8
Public primary school					
- Travel time to nearest > ½ hour (%)	30.3	22.5	22.4	5.3	0
- The fokontany* has at least one public primary school (%)	82.7	82	96.2	73.6	72.6
- Avg. no. of pupils per teacher	64.2	62.3	54.6	41.6	57.2
- Avg. no. of teachers per grade	0.77	0.80	0.93	1.54	1.50

* The *fokontany* is a sub-division of the district.
The surveyed areas have been grouped in quintiles according to the average per capita consumption of their inhabitants.

Sources: EC97 and EPM97, INSTAT, authors' calculations.

In addition, the distribution of human resources is very uneven. The average pupil/teacher ratio masks large disparities. According to a survey of public primary school users in nine districts (of which six are rural) in 1998, this ratio varies from 30 to 96 (MADIO, 1999*b*). Differences in enrolment rates do not explain these variations, since one of the rural districts surveyed has a pupil/teacher ratio of 90, although the enrolment rate is only 60 per cent. The same survey found that 60 per cent of users complained that there were not enough primary school teachers. The EC97 shows, similarly, that the average pupil/teacher ratio increases in proportion to the extent of poverty of the surveyed area. The increase in the ratio (according to official data) also testifies to the fact that public and private providers are finding it increasingly difficult to satisfy demand. The situation is no better in the private sector, moreover, since some private schools have pupil/teacher ratios of over 100 (MADIO, 1999*b*).

The situation is even more serious where the geographical distribution of health personnel is concerned. Most of the poor live in rural areas, which are disadvantaged in this respect. Although it is true that access to health infrastructures is more difficult in rural areas and that the density of the system needs to be increased, it must be emphasised that basic health facilities are relatively well distributed geographically, whereas medical personnel are highly concentrated in the major cities. Seventy per cent of users of basic health centres stated that there were no or not enough physicians, paramedics and even nurses (Secrétariat technique à l'ajustement, 1998). The EC97

reveals that 42 per cent of rural medical facilities have no doctors, and 32 per cent have no nurses. The concentration curve based on the data from this survey confirms this finding that medical personnel are unequally distributed, to the detriment of the poor (Figure 1.A6). Given that the urban population also has the option of turning to private providers, the situation could be improved by redeploying public-sector human resources to the countryside. As an indication, a 1994 census by the physicians' professional association counted 3 300 doctors in private practice, 80 per cent of whom were practising in the Antananarivo metropolitan area.

Table 1.8. **Quality of Education and Health Infrastructure by Surveyed Area, 1997**

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile
Public primary schools					
- Cases in which infrastructure quality is considered satisfactory (%)	14.3	16.7	22.9	34.2	51.4
Basic health centres					
- Cases in which infrastructure quality is considered satisfactory (%)	16	30.4	17.2	40.6	67.7
- Cases in which medicines are available year-round (%)	25.5	30.4	34	64.6	50.0

Note: The surveyed areas were classified by quintile according to average per capita consumption of their inhabitants. The *fokontany* is a sub-division of the district. Judgements as to the quality of infrastructure are given by informants identified in the surveyed area (prominent person, government education or health employee, clergy, etc.).

Sources: EC97, EPM97, INSTAT, authors' calculations.

The shortage and misallocation of resources are responsible for the decaying state of infrastructures and the poor quality of the services provided. To mobilise and motivate the personnel assigned to remote areas, it is necessary to provide a minimum level of resources in order to allow them to exercise their professions in reasonable conditions, which is far from being the case at present. By way of illustration, the figures drawn from the EC97 on the availability of medicines in rural areas are particularly disturbing. Nine per cent of health centres are never supplied with drugs, and 53 per cent only rarely supplied (in urban areas, the corresponding figures are 7 per cent and 22 per cent respectively). When surveyed areas are classified according to degree of poverty, it is the poorest regions which have the worst-quality infrastructures (Table 1.8).

Lastly, although there are still not enough basic infrastructures, the best short-term strategy would be to rehabilitate those that are already in existence. A study of the basic health system (Gautier and Razafindrakoto, 1997) shows among other things that the resources available to the ministry, though limited, could generally suffice to make all of the existing primary health centres operational. An estimate of the minimum budget required to operate each centre (operating costs, capital expenses, purchase of medicines, etc.) indicates that the available resources cover the entirety of requirements. Reallocation is essential, however, to ensure that each health facility (particularly in rural areas) actually has the funding as well as the medical and support (administrative) personnel it needs to function.

Benefit Incidence Analysis of Social Spending

The two preceding sections have addressed, first, the situation with respect to poverty and the links among the various dimensions of poverty at household level, and second, the level and distribution of social service provision. The present section examines poverty reduction policies, considering the redistributive impact of social spending (education and health). Does the way in which the education system and public health facilities are financed allow resources to be transferred to the poor, and more generally, who benefits from these services?

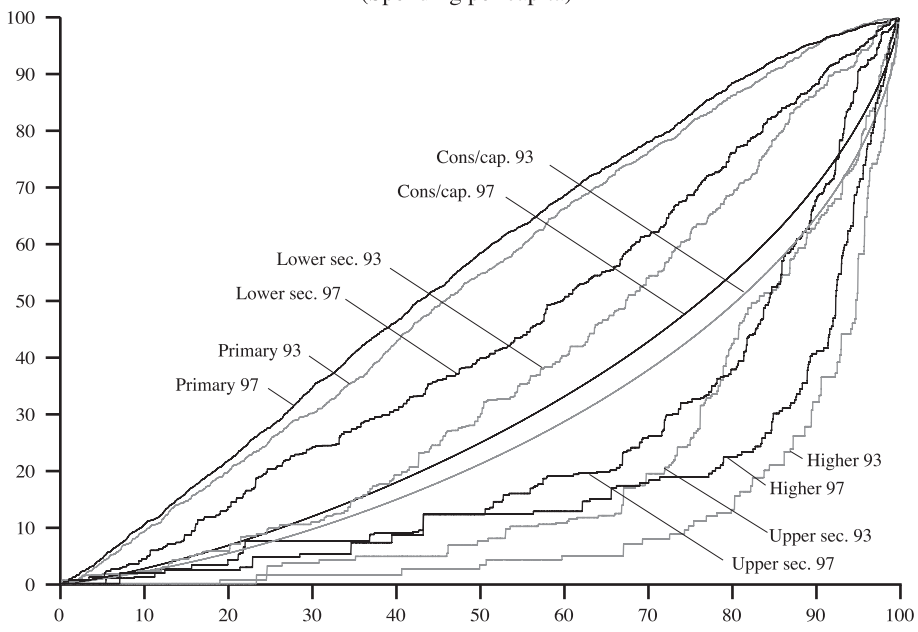
The main tool used here is benefit incidence analysis. This methodology mainly consists in comparing the Lorenz curves of private household consumption expenditures (a proxy for income or welfare) with the concentration curves of the utilisation of various categories of public services, in terms of either attendance or unit costs. The characteristics of the distributions can be established descriptively, using graphs or tables, or in a more rigorous approach they may be based on statistical tests, mainly developed in the context of the theory of stochastic dominance, and taking into consideration the random nature of the samples on which the curves are based.

Although benefit incidence analysis was first applied to developing countries in the late 1970s (see Meerman, 1979, for Malaysia; Selowsky, 1979, for Colombia), the lack of sufficiently disaggregated data prevented more widespread use of this technique. It is only relatively recently, with the proliferation of household surveys and the increase in computational power for processing large samples, that renewed interest was aroused by work on these issues (Van de Walle and Nead, 1995). In the case of Madagascar, four recent studies have used this approach to analyse the distribution of social spending. All of them use EPM data and cover the entire country (Table 1.A6). The first dates from 1996 (World Bank, 1996) and uses data from EPM93. It carried out the most extensive disaggregation of unit public appropriations, which was re-used by the subsequent studies. Sahn and Younger (1999) use the same data, but conduct their analysis at the individual (household) level instead of aggregating by expenditure quintile, as well as using econometric tests to compare distributions of different services. The results obtained are much the same in both cases. Lastly, the AERC report (Razafindravonona *et al*., 1999), returning to a descriptive analysis by quintile, ventures a comparison of change in the incidence of public spending over time, from 1993 to 1997, using data from EPM93 and EPM97. The results must be interpreted with caution, however, mainly because of inconsistencies in the way consumption is calculated.

Figure 1.4 shows a graphical representation of benefit incidence for education using the 1993 and 1997 EPM data. The cumulative shares of individuals in the population, ranked by per capita household expenditures, are shown on the x-axis, while the y-axis shows the cumulative shares of the subsidy or benefits; the latter form the benefit concentration curves for the education services. Two reference distributions serve as yardsticks for assessing the progressive or regressive nature of public spending. The distribution of a given type of spending may be considered

progressive if its concentration curve lies above the 45-degree line; in this case poorer individuals receive a disproportionate share of the total benefit. The distribution is regressive by this yardstick if it lies below the line. The distribution will be considered *relatively progressive* if its concentration curve lies above the Lorenz curve of consumption per capita, and relatively regressive if its concentration curve lies below the Lorenz curve. Relative progressivity means the benefit is distributed more equally than is income (or consumption). This classification allows us to rank three situations in decreasing order of redistributive impact: progressive, relatively progressive and relatively regressive. Visual analysis of concentration curves in the figure clearly shows a sharp improvement in social spending on education between 1993 and 1997.

Figure 1.4. **Concentration Curve of Education Spending by Level, 1993 and 1997**
(Spending per capita)



Source: EPM93, EPM97, INSTAT, authors' calculations.

In the education sector, the inegalitarian character of spending increases with the level of schooling, from primary to higher education, in both 1993 and 1997 (Figure 1.4). In particular, the breakdown of secondary education (which was examined in aggregate form in all previous studies) reveals great differences between lower and upper secondary schools, with public spending on the former proving to be systematically more geared towards the poorest. In 1993, none of the four levels of schooling was progressive, i.e. firmly pro-poor. In relative terms, only the primary level is seen to be relatively progressive (spending is better distributed than income). Spending on higher education is relatively regressive (less well distributed than income), whereas the distribution of spending on secondary education crosses the income

distribution. Within secondary education, however, the allocation to lower secondary schools is above the Lorenz curve everywhere except for the first decile, whereas for upper secondary education it lies below the Lorenz curve until the last decile. The distributional situation improves in 1997: spending becomes progressive for primary education and relatively progressive for lower secondary education, and it is not relatively regressive at any level, although the concentration curves for upper secondary and higher education are well below the Lorenz curve until the last decile.

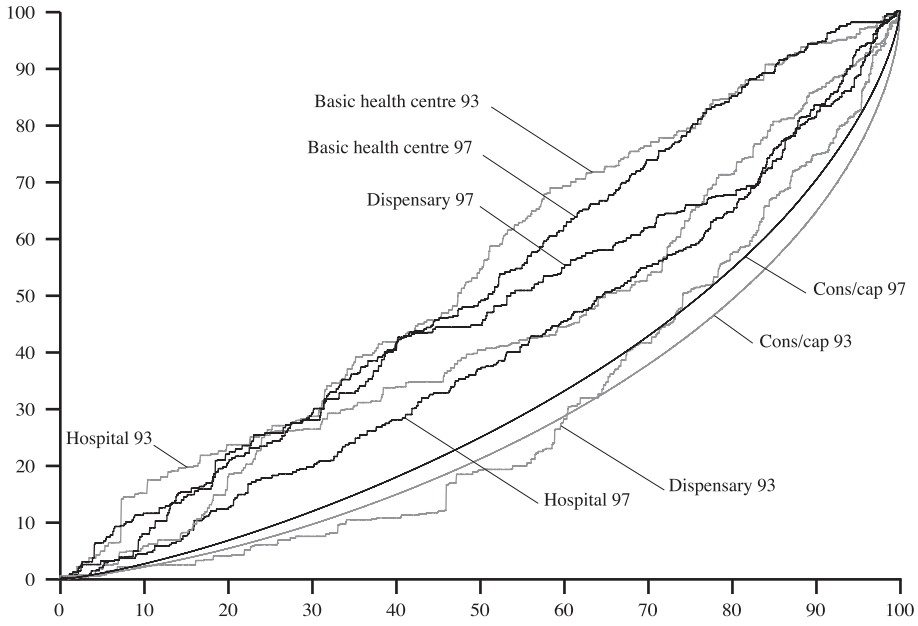
These results need to be put into perspective, however. The calculation of spending per capita does not take account of the differential age structure of households (see Appendix IV). We implicitly consider that this is a subsidy to families that is distributed evenly among all the members of the family. This method of calculation would be perfectly justified if we were studying an untargeted transfer policy, intended for all individuals regardless of age. Here, public expenditures on education, by their very nature, are not intended for all but only for school-age children. The problem is that the poorest households are also the households that have the greatest number of children, and it would thus be desirable to examine the benefit received by each child. In this case, our calculations of incidence show a less redistributive impact of education spending. In 1997, for example, spending on primary education, which seemed to be progressive when we considered the population as a whole, is only relatively progressive if we consider children only.

Comparing the 1993 and 1997 distributions, we find that expenditures are better distributed at all educational levels in 1997. The only level that does not follow this trend completely is upper secondary education, since the curves for the two years intersect, but the 1997 curve lies below the 1993 curve only for the 9th decile.

For analysis of the health care spending, we distinguished three types of public health facilities: basic health centres (health care stations, nursing stations and primary care centres, or CSSPs, staffed by a nurse or midwife); dispensaries and hospitals (general, specialised or secondary). In contrast to previous studies, we have isolated dispensaries (which are usually aggregated with basic health centres), because they form an intermediate layer in the hierarchy of health facilities, and also because this category includes the occupational health centres (OSTIE), which are accessible only to wage employees in the formal private sector and their dependants, and thus do not exist in rural areas.

In 1993, public spending was not progressive for any type of health facility (Figure 1.5). Utilisation of basic health centres and hospitals was relatively progressive, while that of dispensaries was relatively regressive up to the 7th decile. As in the case for education, however, the situation had improved four years later. Although there were still no progressive types of health care facility, all of them had become relatively progressive, despite the reduction of inequalities in standards of living. However, a direct comparison of the 1993 and 1997 curves (marginal incidence) leads to a more ambiguous finding. No significant progress was recorded for basic health centres. Utilisation of hospitals seems to be less egalitarian, except in the vicinity of the 7th decile. In contrast, the improvement in access to dispensaries was spectacular, as the concentration curve for 1997 is far above that for 1993.

Figure 1.5. **Concentration Curves of Health Spending by Type of Health Care Facility, 1993 and 1997**



Source: EPM93, EPM97, INSTAT, authors' calculations.

The descriptive approach, based on visual analysis of the concentration curves, can be supplemented by statistical dominance tests, which allow us to take the variation of the estimators into account and to measure the significance of the observed differences. We used the testing procedure established by Davidson and Duclos (1997) to estimate the level of significance of the difference between two concentration curves. As it is not possible to perform the test for each point on the curve, owing to limitations of computer power and sample size; we used 20 points corresponding to all of the 5 percentage point intervals between 5 and 95 per cent.

Generally speaking, the conclusions arising from visual comparison of the curves are confirmed in terms of dominance (Table 1.A7) and concentration coefficients[14] (Table 1.A8). In addition, the results are comparable to those obtained for Tanzania by Lambert and Sahn (in this volume). In education, a given level "dominates" each of the levels above it, in both 1993 and 1997; that is, primary is more progressive than secondary which is more progressive than university. In both years, only the primary level "dominates" the 45-degree line (progressivity). Lower secondary education is dominated by the 45-degree liner, but dominates per capita consumption (relative progressivity). Upper secondary and higher education are dominated by per capita consumption (regressivity). In the case of the health sector, the relationships among the various types of health facilities are less stable between 1993 and 1997. Although basic health centres systematically dominate the other two types of facilities (dispensaries

and hospitals), hospitals dominate dispensaries in 1993 but are dominated by them in 1997, reflecting the tremendous improvement in the distribution of spending allocated to dispensaries over the period. Basic health centres dominate the 45-degree line bisector in 1997 (progressivity), but the relationship is indeterminate in 1993 (the only certainty is that they are relatively progressive). Hospitals are relatively progressive in both years, dispensaries only in 1997.

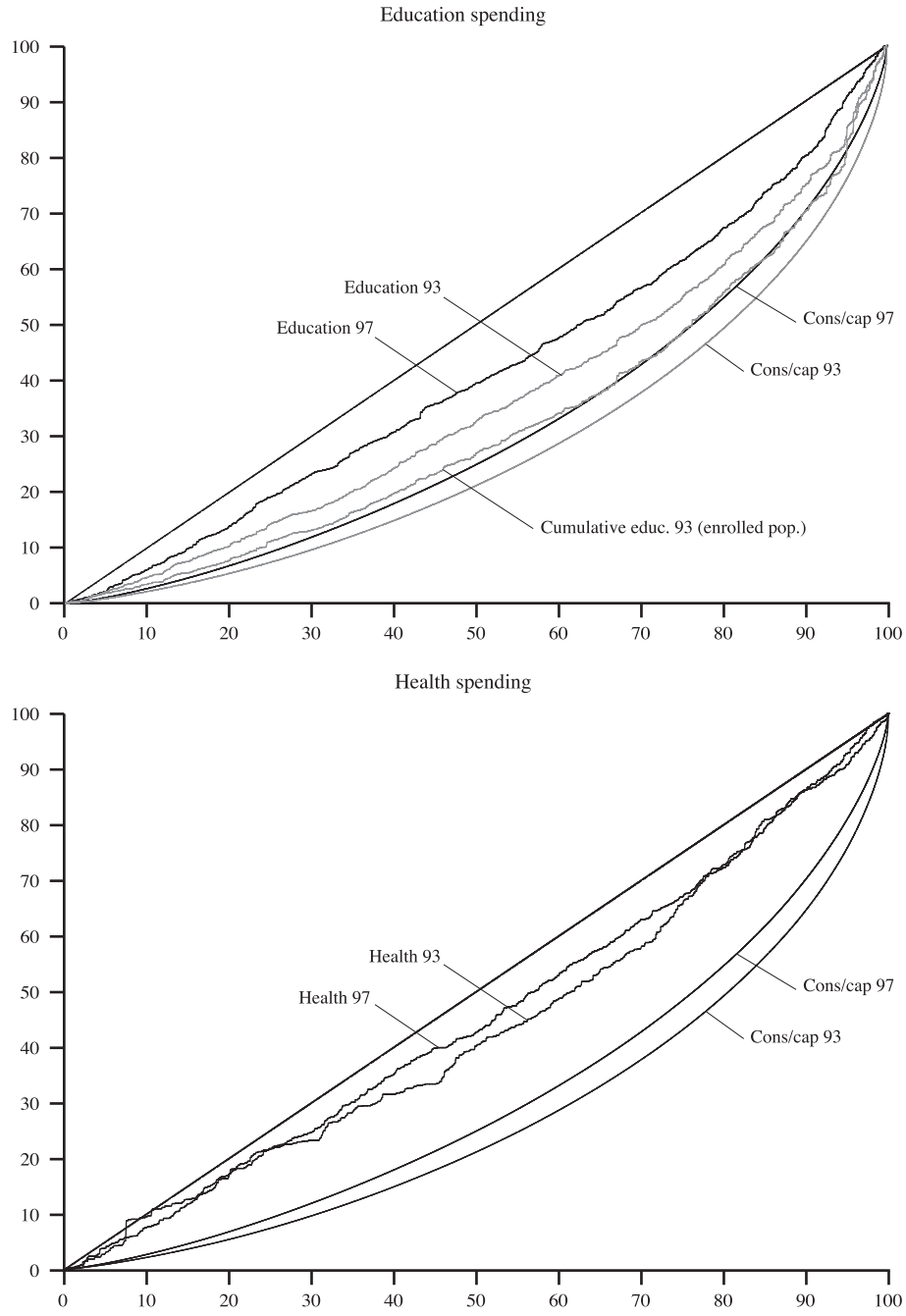
To obtain an overall view of the distribution of social spending by type of beneficiary household, it is necessary to calculate unit spending per school level (for the education sector) and per health facility (for the health sector), in order to weight and aggregate attendance and utilisation rates properly. The budgetary data available allow us to distinguish only three educational levels (primary, secondary, higher) and two types of health facilities (basic health centres and hospitals) in both 1993 and 1997. We were not able to use the breakdown by province, as this was not available for 1997. However, comparison of the two exercises for 1993 suggests that this simplification does not engender any major biases. Lastly, it should be noted that the budget data lack precision, particularly where health is concerned, owing to the preponderant share of spending by the central administration. Only current spending (payroll and operating expenditures) is used, given that it is impossible to determine the amortisation rate for investments.

In their aggregate form, social expenditures appear to be more favourable to the poor in 1997 than 1993 (Figure 1.6). Although no clear trend emerged in the health sector, the distribution of public spending improved appreciably for education. Social spending, though never progressive, is relatively progressive in all cases. Generally speaking, health spending is better distributed than education spending. For example, 17 per cent of health spending went to the poorest quintile in both 1993 and 1997, whereas this quintile received only 10 per cent and 14 per cent respectively of public education spending in these years.

These concentration curves of social spending underestimate the actual inequalities, for at least two reasons (see Appendix IV). First, the redistributive impact of education spending would be smaller if we considered pupils' entire school careers, instead of counting only attendance during the current year, since children from wealthy households spend more years in school than children from poor households. Second, and similarly, the calculation of spending per school-age child differs from the calculation of spending per household or per individual (Figure 1.A7).

Social spending in Madagascar thus clearly has a redistributive dimension. The question is whether the amount of such spending is large enough to have a direct significant influence on poverty levels, apart from its indirect influence on human capital accumulation. In the first place, public education and health expenditures are far from negligible: they amounted respectively to 4.5 per cent and 3.3 per cent of household consumption in 1993 and 1997. Second, they decrease considerably as the level of consumption rises (see Figure 1.A8). In 1993, for example, public spending received by the poorest decile amounted to nearly 11 per cent of the decile's budget, as compared to only 3 per cent for the wealthiest decile.

Figure 1.6. **Concentration Curves of Social Spending, 1993 and 1997**



Note: The "Cumulative education 93" curve represents the total education benefit received by all of the young people attending school in 1993 since their schooling began.
Source: EPM93, EPM97, INSTAT, authors' calculations.

Despite the reorientation of social spending in favour of the poorest groups over the last four years, Madagascar remains one of the developing countries in which such spending is the least well targeted. The Latin American countries, though highly inegalitarian, do much better in this respect (Table 1.A9). If we then factor in the mediocre internal efficiency of the social systems and the average decrease in real budgets per capita, which has resulted in abysmal service quality, the overall situation is far from satisfactory, and far from corresponding to the Malagasy government's declared policy objectives in this area.

Demand for Education and Health Services[15]

An earlier section of this chapter presented an analysis of the incidence of public education and health services. That analysis was descriptive. While important for assessing whether and to what extent services are reaching the poor or other vulnerable socio-economic groups, such an analysis is less useful for evaluating the effects of many potential policies in the social service sectors. As is well known, it may not provide a reliable indication of how, for example, changes in price, quality, or distance to providers will change the level or share of benefits received by the poor (Van de Walle, 1998). This requires behavioural analysis of the responses of households to a policy change, that is, analysis of the demand for the service.

Such an analysis is reported in this section, which presents the results of an econometric analysis of education and health care demand in rural Madagascar. For primary schooling and curative health care, the analysis considered the choice among different providers of these services, and in particular the choice between public and private alternatives. This analysis takes advantage of detailed community-level data on the characteristics of local providers, collected in conjunction with the 1993/94 EPM household survey. These community data permit an assessment of the role of provider quality in the choice among providers and the decision whether to use a service at all — an important issue in Madagascar, where poor or deteriorating quality of public services is considered to be a very serious problem. Also in this section, the demand for secondary schooling is examined. This analysis is less comprehensive, owing to the much more limited nature of the community level data on secondary schools.

Simulation analysis using the econometric estimates permits inferences about the impacts of a number of potential policies in the education and health sectors. Among the policies considered here are changes in user fees, reductions in distance to providers, investments in quality improvements (for primary schooling), and expanded access to private providers of services. Though not strictly speaking a benefit incidence analysis of public spending, distributional issues remain central to the analysis featured in this section, as the simulations for the most part explicitly consider differences by expenditure quantile in changes in the use of different services.

The Demand for Education Services: Primary School Choice

As in many recent studies of provider choice, a nested logit model was used to estimate the primary enrolment choices of rural households[16]. The model distinguished among three options: non-enrolment, public primary school, and private primary school. Essentially the same model was used for the analysis of health care provider choice reported below; Glick *et al*. (2000) describe the empirical approach in detail. Since a common finding in the empirical literature is that the poor are more price-responsive than the well-off — a result with important implications for the distributional outcomes of pricing policies — it is desirable that the model be flexible enough to allow price responses to vary with income level. The models used for this analysis provide this flexibility by estimating separate price parameters for households in different rural per capita expenditure quartiles[17]. A second feature of the estimation, for both primary schooling and health care choice, is that it explicitly incorporates the fact that not all providers are available to every household. In particular, the majority of rural households lack access to a local private primary school, and about half do not have access to a private formal health care provider.

The community survey collected data on the schools (up to a maximum of three) most frequently used by local children. Included are a number of variables which are potential indicators of primary school quality, including student-teacher ratios, sharing of classrooms by multiple classes, and facility indicators such as presence and condition of windows and general building condition. Deriving an accurate measure of the full costs of schooling faced by households proved to be difficult. Information on the direct costs of local public and private schools — expenses on fees, transportation, books and other school-related items — was available from the household survey, but also relevant are indirect or opportunity costs, that is, income or output the household forgoes by having the child attend school instead of working. The farm and household work of boys and girls of primary school age is significant in rural areas of Madagascar (Glick, 1999), so these indirect costs may be important. However, it proved impossible to obtain reliable estimates of opportunity costs from the EPM data, owing essentially to the very small sample of children for whom wages were recorded. Therefore the model includes only the direct costs of each school alternative, using the community (Fokontany) median values of these expenses. Reflecting much higher fees as well as greater spending on other school items, these costs are substantially higher for private primary schools than public schools (16 957 vs. 6 092 Fmg per year on average)[18].

Estimation Results

Selected results of the nested logit model of primary school choice are shown in Table 1.A14. Because of normalisation, the estimates in the model are to be interpreted as showing the effect of the explanatory variables on the utility from a particular school alternative (public or private) relative to the utility from the base option, non-enrolment[19]. For public school, the coefficients on price (annual direct school costs) are negative for each expenditure quartile and decline sharply in absolute value as

income rises. This indicates that the poor are more sensitive to changes in the costs of schooling, in keeping with previous studies of the demand for services in developing countries. A similar pattern is seen for private school — in fact, the estimated private school price effect actually turns positive with the highest quartile, though the coefficient is not significant.

The distance to the nearest school has the expected negative effect for public school but no measurable effect for private school. However, the lack of a result in the latter case may reflect in part the way information on providers was collected. Schools that were relatively far away (which would tend to be the case more often for private schools) were more likely to be excluded from the list of the most frequently used schools recorded by the community survey, hence from the set of choices in the model.

The estimates for the school attributes indicate that — for public primary school — quality plays a significant role in parents' decisions about schooling for their children. The use of the same classroom by multiple classes has a negative and highly significant impact on enrolment in public school. Classrooms in most rural primary schools are small while class sizes are large, so it is not hard to imagine a negative effect of room sharing on children's ability to learn, hence also on the demand for public school. Good condition of windows, which may be acting as a proxy for overall facility quality, has a significant positive impact. For private school, on the other hand, these characteristics do not have significant effects. It is possible that incremental school improvements have larger effects on student achievement when quality is low, in which case the impacts of such improvements on demand will be larger for the lower quality alternative. Hence the difference in the effects of school characteristics on public and private school demand may reflect a lower level of quality in the public schools.

The coefficient on the dummy variable for being female is not significant, indicating that gender has no impact on the choice of public or private primary school relative to non-enrolment. This result is consistent with the similar primary enrolment rates for boys and girls in the descriptive data (see Table 1.A11). In keeping with virtually all other studies of education demand, parents' schooling — especially secondary attainment, which is rare in rural areas — raises the demand for both school alternatives. The number of children in the household has no effect on the demand for public schooling but reduces the probability of private schooling. The latter may be due to the fact that there are fewer resources available per child in larger families, making it harder to afford the more expensive private option.

In initial specifications of the model, household income (represented by per capita household expenditures) was entered in spline form in order to allow the effects of income, like those of price, to vary by expenditure quartile. However, log-likelihood ratio tests could not reject the equality of the expenditure effects for different quartiles, so the simple linear specification of the household per capita expenditure term was used[20]. Still, to assess the effects of the level of household expenditures on school choice, it is necessary to account for non-linearities arising from the interactions of

the expenditure quartile dummies with prices. A straightforward way of doing this is to compare the predicted enrolment probabilities for different expenditure quartiles. In calculating these probabilities, the household per capita expenditure variable was set to the mean for the quartile and all other variables were set equal to the overall sample means. These calculations indicate that, controlling for other factors, the probability of overall (public and private) primary enrolment comes close to doubling when moving from the mean expenditures of the bottom quartile to the mean of the top quartile. They further show that where the private school option is available, the increases in enrolments come largely though changes in private schooling rather than public schooling.

The econometric estimates thus highlight the importance of both the level of household income and school quality as determinants of primary school enrolment. They are consistent with the view that the declines over the last two decades in primary enrolment in Madagascar are a reflection of both an increase in poverty and a deterioration in the quality of the public school system.

Table 1.A15 presents own and cross price elasticities for public and private schooling by rural expenditure quartile, computed from the parameter estimates and the data. Since the responses to price changes will depend on the availability of alternative choices, the elasticities were calculated both for the full sample (for which a public school but not necessarily a private school is available) and the subsample of observations in communities with both a public and private school option available[21]. Columns 1 and 2 show the public schooling price elasticities calculated for the full sample. Overall, the demand for public primary school is relatively price inelastic (the mean elasticity for the sample is –0.25), but there are large differences in the quartile means, reflecting the pattern in the parameter estimates. The elasticity declines from –0.51 for the poorest quartile to essentially zero for the richest. The cross demand effects on private school enrolment appear to be very small, but this reflects the fact that for most of this sample private school is unavailable.

Columns 3 and 4 show the same elasticities for the smaller sample for which both school options are available. Here the cross-price effects are larger, indicating that households will switch to private schools — if available — in response to increases in public school costs. For this sample the private price elasticities are also calculated (last two columns). These are larger on average than those for public school, but as with public school, they generally decline in absolute value with expenditure quartile. The positive estimated elasticity for the top quartile reflects the positive, but insignificant, price coefficient for this quartile in the nested logit model.

The relatively low mean price elasticity for public primary school suggests that a policy of small increases in the costs of public schooling will not lead to large reductions in enrolments. On the other hand, the differences between income groups in the price elasticities point to potentially important distributional effects of such a policy. Higher elasticities among low-income households mean that, in proportional terms, the poor's reduction in demand from a given percentage increase in price will

be greater than that of the non-poor. Proportionately larger reductions in demand (i.e. in enrolments) in turn mean that the share of the poor in total enrolments falls[22]. That is, the incidence of primary schooling benefits, measured here by simple binary indicators of enrolment, becomes less progressive as a result of a price increase[23]. The potential effects of changes in school costs can be better illustrated through simulations of specific changes in public school fees, as reported in the next section.

Policy Simulations for Primary Education[24]

Before discussing the simulation results, two points should be mentioned. First, conclusions about changes in the level and distribution of schooling (and, in a later section, health care) strictly apply to the rural population only; the rural focus was dictated by the scope of the community provider survey. Of course, in a country that remains largely (almost 80 per cent) rural this accounts for most of the population; further, to the extent that behavioural responses are similar in rural and urban areas, we would expect the conclusions to generalise in a qualitative sense to the population overall. A second factor to keep in mind is that the simulations consider enrolment rates among primary age children — quartile per child enrolments — not quartile per capita enrolments. As discussed in the third section, distributional assessments may vary depending on whether benefits are measured on a per child or per capita basis[25].

The first policy simulation is an increase in fees at public primary schools. Given the severe shortage of resources that characterises the public education system in Madagascar (World Bank, 1996), the feasibility and distributional impacts of cost recovery through user fees are important issues. The simulation considered the effects of a 1 000 Fmg increase in annual public primary costs on the probabilities of public school enrolment, private enrolment and overall primary enrolment. Since public school fees average 586 Fmg (758 if we count only the 79 per cent of the sample for which the community median fee is positive), this increase amounts to more than a doubling of the current mean fee. We should note, however, that in absolute terms current fees are low (for example, 758 Fmg is less than $0.50) and make up only a small portion of average annual household school expenditures per public school student. In terms of such costs, 1 000 Fmg would represent less than a 20 per cent increase.

The predicted reductions in public enrolment probabilities from such an increase are small; the mean percentage point decline is just 1.4 per cent. However, there are important differences by expenditure level: mirroring the pattern in the price estimates, the change in the public enrolment rate declines from 3 per cent for the poorest quartile to essentially zero for the wealthiest. In addition, as anticipated from the elasticities, the *proportional* declines in enrolment are also larger for the lower quartiles. Hence the share in rural public enrolments of those in the lower half of the expenditure distribution would decline as a result of a fee increase — that is, public primary schooling would become less well targeted to the poorest rural children.

Substitution into the private sector in principle could offset the declines in public enrolments. However, the simulation indicates that this effect will be small, in large part reflecting the lack of availability of nearby private schools, particularly for poorer households. Consequently, the reductions in overall (public plus private) primary enrolment rates from the public fee increase are only slightly smaller than for public enrolment alone. Again, the reductions are largest for the bottom two expenditure quartiles.

This simulation confirms that modest increases in fees would be possible without serious consequences for average enrolment levels, though they would have undesirable distributional effects. However, it should be pointed out that a 1 000 Fmg increase would not go far towards effective cost-recovery, as it represents a very small percentage of the estimated 50 000 Fmg the government spent per primary student in the year of the survey (World Bank, 1996). More ambitious attempts at cost recovery would likely have non-trivial detrimental impacts on the level and distribution of primary enrolments, at least in the absence of accompanying school improvements[26].

A second set of simulations considered improvements in rural public school quality as represented by the school characteristics variables in the nested logit model. One such simulation examined the effects on public and overall primary enrolment probabilities of eliminating classroom sharing in all public schools where such sharing currently occurs[27]. The mean public enrolment probability in this scenario increases 8 percentage points, from 0.44 to 0.52. This is the average for all observations in the sample; for children in communities that actually experience the improvement (i.e. those for which classroom sharing initially occurs) there is a quite substantial 12 per cent increase. Further, the outcomes are favourable from an equity perspective. The changes in the public primary enrolment rate are slightly larger for children in the lower two quartiles than the upper quartiles, in part because poor children are somewhat more likely to be suffering from low quality public schools as proxied by the room sharing indicator[28]. Because the initial levels of public enrolments are substantially lower for poorer children, their larger absolute gains translate into greater proportional increases as well, so their share in aggregate rural public enrolments rises.

Since some households are induced to switch from private schools to public schools as a result of the quality improvement in the latter, the simulated increases in overall primary enrolments are slightly smaller than for public school alone. However, the gains in overall enrolment probabilities are even more pro-poor than for public school enrolments. This occurs because the predicted school transitions of poorer children consist largely of moves from non-enrolment to public enrolment, whereas the better-off are (relative to the poor) more likely to be simply switching from private to public school in response to the quality improvement[29]. Even so, the simulation suggests that quality improvements like those considered here will not be able greatly to reduce the large current disparities in primary schooling between the poorest and richest households: the enrolment rate of the poorest rural quintile as a fraction of that of the richest rises only modestly, from 60 to 65 per cent.

With estimates of the responses of households to both changes in cost and quality we are in a position to address a question that is important for policy, given the resource constraints facing the public sector: to what extent can improvements in public school quality can be financed by households themselves, through increases in fees? This issue was examined by simulating quality improvements in combination with various levels of fee increases. These simulations show the range of feasible combinations of cost-recovery and enrolment increases for a particular quality improvement[30]. There appears to be some scope for financing public primary school improvements through user fees. For example, if classroom sharing were eliminated, annual fees in the schools undergoing the improvement could be raised by more than 5 000 Fmg — an amount similar to the average of total (fee and non-fee) direct household per student expenditures — while still yielding an increase in the mean enrolment rate over its pre-improvement level. However, there is a great deal of variation around the mean, reflecting the quartile differences in price elasticities. Therefore the ideal policy would be one of differential fee increases — i.e. price discrimination — in which fees are raised more for the non-poor (either individuals or communities) than the poor.

A final simulation addressed a very different "policy": the expansion of private primary schools into communities that currently are served only by public schools. It is sometimes suggested that private education (and health) services can fill the gaps in the public provision of services, especially where resource limitations make further expansion of public facilities infeasible or where the quality of public services is very poor. Further, some have proposed that governments directly or indirectly subsidise the development of the private sector (see, for example, Alderman *et al,* 2001). Rural private primary enrolments are significantly higher for high-income households in the sample, accounting for 26 per cent of primary enrolments for the highest quartile compared with only 14 per cent for the lowest. However, local availability of private primary school is also higher for the well-off (35 per cent vs. 22 per cent), suggesting that at least part of the private enrolment gap may reflect differences in access.

For the simulation of a private sector expansion it was assumed that the new private schools have characteristics, including costs, equal to the means of these variables for existing private schools. The results indicate that although there would be a partial reallocation of students to the private sector, the mean overall primary enrolment rate in rural areas would increase only by 5 per cent (from 0.51 to 0.56) if private schools were to become available in all communities. This is a rather modest increase given that for almost three-quarters of the sample the simulation is, in effect, expanding the set of choices to include a private alternative[31]. An expansion of private schooling would also not appear to be a means for increasing overall educational equity. The predicted primary enrolment rate rises 7 per cent for children in the richest rural quartile but only 2.8 per cent for those in the poorest, even though the private expansion disproportionately improves the schooling options of poorer households, who initially were the least likely to have access to a private school.

On the other hand, the simulation predicts a greater proportional reduction in the public enrolments of children from higher income households, who are more apt to leave the public sector when private schools become available. Consequently, poor children end up accounting for a larger share of *public* primary enrolments. Thus the growth of the private education sector would have the effect of making public education spending better targeted to the poor, though this would occur in a context of a stagnant or worsening distribution of overall (public and private) primary schooling. Of course, even this limited benefit would not be assured if the private expansion itself was not purely market driven but instead relied on government subsidies.

Although larger absolute as well as relative enrolment gains for children in the bottom half of the expenditure distribution (and larger absolute gains for all) were seen in the quality improvement simulations, a full assessment of either strategy would require information on the relative costs of public school quality improvements and private sector subsidisation. Unfortunately, such data were not available for this study[32].

The Demand for Education Services: Determinants of Secondary Enrolment

Secondary schooling is far less prevalent than primary schooling in Madagascar. This is especially true in rural areas, where the net secondary enrolment rate is just 8 per cent (Table 1.A11). At the same time, there appear to be large returns in the labour market from a secondary education (Glick, 1999). Given the potential benefits, it is important to understand the factors constraining secondary enrolments, particularly among rural households. For this analysis we lacked the comprehensive provider information that was available for the analysis of primary schooling. The only community data available on secondary schools are found in the general questionnaire on local infrastructure, which records the presence or absence in the village of lower and upper secondary schools, and the distance to the nearest secondary schools if they are not local. In Glick *et al*. these school distance measures were combined with individual and household data in a probit model of secondary school enrolment decisions for rural children aged 12 to 18.

The first column of Table 1.A16 presents the probit model estimates. Distance to school is indeed a factor in secondary enrolment decisions. In particular, the coefficient on distance to the nearest lower secondary school is negative and highly significant. The sign on the estimate for distance to the nearest upper secondary school is also negative but not statistically significant. This can be explained by the fact that most children in this age range who are in secondary school are still at the lower secondary level, so that the distance to lower secondary schools is more directly relevant to enrolment decisions for this sample[33]. The model also includes a dummy variable for the presence of a paved road in the village or town. Access to a paved route should make a significant difference in the time and effort involved in travelling back and forth to school (for example, the taxi-bus would be an option for some). Given the

typically long distances to the nearest secondary school, this can be an important factor in the decision to attend. Therefore the positive and strongly significant effect of this variable on secondary enrolment seen in the table is not surprising.

Among other covariates, as for primary schooling, parental education has large positive effects on a child's secondary school enrolment. The coefficients on maternal and paternal secondary or higher schooling are much larger than for primary completion. Hence children of parents with relatively high educational attainment are at a particular advantage when it comes to their own possibilities for advancement beyond the primary level. However, this is a small group: only 5 per cent and 8 per cent, respectively, of mothers and fathers in the sample have completed secondary school.

The foregoing estimation treats children in the same manner whether they have completed primary school, dropped out of primary school, or never even enrolled in primary school. Obviously, only those in the first group — primary completers — are actually able to go on to secondary school. Thus the simple current secondary enrolment model does not account for the sequential nature of education decisions. While as desired, it shows the effects of the independent variables on secondary enrolment, some of these effects are indirect, operating through their impacts on prior primary school completion. Therefore we might also want to focus on the group of primary completers alone: what factors determine whether they will go on to secondary school?

To address this question a separate probit model for secondary enrolment was estimated on the sample of children aged 12-18 who have completed their primary schooling[34]. As seen in Table 1.A16, the distance to lower secondary school and the presence of a paved road continue to have highly significant impacts. The effects of parental education are weaker, but this is to be expected since much of the effect of parents' schooling on secondary enrolment will be felt indirectly, through the effects on primary enrolment (and completion). Since the sample includes only those who have completed primary school, these indirect effects are purged from the estimates[35]. One notable difference with the results for the previous sample is that, among primary completers, being female is negatively associated with the probability of being enrolled in secondary school. This is consistent with the descriptive data (see Tables 1.A10 and 1.A11) showing that, especially in lower expenditure quintiles, girls account for somewhat less than half of secondary enrolments. This gap, which is not dramatic, is one of the few instances for Madagascar where one finds any degree of bias against females in access to education or health services.

The estimation results point to the importance of access — the distance to schools — as a constraint on secondary enrolments in rural areas. To explore this issue further Glick *et al*. used the estimates and data to simulate the effects on secondary enrolment probabilities of reducing the distance to schools. Also investigated were the effects of infrastructure investments, namely, the expansion of paved roads to villages that are currently not served by such roads. For the full sample of 12 to 18 year olds, reducing the distance to lower secondary school by half raises the predicted secondary enrolment rate from 11 per cent to 13 per cent. Combining this with providing access to paved routes to communities lacking such roads yields a more dramatic increase:

the mean probability of secondary enrolment rises to about 17 per cent, representing a proportional increase of more than 50 per cent over the base. This is about the same as the effect of reducing the distance to lower secondary school to zero, suggesting plausibly that transportation infrastructure improvements — in addition to their more obvious benefits for rural incomes — can substitute for school construction as a means of raising enrolments. Conducting the same policy simulations on the sample of primary completers indicates that there would be large impacts on the probability of continuing on to secondary school, especially for an expansion of the road network.

It should be emphasised that the public investments in school and road construction implied by these simulations would be well beyond current feasibility for Madagascar. The average distance to the nearest lower secondary school is 15 km (it is 40 km to the nearest upper secondary school), and only one-fifth of the communities in the sample are currently served by a paved road. Still, the exercise indicates that building more schools and improving the transportation network can have substantial benefits for secondary enrolment in rural areas. Secondary enrolment rates would remain very low even with these improvements, however. Since more than half of the primary graduates in this rural sample do continue on to secondary school, the most important means by which secondary schooling can be increased appears to be to ensure that more children enter and complete primary school.

The Demand for Health Services: Choice of Health Care Provider

The analysis of the demand for curative health care in Glick *et al*. (2000) considered the choice between outpatient hospital care, basic care, and private formal care in rural areas[36]. The first two categories, hospitals and basic care facilities, are generally public in Madagascar. Separate provider choice models were estimated for adults 15 years and older and children under 15 who experienced an illness or injury in the two weeks prior to the household survey. When there was more than one provider for a category in a community, the category means of the price and non-price provider characteristics were used in the model.

For the adult sample the cost per visit was calculated as the sum of direct costs (fees and transportation costs, obtained for each provider from the community questionnaire), and indirect or opportunity costs, which are the earnings forgone because of the lost work time associated with seeking treatment[37]. In rural areas of Madagascar, where health care facilities may be some distance away from an individual's place of residence, these indirect costs can be significant. For children under 15 it was more difficult to calculate indirect costs. As mentioned earlier, the sample of rural wage-earning children was too small to obtain reliable estimates of potential earnings. For younger children, the relevant opportunity cost involves the time of the relative who takes the child for treatment, but that person's identity was not recorded in the household survey. For the children's provider choice model, therefore, it was necessary to rely solely on direct (fees plus transportation) costs. The disadvantage here is that for the public provider categories of hospital and basic care, the direct costs are zero in about

three-quarters of the cases even when transportation costs are added to fees. This means that there is not a great deal of variation in the cost variable, making it harder to measure price effects.

Estimation Results

Selected results from the nested logit model for adults are shown in Table 1.A17. With regard to the grouping of choices in the model, the formal care categories (hospital, basic care, private formal care) are assumed to be related choices; that is, their errors are allowed to be correlated. The informal or self-care alternative is used as the base choice. The cost of treatment has negative and generally significant effects on outpatient hospital care (column 1) and basic care (column 2). As in the case of primary schooling, for hospital and basic care the estimates show that individuals from low income households are more sensitive to changes in cost; this pattern is clearer for basic care than hospital care. For private formal care, the small number of observations in the lower expenditure quartiles with cost information for this provider made it necessary to enter price linearly rather than interacted with the quartile dummies. Even in linear form, however, no price effect for private care is found.

Household income, represented here by household expenditures per capita, has a strong positive effect on the demand for private formal care. That is, better off individuals are more likely than the poor to consult a private doctor, visit a private clinic, or use a private pharmacy[38]. The dummy variable for gender is not significant, i.e. women are not less likely than men to seek care when ill.

The results for the non-price provider characteristics are mixed[39]. Drug availability has selective impacts on provider choice. Availability of free vaccines increases the demand for hospital care while the availability of malaria medicine raises the demand for care at basic health centres. The availability of a doctor has a positive effect on the probability of private formal care. This indicates that ill adults are more likely to turn to private formal care when this category consists of a doctor (instead of just a private clinic or pharmacy). There is no measured effect of doctor availability for either basic care or hospital care, but note in the latter case that doctors are almost always present in hospitals. There appears to be little effect of facility quality, measured here by the use of electricity and refrigeration. The only notable result is an anomalous one — a negative and significant coefficient for hospital care on the dummy for use of a refrigerator.

One might conclude from these mixed findings that households are not responsive to many aspects of health care quality. However, the results may reflect problems inherent in aggregating multiple providers into broad provider categories. Moreover, for the drug availability indicators, supply and demand interactions may be influencing the results along the lines suggested by Mwabu *et al*. (1993). All things equal, where demand is high, it is more likely that shortages of free drugs will arise, hence that the provider survey will record these drugs as being unavailable at least part of the time. This can lead to a lack of a positive estimated effect, or even a negative estimate, of drug availability on demand[40].

Table 1.A18 presents the nested logit estimates for children under 15. In contrast to the previous model, provider costs for each alternative were entered linearly in this model. This was necessary because of the lack of variation in the cost variable (which as noted above includes only direct costs), which precluded the estimation of separate price effects for each quartile. Still, the estimates for the simpler linear specification show that an increase in the cost of basic care reduces the likelihood that an ill child is taken to this type of provider.

This model also includes the distance to each provider. Since this variable is related to the time required to travel to and from a consultation, it will capture in part the opportunity costs faced by the household seeking care for the child[41]. Distance has a highly significant negative impact on the decision to seek basic care. This is an important result, since basic care is the most significant source of formal health care for rural children, accounting for more consultations than the other two categories combined. As with the negative effects of distance on education demand reported above, the estimate highlights the problem of lack of local access to basic services for rural households.

As with adults, we see only limited effects of non-price provider characteristics. Availability of free vaccines increases demand for hospital care but not basic care. In fact, the coefficient on vaccine availability is negative and significant for basic care. Such a result may reflect lingering collinearity in the data[42], or possibly supply and demand interactions of the kind mentioned above. Doctor availability and use of a refrigerator are associated with greater demand for basic care. With respect to the other variables in the model, a greater number of adults in the household generally raises the utility of a given type of care relative to no care/informal care, as does the schooling of the household head. These variables may be related to, and capturing the effects of, the level of family resources. In common with adults, there is no evidence of gender bias in health care decisions for children.

In Table 1.A20 the direct and cross price elasticities for the adult sample are calculated by rural expenditure quartile. Since the price coefficient for private formal care was not significant (as well as being "wrongly" signed), only the elasticities for hospital and basic care are shown. For each of these alternatives the elasticities are calculated on the subsamples for which the alternative is available. For hospital care the own price elasticities are generally low, and there is no clear pattern by quartile. The cross-elasticities of basic and private formal care with respect to the hospital care price are very small, but this largely reflects the fact that these alternatives are not available for much of the subsample with access to hospital care. For basic care, the mean own price elasticity is larger but still modest (–0.36). Here, however, we see a sharply declining pattern by expenditure quartile, reflecting the pattern in the price estimates. The elasticity for the poorest quartile is a substantial –0.63 compared with just –0.17 for the wealthiest. Therefore price increases for basic care will tend to reduce demand for this alternative proportionately more for poorer households.

Policy Simulations for Health Care

At the time of the 1993 EPM survey, rural public health facilities generally did not impose explicit charges for consultations[43]. Several simulations in Glick *et al*. explored the potential for cost recovery through fees in this sector. For the adult sample, two scenarios were considered: instituting fees at all basic care facilities, and instituting fees at all public providers, that is, for both basic care facilities and hospitals[44]. The latter scenario is relevant since the government may wish to maintain uniform prices for similar services at all types of publicly run facilities. Although choosing the level of the fee for the simulations is somewhat arbitrary, 1 000 Fmg (approximately $0.50), equal to about half the average fee charged by private formal providers, would be in the plausible range for a policy of user charges. This amount is a very small percentage of mean household monthly expenditures, even for the poorest rural quartile. However, it would constitute a significant increase in the total costs of care at public facilities, given mean total (direct and indirect) costs per visit of 1 593 Fmg for hospitals and 824 Fmg for basic care facilities[45].

The simulations point to the likelihood of significant reductions in the demand for health services for adults from the introduction of user charges of this magnitude. The reductions are larger for poor households, primarily reflecting the much higher basic care price elasticities for the poor. For ill adults in the lowest expenditure quartile, introducing a 1 000 Fmg charge per visit at all public providers (hospitals and basic care facilities) reduces the mean predicted probability of public care nearly in half, from 0.20 to 0.11. Substitution into the private sector is not adequate to prevent a significant decline in the overall demand for formal care for this group: the predicted probability drops from 025 to 0.17. In contrast, for the top quartile, the mean probability of receiving formal care falls only slightly, from 0.31 to 0.29[46]. In proportional terms, the declines in the demand for public care are much larger for the lower two quartiles, implying that price increases for public health services in rural areas will shift the allocation of these services away from the poor.

For children, the simulated effects of increases in the cost of care were smaller. An increase of 1 000 Fmg in the cost of basic care led to an average reduction of 4 per cent (from 0.20 to 0.16) in the probability of basic care and a reduction of 2 percentage points (from 0.34 to 0.32) in the probability of any formal care. Since cost was entered linearly in the children's logit model there was little variation by quartile in the changes in care probabilities. Although the simulation suggests that the demand for curative health care for children would be little affected by price increases, one should be quite cautious here. The lack of variation in the cost variable used in the children's estimation, which included direct costs only and consequently was zero for a large share (in fact, the majority) of local public providers, casts some doubt on the accuracy of the estimates of the price effects.

Additional simulations suggest that an expansion of private formal care providers (currently available in slightly less than half of the sampled communities) would at best have only very modest effects on the overall rates of care in rural areas. For these

simulations the probabilities of each health care choice were recalculated on the assumption that the private care alternative was available to all communities, with the new private providers having the mean characteristics of existing ones. This would raise the expected probabilities of care conditional on illness by just 1.2 and 1.9 percentage points for adults and children, respectively. Therefore an expansion of relatively expensive private providers (a category composed primarily of private doctors) would not significantly improve access to health care services in rural areas. The result is not surprising: the absence of private providers in many poor communities no doubt reflects in large part the lack of demand for these more costly forms of care. Hence an expansion into these areas, at least at current price levels, would not be expected to alter radically levels and patterns of treatment[47]. For the private sector — in education as well as health care — to have a more significant impact, substantial government subsidies would probably be necessary for private providers to find it worthwhile to expand into unserved rural areas while offering their services at prices low enough to attract poor consumers.

Interactions between Investment in Human Capital and Income Poverty

This section examines the interactions among the three forms of poverty considered in this chapter: income, education and health. We consider first the effects of investment in human capital on earning capacity, and subsequently the interactions between investment in education and investment in health. A third sub-section presents an estimation of the impact of income poverty on primary school enrolment in the framework of using a long-term inter-generational model.

Effects of Investment in Human Capital on Earning Capacity

The Return on Educational Investment

A great deal of research has been devoted to estimating the return on educational investment in developing countries. The review of this literature by Psacharopoulos (1994) demonstrates the importance of such investment, particularly at the primary level.

Returns on education were estimated on the basis of data from the EPM93 household survey, distinguishing three types of employment: formal, informal and agricultural (Cogneau and Robilliard, 2000). The estimations of the hourly remuneration equations, for formal and informal sector jobs, reveal that education (number of years of schooling) brings very significant returns: one additional year of schooling adds more than 10 per cent to hourly income (Table 1.A22). This finding is in line with earlier results obtained by Glick (1999) using EPM93, and by Cogneau (1999) on the basis of a 1995 survey of employment in Antananarivo. In contrast, the equation for gross agricultural operating surplus shows that the average educational level of the members of the household contributes little to the total factor productivity of family agriculture (Table 1.A20).

Since, according to EPM93, agriculture accounts for over 70 per cent of all work activity in Madagascar, the low estimated returns to education in agriculture suggest that there are limits to potential effects of greater educational attainment on overall poverty. Given the above-mentioned differential in educational returns, however, formal education is also a powerful force driving the reallocation of labour out of the family farming sector, towards informal rural activities on the one hand and formal wage employment on the other. Taking this labour reallocation effect into consideration leads to a very substantial re-evaluation of the impact of education on agricultural household incomes, as shown by a recent study on Ghana (Joliffe, 2000). Thus, as long as this supply of non-agricultural labour meets growing demand, a process of structural change could start up in which educational investment would have a substantial impact on poverty reduction.

The Return on Health Investment

According to the theory of human capital, an individual's health is also likely to affect his or her productive potential and earning capacity (Schultz, 1961; Mushkin, 1962). Of the studies that have tried to verify this relationship, the most common are those which examine the effect of nutritional status (such as body mass or caloric intake) on earnings or output as well as labour force activity[48]. On the whole, these studies confirm that there is a robust relationship between long-term nutritional indicators and these variables. Studies based on other types of health variables yield more diverse and more ambiguous results (Dumont, 1999*a*).

The SET97 and EPM93 survey data make it possible to evaluate the relationship between employment conditions on the one hand, and morbidity, disabilities and nutritional status on the other. They reveal that health problems have a statistically significant negative effect on individual incomes, but this effect was found to be modest for all of the indicators used.

Impact of the Morbidity Rate

A rough calculation of the economic cost attributable to illness can be made on the basis of the EPM93 survey (Table 1.9). It was found that 56 per cent of those who were ill during the two weeks preceding the survey had to stop their regular work activities as a result of their illness. The average amount of time off from work over this period was approximately five days. The fact that 75 per cent of cases in which an individual had to take time off from work are attributable to relatively long-term illnesses (greater than or equal to two weeks) could mask recurrences of such periods off work beyond the two-week observation period.

Table 1.9. **Proportion of Ill/Injured People Who Stopped Working Completely During the Preceding Two Weeks, by Duration of Illness**
(percentages)

2 to 4 weeks	1 to 6 months	6 to 12 months	Over a year
40	64	81	48

Sources: EPM93, authors' calculations.

Based on estimates of the population, the total number of days in which individuals 15 years and up did not work owing to illness during the two weeks preceding the survey is estimated at 4.4 million. In annual terms, the loss would therefore be of the order of 26 times 4.4 ≈ 114 million days, i.e. approximately 4.6 per cent of the employed labour supply.

Impact of Disabilities

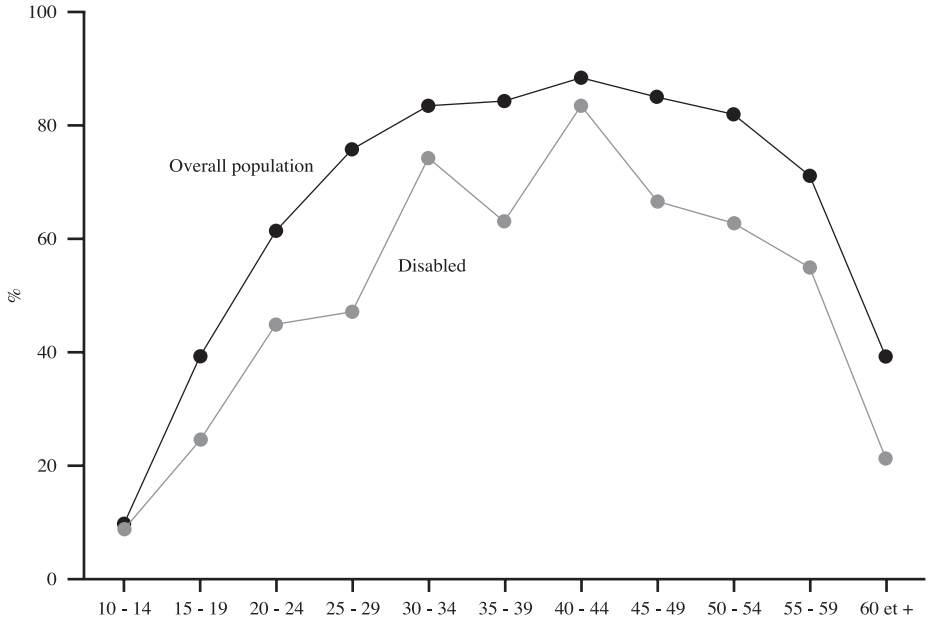
In the SET97 survey, which covers a representative sample of Madagascar's capital[49], the disabled are identified on the basis of a measure known as the "composite indicator of disability". In contrast to the other available surveys, this indicator includes an objective medical diagnosis: the coding is based on the evaluation of a physician who, on the basis of the individual characteristics of the person surveyed, assigns a disability rating on a scale from 0 (no disability) to 7 (permanently bedridden) for each item of medical information collected. Three types of information have been considered here: the person's subjective evaluation of his/her state of health, reported disabilities and, where applicable, chronic illnesses. Those whose composite disability indicator is greater than or equal to four (the level at which a person must restrict somewhat his/her occupational or domestic activities) are considered to be "disabled".

Other things being equal, the disabled are at a disadvantage in terms of access to the job market: the overall labour force participation rate is 63.4 per cent, but that of the disabled sub-population is 47.3 per cent. Similarly, people with disabling health problems show a lower rate of multiple job-holding than does the employed labour force as a whole: 10.4 per cent as against 12.4 per cent (Figure 1.7).

Furthermore, when they do have access to a job, the disabled are confined to sectors where there is little job security, as is shown by the proportion in wage employment: 53 per cent of the employed labour force are wage employees, whereas this proportion falls to only 43.6 per cent for those suffering from disabling illnesses. Analysis of the institutional distribution of employed disabled people supplements this observation by showing that although there is no significant difference in access to the public and social sectors between the two groups, 66 per cent of people with disabling health problems are employed in the micro-enterprise sector and only 19 per

cent in formal sector enterprises (respectively 59 per cent and 26 per cent for the able-bodied). Econometric analysis shows that, for both men and women, health status (along with other factors such as age, educational level, institutional sector and type of job) have a significant effect on working hours and earnings. Our indicator for disability has a negative effect on earnings (Table 1.A22). Other things being equal, moving down 2 ranks in the composite disability indicator is equivalent to gaining 1.45 years of schooling for men, and 0.58 years for women. Estimations of the impact on working hours are more problematic: although the composite disability indicator has a negative and highly significant effect on the probability of participation in the workforce (result not presented), it was not possible (after controlling for selectivity bias) to show any significant effect on working hours

Figure 1.7. **Labour Force Participation Rate, by Age**



Source: SET97 survey, MADIO, authors' calculations.

Impact of Nutritional Status

Estimations using height controlling for age (a long-term nutritional indicator) reveal a positive, though not very significant, effect of height on hourly remuneration (Table 1.A23). Other things being equal, being 10 cm taller leads to a wage increase comparable to that resulting from an additional year of schooling[50]. Height had no effect, however, on the probability of participating in the labour market or on hours of work.

Interactions between Education and Health Investment

Effect of Education on Health Status and the Demand for Care

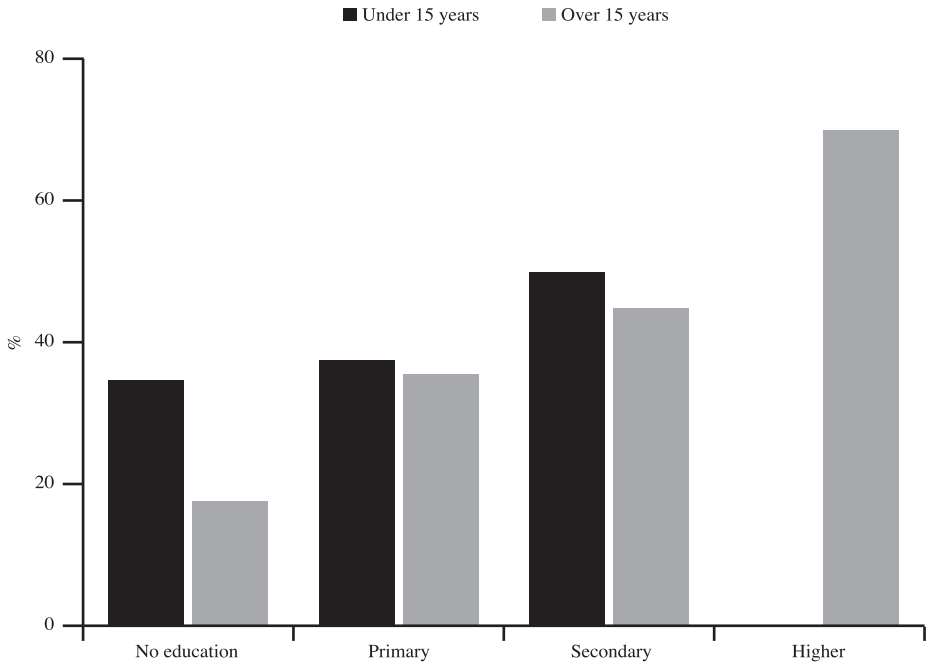
Generally speaking, the non-market returns to education were demonstrated long ago (Haveman and Wolfe, 1984). Most estimations confirm that education has important impacts on anthropometric variables and the mortality rate (Pitt, 1996; Lee, Rosenzweig and Pitt, 1997). Demand for health care is also positively related to educational level (Akin *et al.*, 1986; Mwabu *et al.*, 1993; Ii, 1996).

In Madagascar, the data from the EPM93 survey do not reveal a strong relationship between morbidity and educational level. This finding is attributable to the combination of two opposite effects: more highly educated people have a lower incidence of disease, but a stronger propensity to report themselves ill. For individuals over 15 years of age, the distribution of self-reported ill individuals by educational level corresponds broadly to that of the population as a whole, as it appears in each social milieu. For those under 15 years of age, however, the educational level of the head of household has an impact on reported morbidity: between a household whose head has no education and one in which the household head has a post-secondary education, the percentage of children under 15 who were reported to be ill in the last two weeks rises from 14 to 20.

The percentage of people having consulted a health care provider in the previous two weeks, broken down by the educational level of the individual, or that of the mother when the individual is a child (Figure 1.8), seems to reflect the importance of education more clearly. For example, among those over 15 years of age the portion seeking care ranges from 17.6 per cent to 69.9 per cent depending on their educational level. The multivariate analysis presented above, however, seems to show that this effect is mainly attributable to household income, at least in rural areas, which is correlated with education. Where children are concerned, the same type of analysis finds that the education of the household head has a statistically significant but slight impact (Table 1.A18).

Where prenatal care is concerned, 74.5 per cent of the women who were pregnant during the previous year consulted a health care provider at least once. For purposes of comparison, we note that this rate compares to averages of 98 per cent in the developed countries, 45 per cent in the least developed countries (a group that includes Madagascar) and 63 per cent in other developing countries. The mother's education level seems to have a very strong influence on demand for this type of health service (Table 1.10).

Figure 1.8. **Medical Consultation Rate by Educational Level of the Individual (+15 years) or Mother (-15 years)**



Source: EPM93, authors' calculations.

Table 1.10. **Prenatal Consultations by Place of Residence and Educational Level**

	No education		Primary		Secondary		Higher	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Percentage of women who were pregnant during the last 12 months and never consulted a provider for prenatal care	44.4	n.d.	20.98	17.43	11.43	13.24	n.d.	10.0

n.d.: not determined.

Sources: EPM93, authors' calculations.

The results obtained from the ENDS92 survey data in terms of infant mortality and children's nutritional status constitute a useful supplement to the preceding observations and point again to the important role played by the mother's education in the health of children. Regardless of the type of mortality considered, the impact of the mother's education level is very clear (Table 1.11). For example, if one considers in turn mothers at the "no education", "secondary 1" and "secondary 2 or higher" levels, the probability of the child dying before the age of one decreases each time by a factor of 2.5, falling from 137.6 to 48.4 per 1 000.

Table 1.11. **Mortality Rates for the 10-year Period Preceding the Survey, by Mother's Level of Education** (‰)

Mother's educational level	Neonatal mortality	Infant mortality	Child mortality	Infant + child mortality
No education	52.0	137.6	98.4	222.5
Primary	40.9	97.6	89.5	178.3
Secondary 1	41.6	82.0	53.8	131.3
Secondary 2 or higher	31.2	48.4	18.5	66.1

Source: ENDS92.

The Impact of Children's Health on Their Educational Attainment

Interest in the relationship between health and school performance is relatively recent; the majority of studies that refer to this topic have been published since the mid-1980s. Such studies are still relatively rare, however, and they use a variety of methodological approaches. Although the majority of them establish a positive relationship between nutritional or health status on the one hand, and educational attainment on the other, they often encounter serious econometric problems that compromise the robustness of the relationship[51]. In addition, some recent studies that do attempt to deal with these problems reach rather ambiguous conclusions (Glewwe and Jacoby, 1993; Behrman and Lavy, 1994).

We examine here the effect of medium and long-term nutritional status on educational attainment, using data from the SET97 survey[52] of Antananarivo, the national capital. It emerges that, for the population studied, medium- and long-term nutrition indicators have a significant positive impact on educational attainment. Our estimations show that anthropometric have a positive and significant effect on children's years in of schooling, but this effect is seen to be slight when we control for other environmental variables such as parents' education or occupation. For example, other things being equal, being 10 cm taller increases the child's potential duration of schooling by three months (Table 1.A24). The BMI indicator, or Quételet index (ratio of weight to the square of height), has a positive impact on schooling.

Poverty and the Transmission of Education between Generations

The two preceding sections dealt with the impact of investment in human capital on income poverty, and the interactions between investment in education and investment in health. Of the relationships linking the three forms of poverty considered in this chapter, we now reconsider the impact of poverty on investment in human capital. Although this relationship has already been considered in part, here we use an inter-generational model of the transmission of education and concentrate on the simultaneous determination of education and income efforts.

We built a fairly simple model of children's schooling and of income formation. Both the model and the estimation method are inspired by Maurin (1999), but the latter author analyses a different factor (the extent to which children are behind in their schooling, rather than school attendance).

$$S_{t+1} = aR_t + bS_t + V_{t+1} \qquad (1a)$$

$$R_t = cS_t + U_t \qquad (1b)$$

$$S_t = aR_{t-1} + bS_{t-1} + V_t \qquad (1a¢)$$

Equation (1a) states that the child's schooling, S_{t+1} (represented here by primary school attendance), depends on the poverty of the household, R_t, and on the education of the parents, S_t (represented here by whether the father attended primary school). The parents' stock of education increases the expected return on schooling of their children, in contrast to the return on the investment in the specific know-how required in family farms or informal activities.

Equation (1b) makes the poverty situation dependent on the parents' stock of education. The estimation strategy basically consists in instrumenting the poverty situation by the grandfather's primary education[53].

The variable analysed is whether a child 10 to 13 years old (our estimating sample) has ever attended primary school. The reason for this choice is that a child not enrolled in primary school by age 10 has very little chance of attending school thereafter, as is confirmed by the fact that the probability of school attendance does not vary with the age of the child. Thus defined, the schooling variable corresponds exactly to the variable available in the survey data for the child's father and grandfather: whether they were enrolled in primary school, regardless of the duration of schooling.

Table 1.A25 shows that the use of this method radically changes the estimated coefficients for income and for the father's education, when the estimation using a univariate probit is compared to the estimation instrumented in a bivariate probit framework. As can be seen, the point estimations of the two coefficients stand in a ratio of one to three. As expected, however, the effect of the father's education on the poverty of the household does not change. Table 1.12 indicates the scale of the resulting adjustment, in terms of the differences in the probability of school attendance. Moving above the poverty line increases the child's probability of attending school by 51 per cent when the father did not attend school and by 46 per cent when he did attend school, as against 26 and 28 per cent respectively when conventional estimation methods are used.

Table 1.12 **Increase in the Probability of School Attendance in the Case of an Exogenous Rise above the Poverty Line, According to Father's Education**
(percentages)

Origin (father) / Destination	Biased income effect (univariate probit)	Unbiased income effect (bivariate probit)
Did not attend school	+26.0	+51.0
Attended school	+28.0	+45.9

In other words, the impact specifically due to income is greatly underestimated because of the negative correlation between the unobserved factors affecting income and those affecting school attendance. This negative correlation may be interpreted in several ways. It may reflect substantial simultaneity factors, such as putting children to work[54] and the mother's economic activity. Most important, however, it suggests that the most productive parents, for a given level of education, are also in the best position to pass on specific skills to their children, outside of the school context. They therefore have an incentive to start their children working on the family farm in the family business instead of sending them to school. In other words, there is substitution between family education and formal education[55]. There is thus no doubt that the reduction of monetary poverty will bring a strong increase in the rate of primary school enrolment. Another important variable is the relation between the return on formal education and the direct costs of such education. These costs are of more than minor significance to poor households, as was shown in the price elasticity estimation and simulations presented above. It is likely that the costs are high enough to induce parents possessing agricultural and craft know-how to substitute an informal family education for academic education, as the latter has an uncertain return in terms of agricultural income (see above and Table 1.A20).

Finally, we can reconstruct a matrix of inter-generational transition among the four states defined by crossing the poverty variable with the primary schooling variable (Table 1.A26). The probabilities of escaping from poverty were estimated from the results of the estimation linking the household's poverty situation to the parents' schooling. This matrix can be projected into the future by factoring in the fertility differentials for the four categories, and by assuming that the conditions of income growth and provision of education remain unchanged.

Table 1.13. **Dynamic Inter-generational Simulation with Fertility Differentials**

	Fertility Differential	Initial Distribution	Next Generation	Long Term*
Poor, not in school	1.14	37.5	24.0	19.6
Poor, in school	1.17	25.5	35.7	39.0
Non-poor, not in school	0.87	15.1	9.6	8.0
Non-poor, in school	0.82	21.9	30.7	33.5
Poverty	–	63.0	59.7	58.6
Enrolment in primary school	–	47.4	66.4	72.5

* A specific vector associated with the greatest eigenvalue in the matrix, produced by the transition matrix and the fertility differential vector.

As can be seen in Table 1.13, this projection (which is based on expected enrolment rates and trends in fertility in the absence of policy changes) yields only a small reduction in the incidence of poverty and a limited increase in net primary school enrolment rates; in the long term, the former falls to 58.6 per cent, while the latter rise to 72.5 per cent. Thus, mere reproduction of current mechanisms for escaping poverty, via enrolment in primary school and the transmission of education between

generations, will not suffice to improve the well-being of future generations. This finding strongly indicates the need for active policies with regard to economic growth, redistribution of resources and reduction of school costs.

Conclusion and Policy Implications

The 40-year decline in Madagascar's economy has made the country one of the poorest in the world. From 1960 to 1996, its GDP per capita fell by nearly 40 per cent. Since 1997, the country has been experiencing renewed growth which, although it appears to be vulnerable owing to a number of unresolved structural problems, has been accompanied by many economic reforms and democratisation of public affairs, and provides grounds for hope that a true development process will start up. This process will require, among other things, sound management of the budgets devoted to education and health care.

The Failure of Interventionist Supply Policies

The very substantial public outlays made between independence and the 1980s brought about a considerable increase in both primary and secondary school attendance, as well as significant progress on the health front. Like Tanzania, Madagascar went through a socialist period during which giving the poorest groups access to basic infrastructure was a leading government priority. These interventionist supply-side policies met with a measure of initial success, but they subsequently ran afoul of the economy-wide recession that hit the country. Since then, Madagascar has fallen back to the African average in terms of school enrolments, and remains below African health standards. The 1990s witnessed a further downturn in the main health indicators. Although Madagascar has been to some extent spared by AIDS, it still suffers from many epidemics (malaria, tuberculosis, cholera, leprosy, plague). The nutritional status and vaccination rate of children are especially worrying.

The lack of economic growth led to problems in public finance, and tighter restrictions on international financing led the country to adopt, belatedly, drastic budget-cutting policies. Today, public spending per capita is at a very low level overall. Since 1980, the education and health budgets have not escaped from the series of deep cuts in central government expenditures; to the contrary, their share in these expenditures fell steadily until 1996. Recently, serious efforts have been made to increase both current and investment spending, but Madagascar remains far below international norms (in 1998, current expenditures on education and health amounted to 5 dollars per capita and 2 dollars per capita respectively). The financial constraint is reflected in the poor quality and low internal efficiency of the public school system: repetition and dropout rates are very high, although the performance of those pupils who do attend school is respectable in terms of basic skills acquisition. In urban areas, more

children are attending private schools, but these schools are still inaccessible to poor households. The health system suffers from similar functional problems, such as irregular supply of drugs and decaying infrastructures.

The increase in monetary poverty forced households to reduce their demand for education and health care. Nearly three-quarters of Madagascar's population lives under the extreme poverty line of $1 per day, and the estimations presented in the preceding sections agree as to the importance of monetary factors in the decision to send children to school or to consult a doctor. These estimations therefore suggest that, in the current situation, a renewed policy of increasing the supply of infrastructure will not suffice to bring children back to school and the ill back to health care institutions. Social spending will therefore have no chance of reducing poverty significantly unless it is integrated into an overall growth and redistribution strategy, in which a thorough reform of the state would not be the smallest component.

The Need for Better Management of Available Resources

At a time when Madagascar is successfully implementing the first phase of the democratisation of its public affairs, it must be hoped that substantial progress will be made in governance and the management of public services. There is a great deal of room for improvement even within the strict limits of the current budget, in particular by instituting more vigorous and more efficient administrative decentralisation. Many shortages that are particularly harmful to the poor could be avoided.

On paper, public primary schools are fairly well distributed geographically, but a third of them are closed at present. The same is true for basic health centres. Furthermore, human resources are overly concentrated in the wealthiest areas. Private provision of education and health services could be encouraged, in order to offset the inefficiency of the public system, but our simulations give little credit to this option where rural areas are concerned: in order for substitution actually to take place, substantial public subsidies would have to be granted to attract private providers to the remoter areas of the country and to ensure that they do not charge prohibitive fees, given the extreme poverty of the households concerned. The three leading priorities for public provision of education and health are thus:

— rehabilitation of existing infrastructure;

— geographical reallocation of teaching and medical personnel;

— administrative decentralisation and capacity building.

Lastly, the results of our estimations show the importance of proximity to service providers, in the case of health centres and secondary education. These findings indicate that, instead of building new specialised infrastructures, improving road and transport infrastructure could have a direct impact on lower secondary school attendance and

the proportion of diseases treated, apart from its effects on household agricultural income. This upgrading of transport infrastructure should also make it easier to improve the geographical reallocation of personnel.

Towards a Progressive System of Fees and Transfers

Descriptive analysis of the incidence of social spending yields results that must be regarded with caution from a methodological standpoint (see above and Appendix IV). Econometric tests confirm, however, for the two years for which they could be performed (1993 and 1997), that spending on primary and lower secondary education is at least relatively progressive, while spending at the other levels (upper secondary and higher) is very clearly regressive, and that spending on the health system (basic health centres, dispensaries, hospitals) is progressive. Not only did public spending increase between 1993 and 1997, but the distribution of education spending improved as well, which suggests that the marginal distributional incidence of the budget increase is positive. In comparison with other countries, however, the targeting of social spending could be improved, if the aim is to reach the very poorest.

Poor households' sensitivity to the cost of services suggests a need for caution concerning cost recovery strategies. Although the simulations show that doubling primary school costs in rural areas would not lead to a significant reduction in enrolment rates, this result is primarily due to the fact that costs are currently quite low. A larger increase could have a negative impact on rural enrolments. Households are even more cost-sensitive in the case of primary health care. In our simulations, the introduction of a moderate fee structure for public services leads to a perceptible drop in the percentage of people consulting a health care provider, even when the presence of private providers is taken into account.

Lastly, a uniform strategy of cost recovery is regressive from a distributional standpoint. The estimations show that the poorest households are the most sensitive to the cost of services. It should therefore be emphasised that such a strategy, if indeed it allowed infrastructure to be rehabilitated and service quality to be improved, would favour the least poor rural children at the expense of the poorest. It would thus be advisable to differentiate the price of services according to the population groups concerned, on the basis of objective, observable criteria such as type of housing and number of children.

In addition, consideration could be given to instituting a system of targeted, conditional transfers. Various scenarios should be considered, depending on:

— the target populations: from the poorest to the moderately poor;

— programme objectives (minimum educational attainment or a complete primary education, emergency care or coverage of the main health hazards), budgetary cost and administrative capacity.

Long-term Interactions

The interactions among the monetary, educational and health-related forms of poverty should be exploited in the context of a long-term development strategy.

As already noted, demand for education is strongly dependent on the growth of national income and improvement in the income distribution. Conversely, various studies confirm that education has only a slight impact on agricultural productivity as such, in current conditions of production, but that it is a powerful factor driving the reallocation of family labour off the homestead and towards non-agricultural activities. Many poor households no longer send their children to school because the benefits of formal education have fallen too low compared to what children learn within their families, once the direct costs associated with schooling are taken into account. In this respect, consideration could be given to overhauling school programmes in order to make school-based learning more relevant to the technical know-how needed for innovative agricultural activities or the development of micro-enterprises with growth potential.

As in the case of demand for education, household demand for health services is highly sensitive to the growth and redistribution of national income, as well as the direct cost of care. Conversely, the nutritional status of children has only a moderate influence on their school performance, just as adults' health status has relatively little impact on their incomes. Health policies should thus be directed to improving health conditions, not for their direct impact on growth and the distribution of wealth, but because health status is an essential component of well-being, and because diseases and disabilities are inherently a dimension of poverty. Moreover, the education of mothers is a powerful determinant of children's health status, as well as of the decline in the birth rate. The fact that enrolment rates for the most recent generations of Malagasy girls are as high as those for boys at all levels of the education system is a most encouraging achievement that must be preserved.

Notes

1. Tanzania ranked 156th and 172nd respectively.

2. It should be emphasised that the poverty indices in Table 1.2 are not comparable to the indices in the following tables, in terms of both the variable analysed (overall consumption rather than consumption per capita) and the population considered (households rather than individuals).

3. The simulations performed by Dorosh (1996) tend to show that the policy followed could have had a positive impact on income distribution and poverty, notably by altering the terms of trade between the cities and the countryside. This argument is contested by De Maio, Stewart and van der Hoeven (1999).

4. In the case of urban areas, the dominance of the generalised Lorenz curve for 1993 over that for 1997 suggests that social welfare did indeed decrease between the two living standard distributions reported by the two surveys. Similarly, regardless of the poverty line used and the index considered, the increase in urban poverty admits of no doubt. See Table 1.A2, where the analysis was conducted using the DADS software developed by Duclos, Araar and Fortin (1999).

5. The dominance testing analysis (Table 1.A2) confirms this reduction of inequalities between the two surveys for the country as a whole and for rural areas, but not for urban areas.

6. These are the so-called FGT indices (for Foster, Greer and Thorbecke, 1984) of order 0, 1 and 2. The simultaneous drop in the P1 and P2 indices could suggest that the 1993-97 period was favourable to the poorest, but this slight improvement is statistically significant only for the P2 index. At the national level, trends in the three poverty indicators vary according to the poverty line used. The same ambiguity is found for rural areas, although for most poverty lines we could conclude that the depth (P1 index) and intensity (P2 index) of rural poverty have diminished.

7. Take the example of children who were nine years old in 1993. The EPM93 household survey enables us to estimate that there were 308 400 such children. They appear four years later as 13-year-olds in EPM97, which estimates their number at 309 500. However, whereas 190 750 attended school in 1993, there were reportedly 206 200 enrolled in 1997. Such a result would imply that not only were no dropouts recorded between these two dates, but also that about 15 000 additional children were enrolled after the age of nine — and both of these hypotheses are completely unrealistic.

Comparison of the data shows a massive inflow of new pupils, constituting a shock that could not have failed to destabilise Madagascar's shaky school system. According to the two surveys, the number enrolled grew by 50.3 per cent, from 1 950 000 in 1993 to 2 930 000 in 1997. It is hardly possible that the school system could have absorbed a million additional pupils in four years, or 250 000 per year, without a massive public spending programme, and there was no such programme. Such a scenario would have been possible if the bulk of the increase in enrolments had been attributable to the private education sector, but this was not the case either. Although the number of pupils enrolled in private schools seems in fact to have grown faster than enrolments in state schools (+56.6 per cent and +48 per cent), the latter would nevertheless have had to absorb 688 000 additional pupils, as the relative share of public education fell only very slightly, from 73.5 per cent to 72.4 per cent.

8. In the rest of the chapter, the monetary poverty variable used is based on the national poverty line defined in terms of minimum calorie intake (see above and Appendix III).

9. The multi-ethnic composition of Madagascar's population is likely to blur the correlation between poverty and stunting, since the Merinas, a group of Asian origin (Sumatra), are both relatively wealthier and less tall. If this "ethnic" effect exists, however, it should strengthen the correlation in the case of wasting (as the Merinas are probably both heavier and shorter).

10. Some districts spend an extremely low proportion (under 50 per cent) of their appropriations. Moreover, the survey of nine districts revealed that some of them do not receive the supplies intended for them, without knowing whether this is due to a lack of funding or to other causes (Secrétariat technique à l'ajustement, 1998).

11. The data stem from many sources — in particular, from the budget ministry (MBDPA) and from sources in other ministries — and are often contradictory. In order to construct a homogeneous series, the painstaking task of harmonising the data had to be undertaken.

12. As civil service wages were neither indexed to inflation nor raised, they fell steadily in real terms from the early 1980s to 1994-95.

13. The impact of this policy on school enrolment of poor children and on the use of health centres by the poor is examined in detail below.

14. The concentration coefficients are extended Gini coefficients (S-Gini, $\rho=2$), which measure the area between the concentration curve for the spending category and the first bisector; areas above the bisector are counted as negative, and areas below it as positive.

15. The empirical results presented in this section are drawn largely from a more detailed study by Glick *et al*. (2000).

16. More precisely, about 90 per cent of the communities covered by the community survey and used in the estimations (for education as well as health care demand) were defined as rural. Most of the remainder would be characterised as semi-rural.

17. Note the use of quartile rather than quintile divisions. While estimating separate price effects for quintiles (or even finer divisions of the expenditure distribution) would allow greater non-linearity in price responses, the estimates in such specifications proved to be sensitive to price outliers.

18. All values reported in this section refer to 1993 Malagasy Francs (US$1 = 1 914 Fmg in 1993).

19. Note that the effects of prices (as well as of the other variables in the model, including income) are alternative-specific; that is, they are not restricted to be the same for public and private school. Allowing income and price effects to vary across alternatives has been somewhat controversial in the literature (see, for example, Gertler *et al*. 1987). However, Dow (1999) provides a compelling theoretical justification for this approach.

20. A similar result was obtained in the case of the health care provider choice models reported below. Hence in that case also the household's expenditure per capita was entered linearly.

21. Actually, the first set of calculations excludes one community (containing about 2 per cent of the sample observations) which lacks a local public school.

22. To see the relationship between price elasticities and the change in quantile shares, define E_j as the enrolments of the *j*th quantile and E as total enrolments (so *j*'s benefit share is E_j/E), e_j as the price elasticity of the *j*th quantile and *e* as the overall or average price elasticity, and P as the price level. The change in the benefit share for quantile *j* resulting from a change in the price is (Glick and Sahn, 2001):

$$\frac{\partial\left(E_j/E\right)}{\partial P} = \frac{1}{P}\left(\frac{E_j}{E}\right)(e_j - e)$$

Hence j's benefit share will fall if its elasticity exceeds (in absolute value) the average elasticity.

23. Note that this refers to changes in average incidence, measured as quantile shares in total enrolments. It does not mean necessarily that "a fee increase is regressive" in the sense that the welfare loss from a price increase would be greater for poorer households; this does not follow logically from higher elasticities for the poor. See Dow (1995) on this point.

24. To save space, the detailed results of these and subsequent simulations are not presented here; they can be found in Glick *et al.* (2000).

25. A standard benefits incidence analysis would compare benefits to different quintiles on a per capita basis. However, a per child approach to analysing schooling has particular advantages; see Selden and Wasylenko (1995).

26. For example, as reported in Glick *et al.* (2000), imposition of a uniform 5 000 Fmg fee in all public primary schools— equal to about 10 per cent of the government per pupil subsidy and roughly a doubling of average household fee and non-fee school expenses —would reduce public enrolments by 6 percentage points (11 percentage points for the poorest quartile) and overall primary enrolments by 5.7 per cent (10 per cent for the poorest quartile, equivalent to a 25 per cent proportional reduction for this group).

27. Another exercise simulated an improvement in facility condition, represented by the condition of windows, with similar results.

28. Note further that if the quintile gains in enrolment were compared on a per capita rather than per child basis, the distribution of the aggregate change in enrolment would appear more favourable to the poor. This is because, as noted, there are more children in the lower expenditure quantiles.

29. Conversely, a worsening of public school quality implies that the poor will tend to withdraw from schooling entirely while wealthier households are relatively more likely to switch to more expensive private alternatives. This appears to be precisely the scenario that played out in Madagascar beginning in the early 1980s.

30. As discussed in Glick and Sahn (2001), this exercise bears some resemblance to, but is simpler than, willingness to pay analysis.

31. However, if quality is higher in private schools, the shift into the private system would mean a larger improvement in educational outcomes than suggested just by the small rise in overall primary enrolments.

32. Additional simulations indicate that the average gains in overall primary enrolments would be similar for a quality investment that eliminated room sharing and a private sector expansion under which the annual costs (fees and other expenses) to households of the new private schools were only half the current mean private school costs. The latter would presumably require a large government subsidy to private providers or to households. In addition, the enrolment gains would not be as favourable to poorer households as under the quality improvement.

33. Note that the parameter estimates for distance will capture both opportunity cost effects (since these costs are in part a function of the time it takes to travel to and from school) and direct cost effects (due to distance-related variation in transportation expenses). The model does not include an explicit representation of school costs, mainly due to the fact that in many communities no child in the sample attended secondary school, precluding the construction of a reliable measure of local school costs.

34. A small minority (about 14 per cent) of those who completed the last primary grade did not obtain a diploma (Certificat d'Études Primaires Elémentaires). An alternate probit model estimated only on the group actually possessing the CEPE yielded results very similar to those presented. The same was true of a model of the determinants of whether the primary completer was ever enrolled in secondary school, rather than currently attending.

35. It should be kept in mind that the sample of primary completers is a self-selected sample. Those who have completed primary school may differ in unobservable (to the researcher) ways from the rest of those in their age group, in terms of e.g. ability or motivation. Strictly speaking, it is not valid to use the estimates to make inferences for the entire population about the probabilities of continuing on to secondary school: the estimates pertain only to the subsample who have actually completed primary school.

36. The provider types contained within these categories are as follows. Hospital includes primary and secondary hospitals; basic care facilities include *dispensaire, post sanitaire, post d'infirmerie,* and *Centres de Soins de Santé Primaire*; private formal care includes doctors, private clinics, and pharmacies. Only visits for outpatient hospital care are included in the first category, but this includes all but a tiny percentage of visits to hospitals.

37. Forgone earnings were calculated by multiplying an individual's predicted hourly earnings, derived from a wage regression, by the average round trip travel time to the provider category reported in the community questionnaire. See Glick *et al.* (2000) for details.

38. This positive effect of income on private formal care is not simply a reflection of the fact that doctors and private clinics are more likely to be available in areas where wealthy individuals live; the model, as noted, accounts for differences in the availability of a given provider.

39. Because of the high correlations among a number of the provider characteristics, several of these variables were excluded from the model. The dropped regressors are nurse and running water availability indicators.

40. A somewhat different form of supply and demand interaction may explain the unexpected negative effect of the use of a refrigerator on the demand for hospital care. The presence of high quality health facilities (proxied by the refrigerator variable) may over time improve the health of the local population. In these areas, there will be fewer illnesses and those that are reported may be less severe than elsewhere. The latter would imply a lower demand for hospital care as opposed to more convenient self-care or basic care, hence a negative association of the quality measure and use of hospitals. The same result could occur if better quality providers make the local population more knowledgeable about health and health care, with the effect that individuals become more skilled at self-care.

41. Note that distance (or more precisely, travel time) also appears implicitly in the adult model, through the calculation of opportunity costs.

42. See notes 39 and 40.

43. Cost recovery was one of the objectives of the reorganisation of the public health sector begun in 1994. We are unaware of any formal evaluation of these efforts.

44. Note that dispensaries, one of the providers included in the basic care category, may be private as well as public. Note also that the type of policy illustrated by the simulations involves setting uniform fees at all providers of a given type. This will involve a smaller increase in cost, or possibly even a reduction in cost, for the small percentage of cases where some level of fee is currently reported.

45. These figures, however, may underestimate the actual costs of care, in particular because of incomplete information on direct costs. Patients at public facilities commonly pay for their own medicines and other supplies, and they often also make informal payments to the medical personnel involved in their care. The community questionnaire collects information on fees only, hence presumably excludes these other expenses.

46. The declines in overall formal care probabilities were much smaller in the simulation in which just the cost of basic care was raised, because of significant substitution of public hospital care for basic care. However, it seems likely that serious efforts at cost recovery by the government would be comprehensive, involving both public hospitals and basic care facilities.

47. Even under the assumption that new private providers were only half as costly as the average of existing ones, a simulated private provider expansion still yielded very small increases in the overall demand for care.

48. Detailed reviews of these studies may be found in Behrman (1993*a*, 1993*b*), Sorkin (1994), and Strauss and Thomas (1995).

49. See MADIO (1997*a*, *b* and *c*) for a presentation of this survey, which investigated issues relating to health, schooling and inter-household transfers in Antananarivo.

50. It should be noted that the dominant ethnic group in the capital, the Merinas, is significantly shorter than the other ethnic groups. As a result, the effect associated with the anthropometric indicator cannot be attributed to discrimination on the labour market.

51. Partial presentations of this research can be found in Behrman (1993*a*, 1993*b*, 1996), and in Behrman and Deolalikar (1988). See also Lockheed *et al.* (1991).

52. We control for selectivity biases, which are rather frequent in these studies, *i)* either by restricting our sample to individuals 20 or more years old who have completed their schooling; or *ii)* by using a two-step Heckman procedure. We also control for any screening problems by expressing the education and height variables in terms of "distance" from the norm (see note to Table 1.A23). Lastly, the introduction of variables representing the education and occupation of parents allows us to control for other environmental factors that influence schooling, such as nutrition.

53. A full description of the theoretical model underlying these equations, of the instrumentation procedure and of the validity tests can be obtained from the authors.

54. In Madagascar, 31.9 per cent of children from 10 to 12 years of age are involved in family market production, mainly in agriculture (Roubaud and Coury, 1997).

55. See also Magnac, Lambert and de Vreyer (1999) on Côte d'Ivoire.

Appendix I

Table 1.A1. **Change in the Main Poverty Indicators**

	1993	1997
National calorie-based poverty line [a]		
P0	67.8	69.7
	-	*+1.8*
		(1.1)
P1	30.9	29.8
	-	*-1.1*
		(0.7)
P2	17.5	15.8
	-	*-1.7*
		(0.5)
$1 per capita and per day poverty line [b]		
P0	75.9	78.8
	-	*+2.8*
		(0.9)
P1	38.1	37.6
	-	*-0.5*
		(0.7)
P2	23.0	21.6
	-	*-1.4*
		(0.6)

Notes :
a) Fmg 248 000 (1993 Fmg).
b) In 1985 $ and PPP: Fmg 306 626 (1993 Fmg).
Standard deviations appear in parentheses.

Sources: EPM93, EPM97, authors' calculations.

Table 1.A2. **Results of Dominance Tests on Change in Living Standards**
(real per capita consumption)

	Urban	Rural	Both
Simple Lorenz dominance	No	I93>I97	I93>I97
Generalised Lorenz dominance	W93>W97	No	No
P0 dominance [a]	P97>P93	No	No
		203 480	171 592
		(35 016)	(20 538)
P1 dominance [a]	P97>P93	No	No
		617 219	352 283
		(292 074)	(84 886)
P2 dominance [a]	P97>P93	No	No
		1 305 396	597 882
		(921 348)	(198 383)

Notes:
a) For all poverty lines z from 0 to max(c). When there is no dominance, we report the poverty line (and its standard deviation) above which poverty is greater in 1997 (P97>P93), whereas below this value poverty is greater in 1993 (P93>P97). Analysis conducted using the DADS software of Duclos, Araar and Fortin (1999).
Standard deviations appear in parentheses.

Sources: EPM93, EPM97, authors' calculations.

Table 1.A3. **Internal Efficiency of Educational Systems: Madagascar and Sub-Saharan Africa**

	Madagascar	Sub-Saharan Africa	Madagascar's Rank in SSA
Primary			
% of repetitions (1990)	36	21	31/32
% who reach the last year (1989)	38	67	27/29
Number of years needed to complete primary education	14	n.a.	26/29
Secondary			
% of repetitions (1990)	43	40	9/23
% of primary completers entering secondary school	20	20	14/18

Source: Bourdon *et al.* (1996).

Table 1.A4. **Change in Public Spending per Pupil and per Educational Level** (constant 1984 Fmg)

	1994	1995	1996	1997
Total no. enrolled in primary education	1 173 600	1 301 030	1 362 200	1 481 460
Spending/primary pupil (constant Fmg)	41 500	28 200	23 270	21 200
Total no. enrolled in secondary education	158 520	157 620	175 930	176 710
Spending/secondary student (constant Fmg)	158 340	267 730	271 700	295 430
Total no. enrolled in higher education	26 940	22 000	20 810	18 940
Spending/higher education student (constant Fmg)	894 680	831 930	797 770	1 013 460
Total no. enrolled in public education	1 359 050	1 480 650	1 558 940	1 677 110
Spending/student (constant Fmg)	72 030	65 650	61 650	61 300

Sources: OGT; Ministry for Secondary and Elementary Education (MINESEB); Budget Ministry (MBDPA); Budget Act (for 1999); authors' calculations.

Table 1.A5. **Distribution of Health Infrastructure and Personnel by District, 1997***

	Population 1997 ('000s)	District Hospital	Basic Health Centre	No. of Staff	of which: Doctors		Population Per Basic Health Centre	Doctors Per 10 000 Inhabitants
Total no.	13 132	87	1 812	13 596	1 070	National average	7 247	0.8
o.w. urban dist.**	2 767	3	163	5 626	633	Urban districts	16 977	2.3
rural dist.	10 365	84	1 649	7 970	437	Rural districts	6 285	0.4
% in urban dist.	21.1	3.4	9	41.4	59.2			
Avg. no. per district	118	0.8	16.3	122.5	9.6			
Urban average	185	0.2	10.9	375.1	42.2			
Rural average	108	0.9	17.2	83.0	4.6			
Maximum no.	734	1	35	2 474	371	Maximum	138 400	5.1
Minimum no.	11	0	1	19	1	Minimum	1 797	0.08

Notes:

* Although we have data on the total number of health care facilities for a more recent year (1999), the detailed breakdown of health care infrastructure and personnel by district is available only for 1997.

**Urban districts are the 15 districts of Madagascar's seven major cities (the capitals of the six *faritany* plus Antsirabe).

Sources: Ministry of Health, General Census of the Population and Housing 1993, INSTAT, authors' calculations.

Table 1.A6. **Benefit Incidence Studies of Social Spending in Madagascar**

	Data	Disaggregation of Public Expenditures	Disaggregation of Households	Type of Tests
World Bank, 1996	EPM93	Regional	Quintiles	Descriptive
MADIO, 1997	EPM93	Regional	Quintiles	Descriptive
Sahn and Younger, 1999	EPM93	Regional	Individual	Econometric, dominance
Razafindravonona *et al.*, 1999	EPM93, EPM97	Regional	Quintiles	Descriptive
OECD, 1999	EPM93, EPM97	Regional	Individual	Econometric, dominance

Table 1.A7. **Dominance Tests on Social Spending, 1993 and 1997**

Education 1993	1	2	3	4	5	6
1. Bisector	-	D	X	D	D	D
2. Spending/cap. 1993		-	X	X	D	D
3. Primary 93			-	D	D	D
4. Lower sec. 93				-	D	D
5. Upper sec. 93					-	D
6. Higher 93						-

Education 1997	1	2	3	4	5	6
1. Bisector	-	D	X	D	D	D
2. Spending/cap. 1997		-	X	X	D§	D
3. Primary 97			-	D	D	D
4. Lower sec. 97				-	D	D
5. Upper sec. 97					-	D
6. Higher 97						-

Health 1993	1	2	3	4	5
1. Bisector	-	D	?	D	D
2. Consump./cap. 1993		-	X	?	X
3. Basic health centre93			-	D	D
4. Dispensary93				-	X
5. Hospital93					-

Health 1997	1	2	3	4	5
1. Bisector	-	D	X	D	D
2. Consump./cap. 1997		-	X	X	X
3. Basic health centre97			-	D	D
4. Dispensary97				-	D
5. Hospital97					-

Note:
D: The spending distribution referred to in the row “dominates” that in the column. X: the spending distribution referred to in the column “dominates” that in the row.
?: Not determined. The level of significance used is the 5 per cent level.
The dominance tests were performed using the DADS software of Duclos, Araar and Fortin (1999).

Sources: EPM93, EPM97, authors’ calculations.

Table 1.A8. **Concentration Coefficients* of Social Spending, 1993 and 1997**

	1993	1997
Bisector	0	0
Expenditure/cap. (Gini)	+0.447 (0.009)	+0.378 (0.006)
Primary	-0.061 (0.021)	-0.1047 (0.015)
Lower secondary	+0.263 (0.036)	+0.123 (0.033)
Upper secondary	+0.613 (0.043)	+0.529 (0.047)
Higher	+0.792 (0.037)	+0.662 (0.055)
Basic health centre	-0.043 (0.047)	-0.031 (0.042)
Dispensary	+0.418 (0.040)	+0.080 (0.051)
Hospital	+0.116 (0.076)	+0.203 (0.044)

Notes:
* Extended Gini coefficients (S-Gini, ρ=2); the standard deviation appears in parentheses.

Table 1.A9. **Incidence of Social Spending in Various Developing Countries**

Public Education Spending in Favour of 1st quintile		Public Health Spending in Favour of 1st Quintile	
AFRICA		**AFRICA**	
Ghana (1992)	16	Ghana (1992)	12
Kenya (1992/93)	17	Kenya (1992/93)	14
South Africa (1993)	14	South Africa (1993)	16
Côte d'Ivoire (1993)	10	**ASIA**	
Malawi (1994/95)	16	Indonesia (1989)	12
Tanzania (1993)	13	Malaysia (1989)	29
ASIA		Viet Nam (1993)	12
Indonesia (1989)	15	**LATIN AMERICA**	
Laos (1993)	11	Argentina (1991)	33
Viet Nam (1993)	15	Brazil (1985)	17
LATIN AMERICA		Chile (1982)	22
Brazil (1985)	14	Colombia (1992)	27
Chile (1982)	25	Uruguay (1989)	37
Colombia (1992)	23		
Mexico (1992)	14		
Uruguay (1989)	33		
Madagascar 1993	10	Madagascar 1993	17
Madagascar 1997	14	Madagascar 1997	17

Sources: World Bank (1996), authors' calculations.

Table 1.A10. **Gross and Net Enrolment Rates and Private and Female Shares in Enrolments,** by Expenditure

	Expenditure quintile					All
	1 (poorest)	2	3	4	5 (richest)	
Primary						
Gross enrolment rate[a]	0.48	0.70	0.75	0.87	1.08	0.73
Net enrolment rate[b]	0.33	0.49	0.51	0.62	0.72	0.51
% female[c]	0.5	0.51	0.5	0.49	0.5	0.50
% private[d]	0.17	0.12	0.18	0.26	0.45	0.23
Secondary						
Gross enrolment rate[a]	0.03	0.07	0.10	0.23	0.49	0.17
Net enrolment rate[b]	0.02	0.06	0.08	0.19	0.36	0.13
% female[c]	0.45	0.45	0.44	0.5	0.48	0.48
% private[d]	0.38	0.18	0.27	0.35	0.53	0.42

Notes:
a) All primary or secondary enrolments as a share of the number of primary or secondary age children.
b) Enrolments of primary or secondary age children as a share of the number of primary or secondary.
c) Share of girls in total enrolment.
d) Share of private enrolment in total enrolment.

Source: Glick *et al*. (2000).

Table 1.A11. **Rural and Urban Enrolment Rates by Expenditure Quintile**

	Rural			Urban		
	1 (poorest)	5 (richest)	all	1 (poorest)	5 (richest)	all
Primary						
Gross enrolment rate	0.44	0.90	0.65	0.95	1.32	1.17
Net enrolment rate	0.3	0.61	0.46	0.63	0.86	0.78
% female	0.5	0.48	0.50	0.5	0.51	0.49
% private	0.14	0.25	0.18	0.16	0.78	0.40
Secondary						
Gross enrolment rate	0.02	0.22	0.09	0.18	0.88	0.52
Net enrolment rate	0.02	0.18	0.08	0.11	0.57	0.38
% female	0.44	0.48	0.48	0.47	0.46	0.47
% private	0.28	0.43	0.33	0.23	0.62	0.49

Note:
Expenditure quintiles are calculated separately for rural and urban samples.

Source: Glick *et al. (*2000).

Table 1.A12. **Rates of Reported Illness / Injury and Treatment by Expenditure Quintile**

	Expenditure quintile					All
	1 (poorest)	2	3	4	5 (richest)	
Percentage reporting recent[a] illness or injury	0.10	0.13	0.14	0.15	0.17	0.14
of which: percentage consulting Health care provider	0.34	0.32	0.34	0.41	0.45	0.38
of which: percentage consulting:[b] Formal care:						
Hospital	0.36	0.17	0.19	0.21	0.18	0.21
Basic health care facility[c]	0.36	0.55	0.52	0.48	0.39	0.46
Doctor, private clinic, or pharmacy	0.14	0.15	0.22	0.20	0.35	0.23
All formal care	0.85	0.87	0.93	0.88	0.92	0.90
Informal care (traditional healer)	0.15	0.13	0.07	0.12	0.08	0.10

Notes:
a) In the two weeks preceding the survey.
b) refers to first type of treatment sought.
c) Includes *Dispensaire, Post sanitaire, Poste d'infirmerie* and *CSSP*.

Source: Glick *et al.* (2000).

Table 1.A13. **Rates and Type of Treatment of Ill / Injured Individuals**
by Region and Expenditure Quintile

	Rural			Urban		
	1 (poorest)	5 (richest)	all	1 (poorest)	5 (richest)	All
Percentage of ill/injured consulting a health care provider	0.33	0.37	0.34	0.38	0.61	0.53
of which: percentage consulting:						
Formal care:						
Hospital	0.40	0.19	0.20	0.36	0.17	0.22
Basic health care facility	0.34	0.41	0.48	0.34	0.35	0.38
Doctor, private clinic, or pharmacy	0.10	0.29	0.19	0.25	0.45	0.35
All formal care	0.85	0.89	0.88	0.96	0.98	0.95
Informal care (Traditional healer)	0.15	0.12	0.12	0.05	0.03	0.05

Notes:
See notes to previous table.
Expenditure quintiles are calculated separately for rural and urban samples.

Source: Glick *et al.* (2000).

Table 1.A14. **Children 6-12. Primary School Choice Nested Logit Model Estimates**

	Public School			Private School		
Variable	Coefficient	t-Statistic		Coefficient	t-Statistic	
Intercept	-3.948	-3.355	***	-4.5017	-3.303	***
School variables:[a]						
price*quartile1	-0.019	-3.491	***	-0.0110	-2.951	***
price*quartile2	-0.008	-2.683	***	-0.0054	-1.94	*
price*quartile3	-0.005	-1.756	*	-0.0030	-1.325	
price*quartile4	-0.001	-0.272		0.0022	1.174	
Distance (km)	-0.689	-2.877	***	0.4445	1.347	
Share classrooms	-0.803	-3.304	***	0.3829	1.164	
Window condition	0.983	2.405	**	-0.0807	-0.215	
Building condition	0.241	1.393		-0.2645	-0.565	
Household exp. per capita/100	0.011	1.165		0.0119	0.928	
Age	0.333	3.587	***	0.2949	3.158	***
Female	0.139	0.93		0.0001	0	
No. of children	-0.001	-0.026		-0.1651	-1.619	*
No. of adults	0.219	2.656	***	0.4128	3.852	***
Mother primary	0.748	2.875	***	0.3736	0.873	
Mother Secondary or higher	1.748	2.925	***	1.6755	2.138	**
Mother education missing	-0.482	-0.619		--	--	
Father primary	0.713	2.665	***	1.6127	3.049	***
Father secondary or higher	2.124	3.302	***	3.4345	3.975	***
Father education missing	0.274	0.595		1.0912	1.129	
Fianarantsoa	-1.158	-2.719	***	-0.9385	-1.655	*
Toamasina	0.532	2.036	**	0.6630	1.232	
Toliara	-0.160	-0.524		-1.2880	-2.111	**
Mahajanga	0.253	0.926		-1.1258	-1.249	
Antsiranana	0.827	2.322	**	0.6293	0.743	
Sigma	0.765	3.858	***	0.7650	3.858	***
No. of observations = 1 820						

Notes:
Base choice is non-enrolment. For province (Faritany) dummy variables, Antananarivo is the excluded category.
a) school cost variables: price*quintile *j* = annual school cost divided by 100 if the expenditure.
per capita of the individual's household falls in the *j*th quartile, zero otherwise.
* significant at 10 per cent; ** significant at 5 per cent; *** significant at 1 per cent.

Source: Glick *et al.* (2000)

Table 1.A15. **Primary School Price Elasticities,**
by Expenditure Quartile

	Public School				Private School	
	Public Available Sample (n=1784)		Public and Private Available Sample (n=504)		Public and Private Available Sample (n=504)	
Quartile	Own Price Elasticity[a]	Cross Price Elasticity[b]	Own Price Elasticity[a]	Cross Price Elasticity[b]	Own Price Elasticity[c]	Cross Price Elasticity[d]
1 (Poorest)	-0.51	0.10	-0.88	0.54	-1.14	0.25
2	-0.22	0.05	-0.37	0.29	-0.77	0.17
3	-0.12	0.03	-0.19	0.18	-0.41	0.13
4 (Richest)	-0.03	0.01	-0.05	0.04	0.34	-0.27
All	-0.25	0.06	-0.38	0.26	-0.41	0.04

Notes :
Computed from nested logit parameter estimates and data using analytical derivatives.
Elasticities are computed for each observation; table shows overall sample and quartile means.
a) elasticity of public school probability with respect to public school price.
b) elasticity of private school probability with respect to public school price.
c) elasticity of private school probability with respect to private school price.
d) elasticity of public school probability with respect to private school price.

Source : Glick *et al.* (2000).

Table 1.A16. **Children 12-18. Determinants of Secondary School Enrolment**

	All Children 12-18			Primary Completers only		
Variable	Coefficient	t-statistic		Coefficient	t-statistic	
Intercept	-0.354	-0.693		5.725	6.247	***
Distance to lower secondary school (km)	-0.062	-6.338	***	-0.066	-5.213	***
Distance to upper secondary school (km)	-0.002	-1.249		0.000	-0.115	
Paved road in village	0.337	2.980	***	0.704	3.904	***
Female	-0.119	-1.059		-0.387	-2.203	**
Age	-0.079	-2.751	***	-0.329	-6.529	***
Household expenditure per capita/10 000	0.000	1.309		0.000	0.047	
No. of children < 5	-0.121	-2.202	**	0.002	0.022	
No. of children 5-14	0.027	0.762		0.082	1.439	
No. of males 15-20	0.030	0.496		-0.056	-0.616	
No. of females 15-20	0.161	2.235	**	0.183	1.603	
No. of males 21-65	0.133	2.126	**	0.021	0.198	
No. of females 21-65	-0.010	-0.142		-0.045	-0.404	
No. of adults > 65	0.002	0.014		-0.030	-0.168	
Mother primary	0.482	4.059	***	-0.197	-0.958	
Mother secondary or higher	1.363	6.461	***	0.398	1.192	
Mother education missing	-0.586	-1.404		-0.727	-1.230	
Father primary	0.178	1.358		0.073	0.340	
Father secondary or higher	1.120	6.212	***	0.806	2.832	***
Father education missing	0.366	1.344		0.054	0.112	
Fianarantsoa	-0.381	-2.528	**	-0.636	-2.794	***
Toamasina	0.031	0.185		-0.069	-0.280	
Toliara	-0.082	-0.432		-0.456	-1.613	
Mahajanga	-0.011	-0.068		0.259	0.938	
Antsiranana	0.359	2.082	**	0.373	1.361	
No. of observations	1 979			480		

Notes:
Estimates of probit model for current enrolment in secondary school.
The excluded province (Faritany) category is Antananarivo.
* significant at 10 per cent; ** significant at 5 per cent; *** significant at 1 per cent.
Source: Glick *et al*. (2000).

Table 1.A17. **Adults: Health Care Provider Choice Nested Logit Model Estimates**

	Provider								
	Hospital			Basic Care			Private Formal Care		
Variable	Coefficient	t-Statistic		Coefficient	t-Statistic		Coefficient	t-Statistic	
Intercept	-12.138	-3.373	***	-1.374	-1.552		-14.025	-2.835	***
Provider cost:[a]							0.033	1.060	
price*quartile1	-0.050	-2.157	**	-0.143	-3.338	***	--	--	
price*quartile2	-0.013	-1.181		-0.097	-3.191	***	--	--	
price*quartile3	-0.030	-1.126		-0.066	-2.802	***	--	--	
price*quartile4	-0.027	-1.994	**	-0.028	-2.236	**	--	--	
Provider Characteristics:[b]									
Doctor	0.596	1.140		0.026	0.138		3.845	2.552	**
Free malaria medicine	-0.263	-0.786		0.438	2.388	**	-0.808	-0.827	
Free antibotics	-0.096	-0.249		-0.091	-0.394		-1.180	-0.957	
Free vaccines	3.634	3.243	***	-0.264	-1.270		0.473	0.810	
Refrigerator	-2.825	-3.470	***	0.005	0.020		1.093	1.234	
Electricity	0.938	1.794	*	0.421	1.363		-0.127	-0.179	
Provider variables missing	0.326	0.932		-0.684	-1.841	*	2.346	3.327	***
Household expenditure per capita/10 000	0.007	1.552		0.003	0.733		0.016	3.434	***
Age	-0.005	-0.550		-0.014	-2.090	**	-0.012	-1.284	
Female	-0.229	-0.788		-0.161	-0.797		-0.097	-0.352	
Years schooling	0.056	1.249		0.018	0.489		0.066	1.393	
Duration of illness	0.222	1.978	**	-0.004	-0.040		0.193	1.639	
No. of children in household	0.078	1.006		0.082	1.354		0.197	2.241	**
No. of adults in household	0.244	3.076	***	0.070	0.993		0.114	1.316	
Sigma	0.870	5.581	***	0.870	5.581	***	0.870	5.581	***
No. of observations = 1 229									

Notes:
Model also includes dummy variables for region (Faritany) and season.
a) For hospital and basic care, price*quintilej = cost per visit/100 if the expenditure per capita of the individual's household falls in the jth quartile, zero otherwise. For private care, cost is entered linearly.
b) Provider characteristics are coded as follows: doctor and malaria, antibiotic, and vaccine availability: 1= never, 2 = part of the time, 3 = always available or present; refrigerator and electricity: 1 =present, 0 = not present.
* significant at 10 per cent; ** significant at 5 per cent; *** significant at 1 per cent.

Source: Glick *et al.* (2000).

Table 1.A18. **Children under 15: Health Care Provider Choice Nested Logit Model Estimates**

	Provider								
	Hospital			Basic Care			Private Formal Care		
Variable	Coefficient	t-Statistic		Coefficient	t-Statistic		Coefficient	t-Statistic	
Intercept	-21.094	-2.902	***	-1.893	-0.663		-9.461	-2.165	**
Provider cost/100	0.015	0.601		-0.068	-2.327	**	-0.041	-1.089	
Distance (km)	-0.002	-0.143		-0.108	-2.362	**	-0.196	-1.503	
Distance missing	0.122	0.103		1.896	1.325		3.389	1.364	
Provider Characteristics:									
Doctor	-0.026	-0.024		0.804	1.814	*	1.119	1.182	
Free malaria medicine	0.091	0.152		0.583	1.687	*	0.265	0.277	
Free antibiotics	1.265	1.715	*	-0.670	-1.434		-1.413	-1.009	
Free vaccines	5.176	2.717	***	-0.962	-2.255	**	1.420	1.510	
Refrigerator	-1.680	-1.407		1.989	2.903	***	-0.705	-0.543	
Electricity	0.224	0.261		-0.472	-0.687		1.938	1.690	*
Provider variables missing	0.463	0.460		-2.135	-1.574		-2.967	-1.180	
Household expenditure per capita/10 000	0.001	0.105		-0.006	-0.573		0.004	0.453	
Age	-0.318	-2.017	**	-0.212	-1.497		-0.334	-2.043	**
Female	1.322	1.455		1.001	1.243		0.369	0.445	
Duration of illness	-0.055	-0.093		-0.011	-0.022		0.594	1.056	
Household head schooling	0.370	1.937	*	0.290	1.601		0.387	1.913	*
No. of children in household	-0.342	-1.068		-0.643	-1.860	*	-0.471	-1.397	
No. of adults in household	0.864	1.877	*	0.671	1.541		0.901	1.885	*
Sigma	0.261	2.032	**	0.261	2.032	**	0.261	2.032	**
No. of observations = 828									

Notes:
Model also includes dummy variables for region (Faritany) and season.
* significant at 10 per cent; ** significant at 5 per cent; *** significant at 1 per cent.

Source: Glick *et al*. (2000).

Table 1.A19. **Adult Health Care Price Elasticities by Expenditure Quartile**

	Hospital			Basic Care		
Quartile	Hospital*	Basic Care	Private Formal Care	Hospital	Basic Care*	Private Formal Care
1	-0.19	0.14	0.05	0.08	-0.63	0.03
2	-0.05	0.06	0.01	0.05	-0.56	0.03
3	-0.16	0.05	0.01	0.06	-0.31	0.03
4	-0.21	0.05	0.01	0.04	-0.17	0.02
All	-0.17	0.07	0.02	0.05	-0.36	0.03

Notes:
Starred (*) columns show own (direct) price elasticities; other columns show cross elasticities.
Computed from nested logit parameter estimates and data using analytical derivatives.

Source: Glick *et al.* (2000).

Table 1.A20. **Estimation of a Cobb-Douglas Type Pseudo Function of Agricultural Output**

Family labour (log) (*)	+0.521	(0.081)
Land area farmed (log)	+0.274	(0.018)
Value of equipment (log)	+0.036	(0.010)
Value of livestock (log)	+0.049	(0.005)
Average education of econ. active members	+0.020	(0.007)
Irrigation	+0.251	(0.056)
Ownership	+0.223	(0.046)
Cash crops	+0.592	(0.122)
Rural area	+0.179	(0.065)
Region 1	+0.025	(0.079)
Region 2	+0.292	(0.085)
Region 3	-0.017	(0.078)
Region 4	+0.162	(0.085)
Region 5	-0.197	(0.084)
GDP/cap. in district	+0.161	(0.021)
Constant	+4.400	(0.455)
R^2	0.460	
Over-identification	21.005	0.1015
Durbin-Wu-Hausman	11.020	0.0001
Sample size	2 904	

Note:
Standard deviations appear in parentheses.
The dependent variable is the logarithm of the gross operating surplus.
(*): Variable instrumented by household structure (by age and sex) and by age of the household head.
Source: EPM93; estimations: Cogneau and Robilliard (2000).

Table 1.A21. **Returns to Education in the Informal and Formal Sectors**

	Informal Sector Hourly Earnings (Household Level)		Formal Sector Hourly Wage (Individual Level)	
Education[a]	+0.103	(0.008)	+0.116	(0.004)
Experience[a]	+0.009	(0.009)	+0.068	(0.007)
(Experience)²/1 000	-0.076	(0.110)	-0.001	(0.000)
Male			+0.188	(0.047)
Sex of household head	+0.184	(0.056)	+0.084	(0.049)
Informal equipment	+0.043	(0.012)		
Urban area	+0.041	(0.063)	+0.045	(0.056)
Region 1	-0.658	(0.092)	-0.188	(0.073)
Region 2	-0.753	(0.106)	-0.241	(0.091)
Region 3	-0.544	(0.099)	+0.060	(0.082)
Region 4	-0.383	(0.114)	-0.142	(0.088)
Region 5	-0.252	(0.108)	-0.115	(0.087)
GDP/cap. in district	+0.431	(0.207)	+0.473	(0.166)
Constant	+5.325	(0.215)	+3.583	(0.155)
R^2	0.127		0.413	
Size of sample	2 605		1 196	

Notes:
Formal sector employment is defined as wage employment in a private or public enterprise or in government service.
Informal sector employment is defined as all other non-agricultural employment, particularly employment in a non-agricultural family business.
Standard deviations appear in parentheses.
a) Average for the economically active members in the cases of education and experience.

Sources: EPM93; estimations: Cogneau and Robilliard (2000).

Table 1.A22. **Effect of Disability on Hourly Earnings and Working Hours, by Sex (Heckit)**

	Hourly earnings				Working hours			
	Men		Women		Men		Women	
Constant	-1.5972**	(0.1532)	-1.4968**	(0.1811)	+3.7128**	(0.0882)	+3.5705**	(0.1223)
Age	+0.0758**	(0.0122)	+0.0634**	(0.0108)	+0.0047	(0.0072)	-0.0197**	(0.0075)
Age2 (10^{-3})	-0.7450**	(0.1465)	-0.6420**	(0.1362)	-0.0963	(0.0864)	+0.2234**	(0.0953)
No. years of schooling	+0.0922**	(0.0042)	+0.1057**	(0.0051)	-0.0126**	(0.0025)	-0.0089**	(0.0035)
Composite disability indicator	-0.0668**	(0.0194)	-0.0309*	(0.0182)	-0.0068	(0.0115)	-0.0068	(0.0125)
Informal sector	-0.4239**	(0.0429)	-0.7485**	(0.0508)	+0.0203	(0.0249)	-0.1222**	(0.0332)
Wage employment	-0.4305**	(0.0421)	-0.5790**	(0.0460)	+0.1550**	(0.0242)	+0.0988**	(0.0299)
Mills ratio related to activity	-0.2027**	(0.0696)	-0.2352*	(0.1267)	+0.0185	(0.0413)	+0.4128**	(0.0892)
Adjusted R^2	0.3269		0.3863		0.0389		0.0418	
Fisher	180.81		183.38		16.49		15.09	
No. of observations	2 592		2 028		2 680		2 259	

Notes:
Survey coverage: population 20 years and older in Antananarivo.
** significant at the 5 per cent level; * significant at the 10 per cent level; no asterisk(s): not significant at the 10 per cent level. Standard deviations appear in parentheses.

Sources: SET97/MADIO survey, authors' calculations.

Table 1.A23. **Estimation of Hourly Earnings and Working Hours: Double Least Squares Adjusted for Selectivity Bias**

	Hourly Earnings	Working Hours
Constant	-4.4627	+2.8708
	(3.7721)	(2.8274)
Age	+0.0309	-0.0104
	(0.0219)	(0.0143)
Age2	-0.2493	+0.0845
	(0.2698)	(0.1761)
Education	+0.0979**	+0.0007
	(0.0119)	(0.0078)
Sex	-0.0890	+0.1439
	(0.29417)	(0.2137)
Height (instrumented)	+0.0181[13%]	+0.0058
	(0.0121)	(0.0189)
Informal sector employment	-0.5221**	+0.0124
	(0.1018)	(0.0660)
Formal sector wage employment	-0.3761**	+0.1009*
	(0.0968)	(0.0619)
Mills ratio	+0.1695	-0.0013
	(0.1297)	(0.0854)
Adjusted R^2	0.3246	0.0395
Fisher	25.391	3.238
No. of observations	406	433

Notes:
Survey coverage: population 20 years and older in Antananarivo.
Standard deviations appear in parentheses.
Height is instrumented by a series of variables: type of housing, household size, ethnic group, occupation of father and mother, education of father and mother when the individual was 15 years old.
** significant at the 5 per cent level; * significant at the 10 per cent level.

Sources: SET97/MADIO survey, authors' calculations.

Table 1.A24. **Effect of Nutritional Problems on Duration of Schooling**

	No. of Years of Schooling	
Constant	+0.2297	(2.8567)
Male	+0.3828	(0.2930)
Age	-0.0360**	(0.0085)
Height	+3.3084*	(1.8288)
Not born in capital city	+0.5999**	(0.2571)
Father's education	+0.3231**	(0.0561)
Mother's education	+0.4066**	(0.0416)
Father had wage employment when individual was 15 years old	+0.4374*	(0.2608)
Mother had wage employment when individual was 15 years old	-0.5176**	(0.2385)
Adjusted R^2	0.3615	
Fisher	40.483	
No. of observations	558	

Survey coverage: population 20 years and older in Antananarivo.
Standard deviations appear in parentheses.
** significant at the 5 per cent level; * significant at the 10 per cent level.

Sources: SET97/MADIO survey, authors' calculations.

Table 1.A25.**Estimation of Inter-generational Model of Schooling**

	Child's Schooling	
	Univariate Probit	Bivariate Probit
Constant	+0.6810* (0.0892)	+1.3203* (0.0841)
Sex of child	+0.0300 (0.0750)	+0.0200 (0.0595)
Poverty of household	-0.7170* (0.0832)	-1.7717* (0.1008)
Father's level of schooling	+0.6174* (0.0767)	+0.4511* (0.0650)
Correlation among unobservable factors of schooling and poverty	-	+0.8036* (0.0908)
N	1 338	
Avg. log-likelihood	-0.5624	-1.2016

Survey coverage: Children 10 to 13 years old.
* coefficient significantly different from 0 at the 1 per cent level.

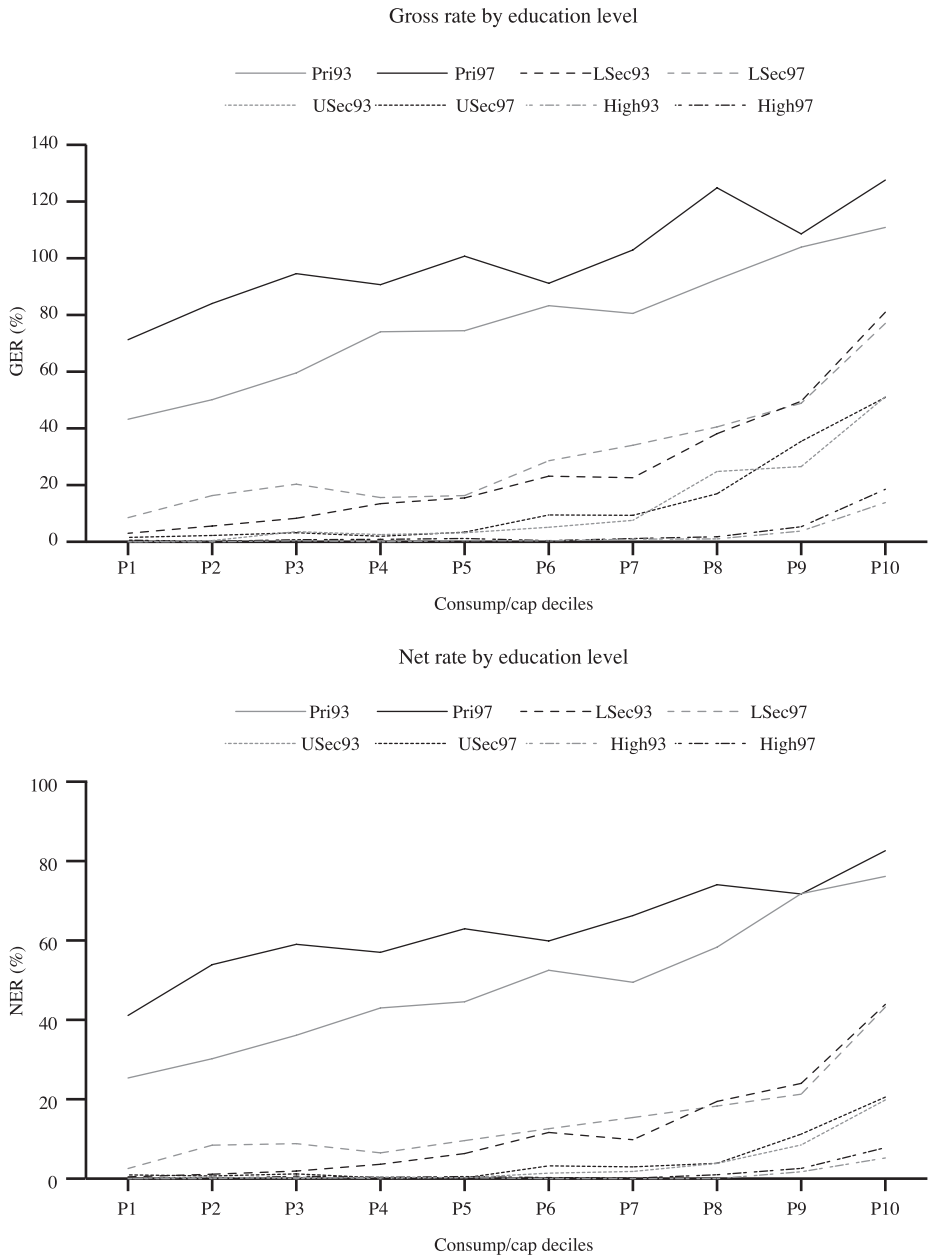
Table 1.A26. **Transition Matrix**

Destination Origin	Uneducated Poor	Educated Poor	Uneducated Non-poor	Educated Non-poor	*All*
Uneducated poor	36.2	26.5	14.6	22.7	*100*
Educated poor	19.6	39.0	7.9	33.5	*100*
Uneducated non-poor	17.3	40.7	7.0	35.0	*100*
Educated non-poor	6.7	48.7	2.7	41.8	*100*

Figure 1.A1. **Enrolment Rates by Age, 1993 and 1997**

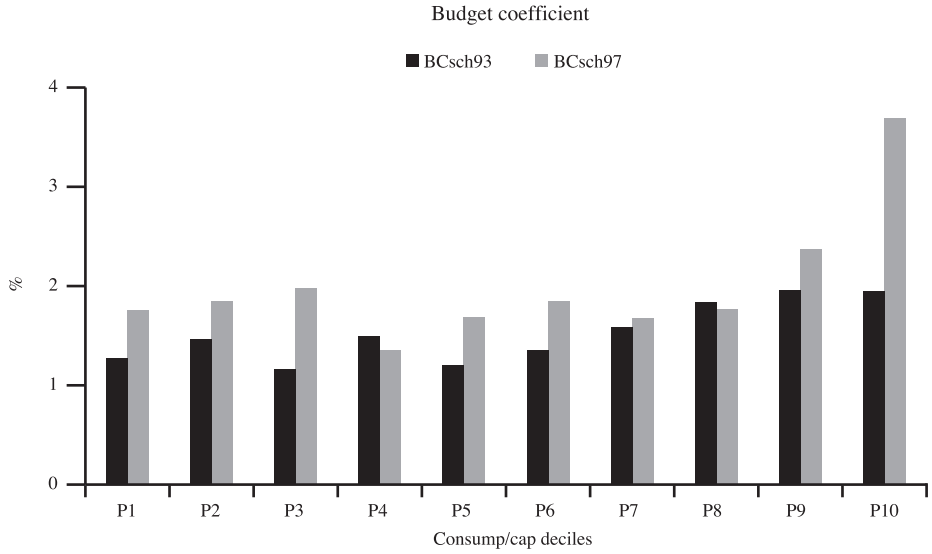
Source: EPM93, EPM97, INSTAT, authors' calculations.

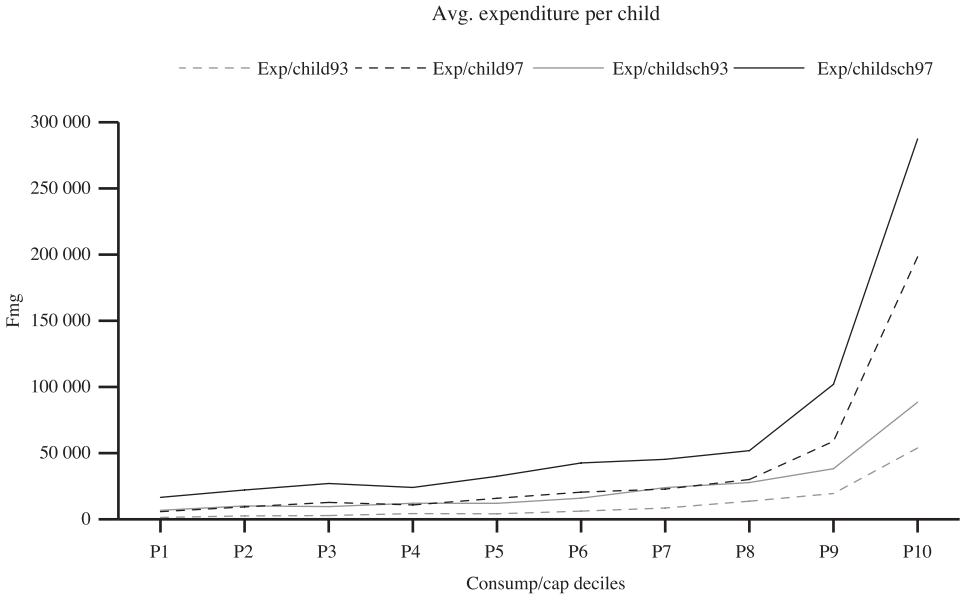
Figure 1.A2. **Enrolment Rates by Consumption Decile, 1993 and 1997**



Source: EPM93, EPM97, INSTAT, authors' calculations.

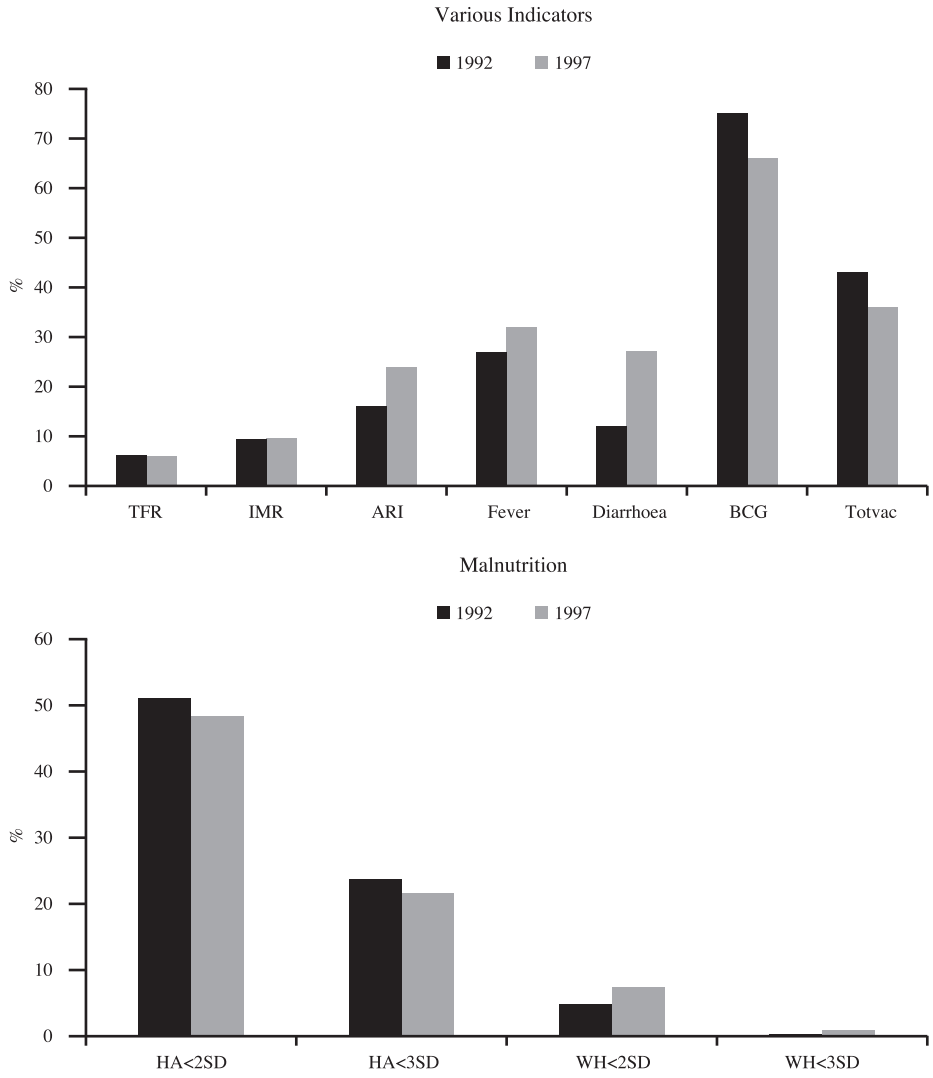
Figure 1.A3. **School-Related Expenditures by Consumption Decile, 1993 and 1997**





Source: EPM93, EPM97, INSTAT, authors' calculations.

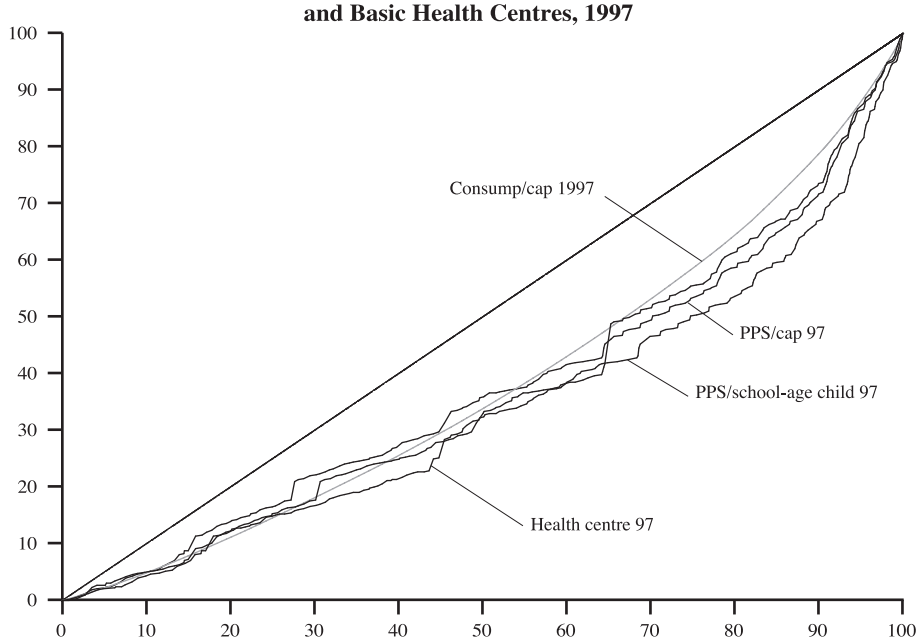
Figure 1.A4. **Change in Health Indicators in Madagascar between 1992 and 1997**



Note: TFR: total fertility rate. IMR: infant mortality rate (per 10 000). ARI: acute respiratory infection.
BCG: proportion of children with BCG vaccinations. Totvac: all vaccinations (BCG, polio, measles, DPT).
HA: height for age (stunting). WH: weight for height (wasting). <2SD: less than 2 standard deviations of the reference population (and similarly for <3SD).

Source: EDS92, EDS97.

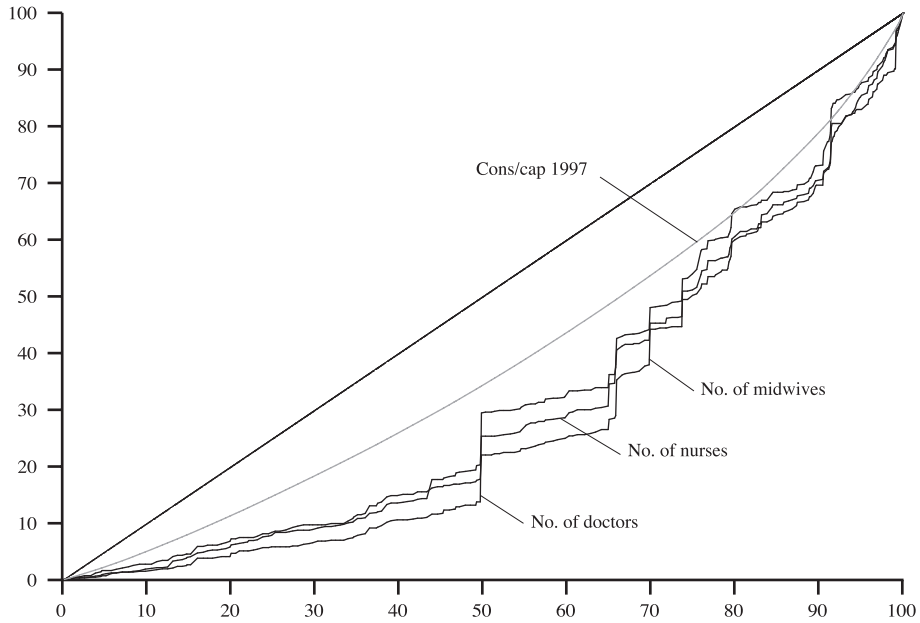
Figure 1.A5. **Concentration Curve of Public Primary Schools and Basic Health Centres, 1997**



Note: This curve was constructed on the basis of the information available for 231 areas surveyed in 1997 (EPM97 and EC97) that are representative of the country as a whole. The same curve was constructed for 1993, but owing to problems with the data, only 198 areas could be used. We therefore cannot compare the two years. Areas are classified by calculating the average per capita consumption of their inhabitants. The curves represent supply (the existence and concentration of infrastructure) with respect to the population; they do not represent user attendance rates. The PPS/school-age child curve considers the number of children of primary school age instead of the total population in each area.

Source: Community survey (EC) 1997, EPM97, INSTAT, authors' calculations.

Figure 1.A6. **Concentration Curve for Medical Personnel, 1997**

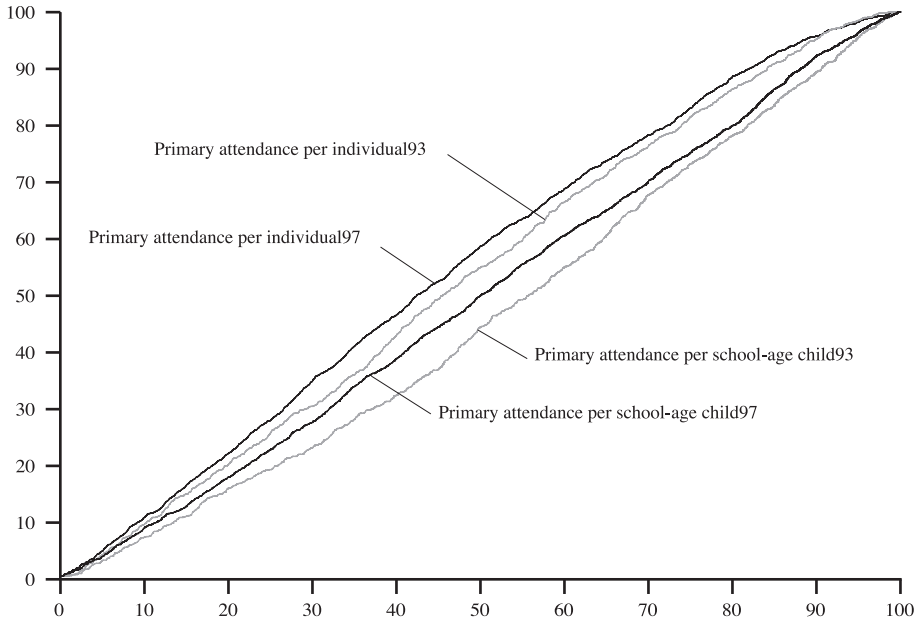


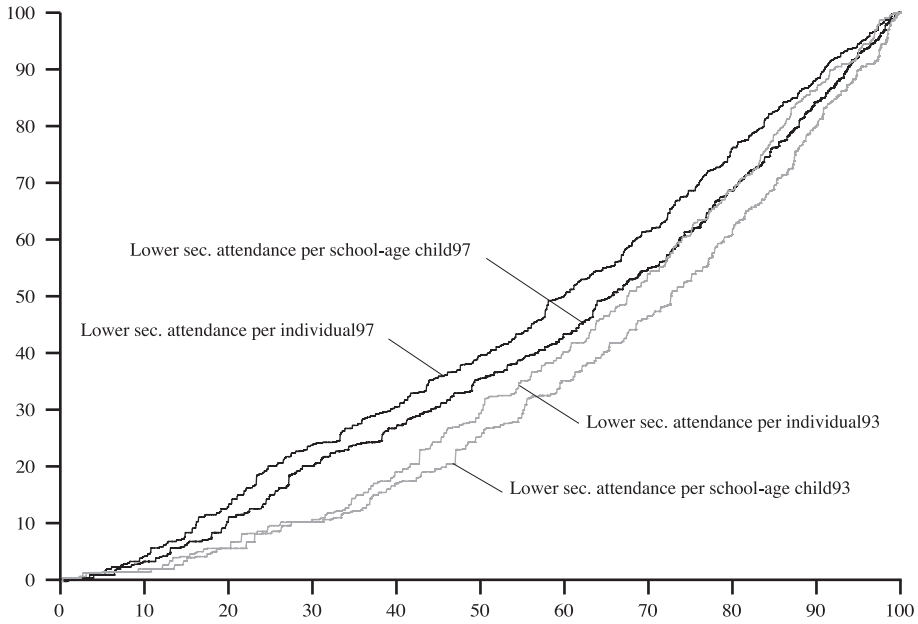
Note: This curve was constructed on the basis of information supplied in 246 areas surveyed (EPM97 and EC97). Areas were classified by calculating the average per capita consumption of their inhabitants. The medical personnel considered are the staffs of the two main health care facilities identified in the area. Since health facilities are much more numerous in richer areas (the average number is 1.7 for the poorest quintile and 2.6 for the richest), and hospitals are located in cities, the actual distribution is even more inegalitarian than that reflected by this curve.

Source: Community survey (EC) 1997, EPM97, INSTAT, authors' calculations.

Figure 1.A7. **Concentration Curve of Spending on Primary and Lower Secondary Education, 1993 and 1997**

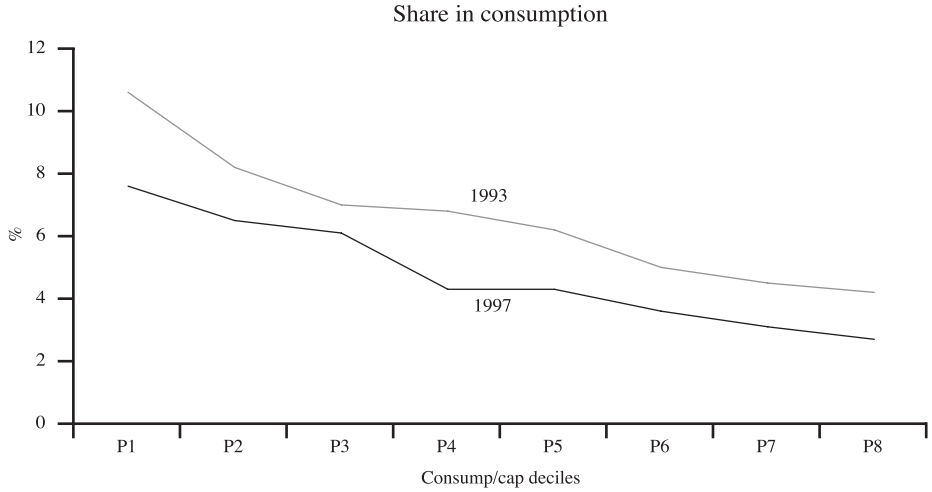
Spending per school-age child





Source: EPM93, EPM97, INSTAT, authors' calculations.

Figure 1.A8. **Social Spending, Consumption and Poverty, 1993 and 1997**



Note: National poverty line based on minimum calorie intake.
Interpretation: in 1997, public health and education spending in favour of the richest households was equivalent to 2 per cent of their consumption. If this spending were added to private household consumption, the incidence of poverty would be only 68.3 per cent.
Source: EPM93, EPM97, budget data, authors' calculations.

Appendix II

Survey Data Used

The main data sources for a study of Madagascar's poverty profile are the two Living Standard Measurement Surveys, EPM93 and EPM97 (EPM = *Enquête permanente auprès des mènages*. The former provides national coverage of 4 508 households and on 12 detailed themes; EPM97 surveyed 6 350 households. In parallel with these two surveys, two "community surveys" (EC93 and EC97) (EDS = *Enquêtes démographiques et de santé*) were administered to the primary survey units, collecting information on infrastructure, markets, social sectors and the needs of the population in the areas surveyed. Other surveys that provide information on households include the Budget-Consumption surveys of rural and urban households in 1978, household surveys in the capital city, the national Demographic and Health Surveys (EDS92 and EDS97) and the General Census of the Population and Housing (RGPH-1993). The chapter also uses data from the MADIO project (see MADIO documents in the Bibliography) and from the Ministry for Secondary and Elementary Education (MINESEB).

Appendix III

Poverty Lines and Indicators of Monetary Poverty

Where long-term trends are concerned (Table 1.1), the concept of poverty used is based on total expenditure by the household, since the work of Pryor (1990) does not enable us to reconstruct expenditure per capita or per adult-equivalent. For 1962, the so-called Pryor poverty line corresponds to a total expenditure of Fmg 47 200. For the other years, this line has been discounted using the inflation rate observed in Antananarivo. The corresponding poverty indicator is the percentage of households whose total real expenditure lies below this line. It must be emphasised that the corresponding data are deeply flawed. For 1962, they stem from two surveys, one in rural areas, the other in the country's seven large cities; mid-sized cities are excluded. The survey for 1980 excludes the six largest urban centres. There is thus some doubt as to whether the data are statistically representative. Moreover, the living standards variable is imprecisely defined. Pryor's work thus leads to estimations that are extrapolated from the household income distribution by income bracket. The poverty indicators provided by Essama-Nsah are even more doubtful, since they are based on a parameter adjustment (beta distribution). In addition, the definition of monetary poverty is far from perfect, since the variable used is total household consumption instead of consumption per capita or per adult-equivalent.

In the rest of the text, we have used expenditure per capita, excluding durable goods but including allocated rent charges.

Two poverty lines were considered. The first, known as the national calorie-based poverty line, is based on a minimum food basket of 31 products, providing 2 133 kilocalories per day. This basket is then converted into a minimum food expenditure and econometrically extended to a minimum non-food basket. The national calorie-based poverty line for 1993 was worth Fmg 248 400. For 1997, this figure was discounted using the inflation rate observed in Antananarivo.

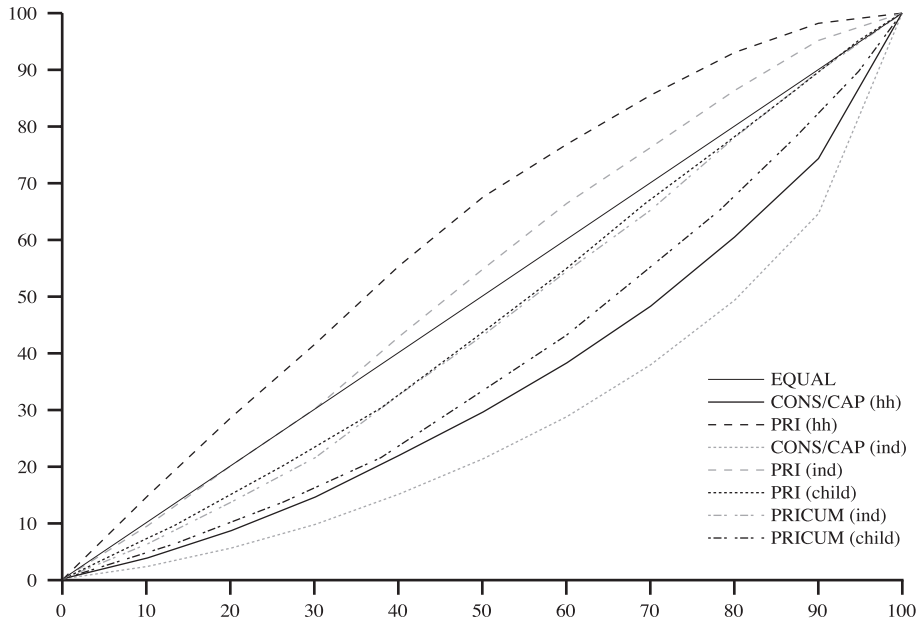
The second poverty line is the so-called extreme poverty line used by the World Bank for cross-country comparisons, namely $1 per person and per day (1985 dollars), converted using the purchasing power parity (PPP) exchange rate for the year under consideration. This method yields a poverty line of Fmg 306 626 for 1993. For 1997, this figure was discounted using the inflation rate observed in Antananarivo.

Appendix IV

Calculating Benefit Incidence: What Can Be Compared and What Conclusions Can Be Drawn?

Calculations of benefit incidence call for certain precautions, as they can easily lead to erroneous conclusions. First, the Lorenz curves of per capita consumption must be constructed at the individual level, not the household level. The reason is that the results obtained at household level underestimate the actual inequalities, since in most developing countries per capita consumption tends to decrease with household size. In an example involving primary school enrolment (see figure below), the first decile of households accounts for 3.6 per cent of total consumption and receives 14.6 per cent of public spending on primary education, whereas the corresponding figures for the first decile of individuals are only 2.2 per cent and 9.4 per cent respectively. Analysis at the individual level makes it possible to control for different sizes of household. Second, it may be judged preferable to relate spending to the population which is supposed to receive it, instead of to the population as a whole. This choice leads here to a rise in estimated inequalities because poor households have proportionally more school-age children, since the per capita income of households is an increasing function of the age of the household head (although this relationship is reversed for the oldest). Thus, first-decile households with primary school-age children receive only 7 per cent of the total allocation to primary education. Ultimately, in our example, if the analysis is conducted in terms of households, it leads to the conclusion that spending on primary education is progressive; if in terms of individuals, spending is found to be progressive only from the fourth decile up; and if in terms of school-age children, spending is found to be only relatively progressive, as shown by the figure below.

Figure 1.A9. **Concentration Curves of Public Spending on Primary Education According to Various Hypotheses**



Note: PRI (hh): primary school attendance by household decile. PRI (ind): primary school attendance by individual decile. PRI (child): primary school attendance by decile of school-age children. PRICUM (ind): total number of years of primary schooling by individual decile. PRICUM (child): total number of years of primary schooling by decile of school-age children. CONS/CAP (hh): Lorenz curve of consumption per capita by household decile. CONS/CAP (ind): Lorenz curve of consumption per capita by individual decile.
Source: EPM93, INSTAT, authors' calculations.

More generally, benefit incidence analysis as practised in the economic literature tends to overestimate the redistributive power of social spending. We mentioned above a *demographic reason* for this, but it is far from being the only reason. At least two other types of reasons are worth noting:

— *Budgetary reasons*: In general, it is assumed that each child in school receives the same allocation, at least within a given level (primary, secondary, etc.). There are two problems with this assumption. First, it is probable that public schools in disadvantaged locations (e.g. rural areas) receive less from the state than their counterparts in better-off areas. Often, owing to defective budgetary procedures, part of the appropriated funds never reach their destinations in the most remote areas, and a number of teaching positions are left vacant (see the second section of the chapter, "Provision of Health and Education Services"). Second, analysis by educational level implicitly assumes that the budgetary cost is the same for all grades within a given level (e.g. from the first to the seventh year of secondary education), whereas in fact this cost should increase with the

grade. Since poor people leave school earlier on the average, failure to take the grade attended into account leads to underestimation of inequalities. Although lack of adequate data prevents us from estimating the impact of the difference in allocation according to the location of the school, the EPM93 survey enabled us to demonstrate the impact of taking account of the grade attended, which appreciably reduces the estimated redistributive impact of education spending.

— *Dynamic reasons*: Benefit incidence analysis is based on school attendance in a given year, but individuals receive benefits from public spending in every year of their school careers, on the sole condition that they attend a public school. Here again, the average number of years of schooling, which is much higher for the wealthiest groups, greatly increases the cumulative benefit that individuals receive during their schooling. Hence the concentration curve obtained using the total number of years of schooling lies well below that which considers only attendance in the year of reference (see figure above).

A final point is worth mentioning. It is advisable to be cautious in drawing conclusions from incidence analysis, and not to try to make it say more than it means. For example, if in two countries the concentration curve of one "dominated" that of the other, one might be tempted to conclude that the former's education policy is more pro-poor than the latter's. However, such dominance could merely reflect the fact that in country 1 the wealthiest households have turned to the private sector owing to the mediocre quality of public education, or, in the event there are no private schools, that the rate of repetition of the poorest is systematically higher in country 1. As a result, if we differentiated the benefit received from attending school according to whether the pupil is in a "normal" school year or is repeating, the redistributive impact of public spending would be sharply reduced.

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Comments

Jean-Claude Berthélemy

On the whole, this chapter provides a good description of education and health policy issues in the context of the fight against poverty. The analysis thoroughly documents the impoverishment of Malagasy households over the last two decades — an increase in poverty that does have a significant monetary dimension, but that is also due to the obvious deterioration in the performance of public health and education policy. The first and second sections offer an excellent historical and institutional introduction to the facts of the problem, which is very helpful to understanding the full importance of education and health issues in Madagascar. The third section provides a persuasive analysis of the incidence of the implicit transfers effected through social policy, showing that these policies are ultimately not very progressive in Madagascar, despite the progress achieved in this respect from 1993 to 1997. The fourth presents a finely detailed study of behaviour relating to demand for education and health services, which makes it possible to simulate the impacts of changes in the environment of households which could be obtained through education and health policy initiatives. The fifth supplements this analysis through a fairly exhaustive examination of the complex interactions between the various types of investment in human capital, and between such investments and monetary poverty. The sixth and last section endeavours to point up the economic policy implications. All in all, this is a fairly comprehensive and high-quality work.

After reading the chapter, however, one is left with three types of question.

First, the econometric analysis of the determinants of school enrolment and consumption of health services is highly detailed, but at the same time, the complexity of the analysis detracts from the clarity of the message. This is mainly due to the fact that the fourth and fifth sections are not fully incorporated into the chapter. Whereas in the fourth section the authors undertake an analysis of school enrolment based on the costs of schooling and the socio-economic characteristics of the household, in the fifth they come back to this topic, estimating an inter-generational model of schooling in which the probability that a child will be enrolled in school depends on the education of his/her father and on the poverty of the household. The latter analysis yields an

interesting result regarding the relatively strong influence of income on the schooling of children, but this new approach seems to call into question the calculations performed in the fourth section. Under these circumstances, it is somewhat regrettable that the simulations of the effects of alternative policies (see below) are performed exclusively on the basis of the econometric results from the fourth section.

Similarly, the fifth section examines the interaction between health and education, showing that educational level influences demand for health services. These observations are very useful, but have not been fully integrated into the fourth section, even though the latter also introduces an effect of education on demand for health care. Similarly, in the fifth section children's health is observed to have an effect on their school performance, but in view of this, it may be asked whether children's state of health should not be factored into the analysis of behaviour concerning school enrolment: departures from the school system must be partly related to academic failure. One might add, moreover, that other observations[1] show that school performance is improved by attendance of a private school.Subsequently, in the simulations of various alternative policies (fourth section), what we have are partial results which are not comparable with one another, and which do not provide sufficient grounds for launching a new education and health policy. The authors present in succession the effects of a Fmg 1 000 increase in annual school fees, of improved school quality (elimination of classroom sharing), of expansion of the private school system (which is more efficient than the public system, but is unable to grow in the current cost situation unless it is subsidised). These simulations are obviously not comparable. It is regrettable that the authors did not try to quantify, even in approximate terms, the cost of the improvement in public schools that they consider in their simulations, nor to evaluate the cost of the subsidies needed to expand the private school system.

Along the same lines, the authors examine the consequences of a Fmg 1 000 increase in the cost of medical consultations, but this is the cost *per visit*, which is not commensurable with the Fmg 1 000 increase in the *annual* cost of schooling studied previously.

Under the circumstances, it is extremely difficult to combine the various simulations presented in such a way as to formulate an anti-poverty policy that is rational in economic terms.

Lastly, the other economic policy conclusions presented in the sixth section leave a number of questions unresolved. For example, the authors stress the importance of transport infrastructure, in order to reduce the cost of access to school and to health centres (they might have added, moreover, that upgrading such infrastructure could also help to reduce teacher absenteeism in rural areas, as teachers do not want to work in remote, hard-to-reach locations). The cost of such civil engineering work needs to be quantified, however, as does its contribution to other aspects of development and poverty reduction, such as improving conditions for the marketing of agricultural products. It is probably correct to say that the lack of transport infrastructure is an obstacle to poverty reduction in Madagascar, but this conclusion alone cannot lead to specific economic policy recommendations unless it is more rigorously quantified.

In the sixth section, the authors also rightly emphasise the importance of expanding rural education in order to promote the mobility of individuals between sectors, in a context where education has little impact on traditional agricultural output; but they provide little evidence in support of this contention concerning the Malagasy economy. Further research would be needed to give their argument a solid basis, and in view of the abundant survey data which the authors were able to gather for Madagascar, it should be feasible to conduct such an investigation.

Overall, this chapter provides a good deal of useful, original information on the microeconomic determinants of poverty in terms of access to health and education services. This information yields only partial conclusions as to the impact of public policy in these fields on poverty reduction, however, since basically the only quantifiable impact is the direct or "budgetary" impact, as shown in the benefit incidence analysis in the third section.

The chapter also provides a useful analytical grid relating to various policy initiatives that might be envisaged for the purpose of fighting poverty in Madagascar, but it enables us neither to compare the costs and benefits of these alternatives, nor to rank them.

Note

1. F. Arestoff and A. Bommier, "Efficacité relative des écoles publiques et privées à Madagascar : étude d'une période de restriction budgétaire", *Revue d'Économie du Développement,* 2001.

Chapter 2

Incidence of Public Spending in the Health and Education Sectors in Tanzania[1]

Sylvie Lambert and David Sahn

Introduction

Tanzania's GNP per capita in 1998 of $210, measured in current dollars, ranks it among the poorest countries in the world. While economic performance has rebounded somewhat from the rather dismal showing in the beginning of the decade, GDP per capita in the late 1990s has not yet reached the pre-crisis level of the early 1980s[2]. Measured in 1987 Tanzanian Shillings, GDP per capita was around Tsh 10 600 in 1980 and had recovered only to Tsh 9 900 by 1992. There has been much controversy over the roots of Tanzania's economic stagnation; few would disagree, however, that at least a large share of the blame rests on the misguided inward economic policies and excessive state control over markets[3]. More controversial is the fact that Tanzania's economy not only remains economically poor, but also has a distribution of income that is, like most African economies, quite inequitable — despite Tanzania's espousal of socialist ideals with the primary objective to improve social welfare through economic justice and opportunity for all. We calculate the Gini coefficient for expenditures per capita to be 0.39. The expenditure share of the bottom 10 per cent of the households is only 2.8 per cent, in contrast to 30.1 per cent for the top decile of the expenditure distribution. Other estimates of the Gini coefficient for per capita expenditures vary according to the data used between 0.41 (HRDS, 1993) to 0.62 (Household Budget Survey, 1991/92). The most recent, but not nationally representative, survey indicates that the Gini coefficient is 0.45 (Semboja *et al*., 1999). In total, these various estimates all point to a relatively high inequality level comparable to what can be observed in Madagascar[4]. The combination of a low national income, highly skewed, with a system of service delivery in the social sectors that is, at best, inadequate, helps establish Tanzania's living standards as among the worst performers in the world.

The poor in Tanzania share common characteristics with others impoverished in sub-Saharan Africa. The most current comprehensive poverty profile measures relative poverty based on the last national household survey data from 1991, and suggests that approximately 50 per cent of Tanzanians are poor[5]. Moreover, the World Bank estimates that 45.5 per cent of the population fall below the $2 per day poverty line (World Bank, 1998). Employing the Foster, Greer and Thorbecke (1984) class of poverty measures, poverty headcount, depth and severity indexes are highest in rural areas, where most Tanzanians reside, and lowest in the national economic capital, Dar es Salaam (see Table 2.1)[6]. Other findings from the poverty profile indicate that the poor spend around three-quarters of their income on food; and that poverty is worse in families where parents have less education, in larger households, and in households where the heads are engaged as non-wage, informal sector workers. There is no evidence that households headed by females were associated with higher risk of poverty than male-headed households. A non-representative survey of rural and peri-urban areas around Dar es Salaam in 1998 indicated that poverty was worse in households with higher dependency ratios. In addition, the probability of being poor increases with the age of the household head. In this survey, female-headed households were more likely to be poor only in rural areas. Poverty was also more closely associated with activities such as farming and petty trade, and less so with employment in civil service, the private sector, and in trades such as quarrying and masonry (Semboja *et al.*, 1999). In fact, survey data reveal that among those households in the bottom quintile of the income distribution, only 2.2 per cent were headed by members engaged in the public and parastatal wage sector, as opposed to over 16 per cent similarly engaged in the upper quintile (Sahn, Dorosh and Younger, 1997). Table 2.1 provides the most reliable poverty figures available. They are based on the 1991/92 Household Budget Survey.

Table 2.1. **Poverty Figures**

	Headcount	Poverty Gap Index	Poverty Severity Index
Dar es Salaam	5.6	1.2	0.6
Other Urban	41.1	13.1	5.8
Rural	51.8	15.1	7.1

Source: 1991/92 Household Budget Survey.

While reliable time series data are not available on money metric measures of poverty, a wealth index[7] derived from the Demographic and Health Surveys, conducted in 1991 and 1996, presents, possibly, the clearest picture of changes in economic welfare of the population. The advantage of these surveys is that the survey instrument, sampling, and survey methods were identical. The disadvantage is that the economic information contained therein is limited to data on a small number of assets. Nevertheless, this wealth index derived using factor analysis indicates that the number of poor fell from 39.6 to 33.1 per cent between 1991 and 1996. However, statistical test of stochastic dominance indicates that, for at least up to the third order, we cannot

reject the null that poverty remained the same between the two periods. Further disaggregation by rural and urban areas, however, does allow us to reject the null of no change in poverty in urban areas, where the headcount numbers fell from 10.1 to 5.9 per cent. Other attempts at assessing the evolution of poverty in the first half of the 1990s underscore that it has not changed monotonically. In fact, poverty seems to have decreased between 1991 and 1993, and thereafter increased between 1993 and 1995 (World Bank, 1996, Table A1.5).

Beyond the examination of economic well-being, a number of other indicators of living standards present a mixed picture of the country's failings and accomplishments. Table I.1 of the introductory chapter of this book presents some basic human development indicators in the four countries studied and Table 2.2 in this chapter adds some relevant information regarding Tanzania. Malnutrition shows no sign of change during the period 1991 to 1996: 42 per cent were chronically malnourished or stunted in the former period and 43 per cent in the latter — statistically, the same. Approximately 7 per cent were wasted or acutely malnourished during both surveys. The lack of improvement is found in both rural and urban areas (Sahn, Stifel and Younger, 1999). Despite this lack of improvement in nutritional status, we find that there has been a long-term secular decline in infant and child mortality from the early 1980s to the early to mid-1990s, with infant mortality rate falling from 101 per 1 000 live births in 1980 to 92 per 1 000 in 1997 (Table 2.2). However, the rate of improvement has been slow, as shown in Figures 2.A1 and 2.A2. Similarly, no reliable information is available on mortality rates during the past five years when AIDS has emerged as a major source of early death. In 1997, among its neighbouring countries, Tanzania's rate of AIDS infection of 281 per 100 000 was second only to Zambia (530 per 100 000), while the sub-Saharan Africa average was 111 per 100 000 (UNDP, 1999). These rates of infection have further increased over the last few years. According to the December 1998 report of the National AIDS Control Programme (NACP), the case rate reached 365 per 100 000 by the end of 1998 in Tanzania. This number masks considerable regional disparities, from a low 119 per 100 000 in the northern region of Mara to a high 989 per 100 000 in Mbeya. This latter number obviously testifies to the seriousness of the problem in this region but also reflects a better reporting of AIDS cases. It brings into question whether there is underreporting of AIDS cases in other regions. With the projection that 20 per cent of the mortality for Tanzania's population under five years of age will be from AIDS in the years 2000-2005, we can expect that at least some of the improvement in infant mortality observed during the past decades will be eroded. While we return to a more detailed discussion of the determinants of nutritional status in the fifth section of the paper, it is noteworthy that the marked improvement in immunisation rates that occurred during the 1980s levelled off in the 1990s. Despite slow progress in the reduction of infant and child mortality, life expectancy has fallen in recent years. From 52 years in 1981, and 54 years in the late 1980s, the life expectancy at birth fell to 47.9 years (one year below SSA average), nearly cancelling the progress made since the early 1970s when life expectancy reached 45.3 years (Table 2.2). This is due to the increased adult mortality rates since the early 1990s. This increase has been more rapid among males

than females (see Figure 2.A3). Indications are that the worsening mortality picture is due to the AIDS epidemic. Of the loss of six years of life expectancy observed between the late 1980s and the late 1990s, five years are attributable to the AIDS epidemic. This will not only contribute to worsening mortality rates for mothers and their children[8], but will create a generation of children orphaned or with critically ill parents[9]. Although no precise statistics are available to date, there is little doubt that AIDS is also a poverty-related disease. In particular, poverty is linked to living conditions (migration, homelessness, and sex trade) that may contribute to a higher incidence of promiscuous sexual behaviour. Furthermore, the loss of the most economically active members of the households to death from AIDS further aggravates the situation of the poorest households. In addition, gender disparity is sadly illustrated with young women (15 to 22) — whose social position does not allow them much say as to the conditions of their sexual activity — being more severely affected by the disease (World Bank, 2000).

Table 2.2. **Human Development Indicators**

Countries (HDI Rank in 1999)	Years	Tanzania, U. Rep. of (156)	All Developing Countries	Least Developed Countries	Sub-Saharan Africa
Life expectancy at birth	1970	45.3	54.5	43.4	44.1
(years)	1981	52	--	50	--
	1997	47.9	64.4	51.7	48.9
Infant mortality rate	1970	129	111	149	137
(per 1 000 live births)	1980	101	--	124	--
	1997	92	64	104	105
Population without access to	1975-80	39	--	--	--
safe water (%)	1990-97	34	28	41	50
Underweight children under	1975	25	40.21	--	--
age 5 (%)	1990-97	27	30.3	39	32
Adult literacy rate (%)	1970	37.1	47.73	29.68	--
	1980	79	--	40	--
	1997	71.6	71.4	50.7	58.5
Gross enrolment ratio for all	1980	44	46.5	31.6	--
Levels	1997	33	59	37	44
(% age 6-23)					
Real GDP per capita (PPP$)	1960	272	915	562	--
	1997	580	3240	992	1534

Source: UNDP, 1998 ; UNDP, 1999 and World Bank, 1983.

When we look at information on the success of Tanzania's long-term strategy to provide basic educational services for all children, we see some success. The adult literacy rate is one of the highest in sub-Saharan Africa, reaching 68 per cent in 1999, as compared to 58 per cent, the average in sub-Saharan Africa. This is an accomplishment inherited from the socialist policy conducted in the 1970s. Nevertheless,

despite a long-term overall increase since Tanzania achieved independence, the adult literacy rate reached a peak in the early 1990s (about 90 per cent in 1992) and has been declining steadily since (see Table 2.2). Adult literacy courses are available, and are attended by about 30 per cent of the adult illiterate population[10]. Roughly 3.2 million adults attended in 1996 (URT, MOEC, 1999*a*). However favourable these numbers may look, it will not be sufficient to stop the decline of the literacy rate. A look at gross enrolment rates also suggests that this trend is not likely to be reversed very quickly. There has been a decline in primary school attendance from the peak reached in the late 1970s. Secondary school enrolments have been increasing in absolute numbers but they remain below 7 per cent on mainland Tanzania. It is the lowest in sub-Saharan Africa. The data indicate that the gender bias against females is negligible at primary level but increases with higher levels of education. In fact, less than 20 per cent of those who attend tertiary school are females. Over the past 30 years, there has been a small improvement in the share of school attendees who are females, although this is limited to primary and secondary education. These enrolment figures are consistent with education attainment numbers derived from a comparison of the recent DHS surveys. Between 1991 and 1995, there was a 5 per cent decline in the share of females aged 15-49 not having attended any school. The improvement was limited to primary school education. This was true for women in both urban and rural areas (Sahn, Stifel and Younger, 1999). It is worth noting however that, among the bottom 35 countries in the HDI ranking, Tanzania displays the least gender disparity.

In sum, Tanzania's accomplishments in the social sector, like its economic performance, have been disappointing. It ranks 156 out of 174 according to UNDP's Human Development Index (UNDP, 1999)[11] This position has worsened since the beginning of the decade when it ranked 127 (1991) but is consistent with a GNP per capita of $210, which ranks 199 out of 210 countries for which data are available (World Bank, 1999)[12]. Tanzania's HDI rank is below that of Zambia and the Democratic Republic of Congo and far below that of Kenya, but Tanzania fares better, according to the HDI, than its other neighbours, Uganda, Malawi, Rwanda, Mozambique and Burundi.

Thus, given the urgency of improving policy performance as a means of addressing the dismal economic and social performance of Tanzania, the remainder of this paper will focus on the role of health and education spending in reducing poverty and raising living standards. Both the health and education sectors suffered from the decrease of public spending in these areas during the 1980s. The downward trend has only been reversed during the second part of the 1990s. The permanency of this policy is now ensured by the September 1999 decision to make Tanzania eligible for the HIPC initiative. In fact, in this framework, donors require that the effective level of social spending should keep up with the budgeted one, and that this latter should not decrease from one year to the next. To determine how the amounts now put aside for spending in these sectors should be used most efficiently is one of the objectives of this study.

Organisationally, in the next section we will discuss issues related to the supply of public education and health services. In the third section, we will present evidence on the incidence of public education and health expenditures. The fourth section is

concerned with estimating the demand for education and health services among individuals, followed by a fifth section in which we study some interactions between health and education, and between the education levels of various family members. We will conclude with a summary of our findings and policy recommendations that can be gleaned from our analysis.

Supply of Health and Education Services.

Health[13]

In 1961, the newly independent government of Tanzania inherited a health system that relied heavily on traditional healers, a few clinics, and missionary health centres. Expansion of coverage, with a goal of universal access, was a priority of the post-independence regime, in a way not dissimilar to that followed in the mid-1970s by Madagascar. At first glance, the goal appeared to have been realised with amazing speed — by 1978, 90 per cent of Tanzanians lived within 10 km of a health facility, and 75 per cent within 5 km. Despite the substantial sums of money contributed by donors to finance the extensive network of health facilities, particularly the infrastructure and initial training of health workers, it became apparent by the 1980s that the limited tax base meant that the government did not have the means to cover the recurrent costs of operating the public health network, as was also the case in Madagascar at the same period. While decreasing export revenues, in part, precipitated the fiscal crisis, a broad range of policy failures — both in terms of macroeconomic managements and failures in the health sector strategy — contributed to the poor quality of services available through the public facilities. Donors, too, shared the blame for the failures of the health sector, as their initiatives were often undertaken with little regard for efficiency and without any serious attempt to develop a comprehensive national strategy[14].

The continued stagnation of human capital through the early 1990s led to a shift in government policy. By the mid-1990s, the government was refocusing on its role in the service delivery of basic health and education services. In addition, it began encouraging private sector involvement as a partner in the provision of health services, particularly those with small public good components, in recognition of the fact that the state was unable to meet all the health needs of the population. Increased concern for the financial sustainability of services has led to an emphasis on investments in activities with the highest social return and on increased co-ordination in government and donor spending.

Fundamental changes were made in the principles guiding health care decisions. For example, the measures of success were redefined as measures of individual outcomes (e.g. mortality rates) rather than based on project intermediates (e.g. facilities constructed). Even more revolutionary, the role of the household in contributing to the costs of the services provided was accepted. Prior to the early 1990s, the government

had maintained universal and nominally free access to government health facilities, discouraging for-profit private sector activities. Yet, the government accepted a cost-sharing initiative incorporating direct fees. User fees were first implemented in January 1993, and thereafter increased in July 1994. In order to guarantee general access to health care, children younger than five, pregnant women, people affected by some chronic diseases (tuberculosis, leprosy, AIDS, diabetes), as well as people unable to pay were supposedly exempted from these fees. Nonetheless, evidence from field study conducted by P. Tibandebage and M. Mackintosh[15] shows that the exemption system is not functioning very well and that exclusion from care due to inability to pay is fairly common. According to their study, the mean payment for a single visit to a non-government facility in Mbeya region was equivalent to 12-15 per cent of the public sector minimum monthly wage of Tsh 35 000. Given that poor households spend about 75 per cent of their budget on food, this amount corresponds to about 50 per cent of their budget for non-food basics. In Dar es Salaam, the mean payment was 7-8 per cent of the public sector minimum wage, but there was no option for free treatment. Note, also, that this minimum wage corresponds to a yearly income of $530, well above the average income in the country. Finally, the actual cost of public facilities is greater than the set fees for two reasons: first, hospitals often run out of drug supplies, thus requiring patients to purchase drugs directly at the pharmacy at a higher price; and second, people complain about the existence of some informal charges, such as payments demanded for the use of clinic supplies, medical tests and fees for health care providers, such as seeing the doctor or nurse. The liberalisation does not seem to have addressed these problems effectively.

In terms of the institutional structure of Tanzania's health care system, it can best be viewed as a referral pyramid with village health workers trained in basic first aid, sanitation, and nutrition education. The next tier is the dispensary, staffed by at least one rural medical aide. These dispensaries provide basic curative and preventative care and serve four villages on average. Rural health centres are staffed by a medical assistant and seven to eight trained health workers. These centres offer only limited in-patient facilities but oversee about six dispensaries (World Bank, 1990).

There are 104 district hospitals. These hospitals are designed to offer both primary health care and basic surgical, medical and maternity facilities to those referred from lower level facilities. Seventeen regional hospitals offer services similar to the district hospitals, but have more sophisticated equipment. Four consultant hospitals form the top layer of health coverage, with the best facilities located at the Muhimbili Medical Centre, Dar es Salaam. The Muhimbili Centre also has a medical school.

An interesting note is that 17 of the 104 district hospitals were Voluntary Agency hospitals. These missionary health services generally charge a fee for their services. By including them within the fabric of universal health coverage, the government avoided redundancy in areas where health services were already adequately provided, but subsidised them up to their total recurrent costs.

Also important to the structure of health care is the existence of various vertical programmes. These programmes are designed for specific illnesses such as tuberculosis, malaria and AIDS, as well as various immunisation treatments. They are unique in that they have a central unit in the Ministry of Health with co-ordinators at the regional and district levels and, often, workers to implement the programme at health facilities. They do not answer to the director of the facility in which they work but to their superior within the programme.

Table 2.3 offers a detailed look at the source and use of funds in recurrent health expenses for the period 1989-90 to 1998-99, with estimates for the 1999-2000 fiscal year. In the most recent years, real recurrent expenditures have fallen in real terms as has health spending as a share of GDP, even disregarding the extraordinarily high figures in 1994/95. Health's share of social sector recurrent spending has also recently declined. Despite increasing emphasis on local financing, the dominance of national funds is quite apparent. The emphasis on curative care, split fairly evenly across national hospitals, regional and district hospitals, and health centres and dispensaries, emphasises the high costs associated with hospitals. Recent efforts to increase the expenditure in preventative services and lower the subsidising of national hospitals is evident.

Table 2.A1 (from World Bank, 1999, Vol. 2) presents the input use in the health sector programme in 1996-97. Payments for personnel represent almost 60 per cent of total expenditures with drugs being another 17 per cent.

In 1996-97, donors accounted for 21 per cent of total government spending on health including 63 per cent of the total preventative spending[16]. This financing by donors is in sharp decline. In fact, in 1994, donors contributed up to 1.7 times the government health budget. This decrease is another threat to the sustainability of this sector. Of the donor funds, over 80 per cent are destined for preventative services with another 18 per cent devoted to curative services, principally those delivered in dispensaries and health centres (Table 2.A2).

Nearly half of the cost of health care is borne directly by the population. In 1994, per capita annual expenditure in health amounted to about $7. At the same date, the estimated minimum cost of providing the basic health package and essential clinical health services in a low-income country was estimated to be $12. In comparison, the Tanzanian system is severely underfunded with government spending comprising less than 25 per cent of the minimum recommended spending (Tibandebage and Mackintosh, 1999).

Table 2.3. **Health Recurrent Expenditure by Sub-Sector 1989-90/1999-2000**

	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000 budget
Nominal Recurrent Expenses	9 010	13 154	16 409	20 361	30 663	56 968	32 760	37 220	47910	61600	56650
Real recurrent expenses (1995 prices)	29 061	34 616	34 915	35 140	41 436	56 968					
Percentage discretionary recurrent expenditure	11.5	11.8	11.7	10.3	13.0	20.6	12.5	11.2	11.41	11.31	9.63
Percentage of GDP	1.2	1.4	1.5	1.6	1.9	2.5					
Health as percentage of social sector spending					33	38					
Source of Funds (%)											
Ministry of Health	49	46	45	46	43	50	37	43	54	60	56
Regional supply	24	25	30	30	22	16	20	20	16	16	14
District supply	27	29	24	23	35	35	43	37	30	24	30
Use of Funds (%)										budget	
National referral Hospitals	33	31	32	33	21	27	17	16			
Regional & district hospitals	28	29	33	34	33	32	34	34			
Health centres & dispensaries	87	29	24	23	35	31	33	33			
Sub-total curative	88	88	89	90	89	90	84	80	86	80	
Preventative services	3	3	3	4	4	7	10	13	8	12	
Ministerial administration	1	1	1	1	1	1	1	1	2	2	
Training	5	5	5	3	5	3	4	3	4	6	
Other	3	3	2	2	1	0	1	0			

Education

Education has long been a source of pride for independent Tanzania. The first educational act passed in 1962 was aimed at abolishing the racial system that previously existed. Apart from promoting a unified national identity (through the use of Kiswahili in primary education, for example), the main concern was to try to provide the country with an indigenous skilled labour force. Therefore, policy emphasis was on the expansion of secondary and tertiary education. The need for each type of skilled labour was estimated based on the projected demand for skills from the public sector, and the desirable output from each level of education was deduced. Secondary education supply was designed to meet these estimated needs. In fact, until recently, secondary school leavers were automatically enrolled in the public labour force. As a result, provision of education was heavily constrained at a level that did not account for the social demand for education and the human resources need of the private sector. In 1967, following the Arusha Declaration, the Education for Self Reliance Act was promulgated, instituting the acquisition of knowledge relevant to real life situation as the major goal for education. In this context, economic activities intended to promote self-reliance were introduced in primary schools; all pupils had to participate in the school activities (e.g. agriculture, brick-making) designed to promote the acquisition of skills relevant for self-employment in both the rural and the urban sector. In practice, this turned out to be a means for schools to generate badly needed income. Universal Primary Education (UPE) was instituted in 1969 with the objective of reaching 100 per cent primary enrolment rate for children aged 7-13 by 1989. This date was advanced to 1977 by the 1974 Musoma Resolution. This required an increase in the number of educational facilities in order to enrol all children of school age and allow for repetition. By 1974, Tanzania had a capacity to enrol only 55 per cent of the total number of school age children, while actual enrolment was 48 per cent. Efforts made to achieve UPE by 1977 required multiplying the total primary enrolment by 1.37 between 1974 and 1978. By 1978, 93 per cent of eligible children were enrolled in Standard 1 (as compared to 26 per cent in 1974; URT/MOEC, 1997). The problem then was to retain the huge enrolment and to maintain standards. The ability of the state to build additional classrooms, to train and pay additional teachers, and to provide adequate learning material was limited, especially as the general economic situation in the country started to deteriorate. The issue of quality of primary schooling became a major concern. Enrolment rates began to decrease as drop-out rates increased. These trends have not been reversed since the 1980s, despite recent efforts to protect the share of public spending dedicated to the education sector.

In this sector again, it is interesting to note the similarity between Tanzania and Madagascar. In fact, Madagascar also adopted a policy of rapid expansion of the education sector (from 1975) and witnessed a similar collapse of its efforts in the 1980s when confronted by a major economic crisis (see the Madagascar case study in this volume for more details).

In 1986, the government allowed communities, religious organisations and NGOs to start private secondary schools. In 1993, pre-primary schools and teachers' education were also liberalised. Until 1995, no for-profit organisation was allowed to run a primary school. This ban was lifted by the 1995 act that introduced for-profit private primary schools. These new schools still account for a very small share of primary education provision (in 1998, they were only 33 out of a total of 11 339 primary schools), and most operate in English. In contrast, at the secondary level, about half of the schools are privately run.

Education has a structure inherited from the British: following two years of pre-primary school, primary school starts at the age of six or seven and lasts seven years (Standard 1 to Standard 7)[17]. This, together with adult literacy courses, constitutes the basic educational system. Enrolment and attendance is compulsory from age seven. Repetition is allowed in the lower classes (up to Standard 4) but is permitted only in very special cases in Standard 5 to 7.

Entrance to secondary school is based upon performance on a national exam (Primary School Leaving Exam, PSLE). It is divided into two levels: ordinary level (Form 1 to 4) and advanced level (Form 5 and 6). From Form 4, it is possible to enter a specialised (professional) course for two or three years. Teachers in primary school are now required to have such training (Grade A teachers). From Form 6, it is possible to obtain further education either by following specific courses for two years to receive a diploma or by entering a university. Teachers in secondary school are required to have at least a diploma; only some of them have a degree (four years of university education). Basic education is completed in Kiswahili, while secondary education and higher education are completed in English[18].

As mentioned above, the provision for secondary schooling was severely limited in the 1980s owing to restrictive government policy and poor funding. It improved considerably in the 1990s, especially because of the increased number of private secondary schools. In 1998, there were 406 public secondary schools (as compared to only 193 in 1994) and 375 private ones (as compared to 298 in 1994). Teacher-pupil ratios were 1:20 in public schools and 1:19 in private ones in 1998. Public schools are operating at capacity, but private schools have not reached capacity. The cost of private secondary education (even when run by religious organisations) is, however, not affordable for a large part of the population.

Tertiary education concerns only a very limited number of students. Enrolment stagnated around 3 000 pupils until the early 1990s. Then, following the establishment of the Open University of Tanzania (OUT), enrolment rose sharply, to reach 10 553 students during the academic year 1997-98. Nearly half of them attend the OUT.

After the early achievements, enrolment rates in primary schools suffered from the 1980s financial crisis. Enrolment began declining in 1981 reaching its lowest in absolute numbers in 1987. Net enrolment rate was only 51 per cent in 1991. Although there has been a slight recovery during the last decade, enrolment now reaches only

57 per cent (1998) while the gross enrolment ratio is 76 per cent (as compared to 78 per cent in 1997). There is no difference in enrolment between boys and girls at this level. In secondary schools (ordinary level), 46.5 per cent of the students are girls. The gender gap increases markedly at all levels during secondary school. Among pupils enrolled in the advanced level (Forms 5 and 6), only one-third are girls (URT/MOEC, 1999*b*). Enrolment varies significantly between regions, from a high of 75 per cent net enrolment rate in the Dar es Salaam region to a low of 45 per cent in the Kagera region in 1998. Enrolment has been falling more in some areas of the country, such as the central and the western zones.

Teacher to pupil ratio is about 1:20 at the secondary level (both in private and public schools); it is 1:38 on average at the primary level. Here again, these average levels hide a vast interregional variation from 1:25 in the Tabora region where primary enrolment is low (49 per cent) to 1:44 in Dar es Salaam. Although further detailed data were not available, it appears that the regional disaggregation is not the most relevant factor in assessing the inequality in school provision. It varies both between and within districts.

Since 1989, quality of education has deteriorated steadily. This is evidenced by the achievement on primary school national exams (PSLE) and by the number of university students. From 1989 to 1994, the percentage of students qualifying in Division 1, 2 or 3 on the Certificate of Secondary Education examination declined from 39.3 per cent to 20.4 per cent. It improved slightly in 1995, reaching 24.6 per cent. Until very recently, the private sector was thought to provide a service of lower quality than the public sector. Using the HRDS 1993 survey, Lassibile and Tan (1999) showed that public secondary schools are more efficient than private ones in that a child with a given set of personal characteristics (including initial level of learning) attending a public school will obtain a higher Form 4 grade than if he/she had attended a private school. They emphasise that this result may be linked to the fact that, in 1993, most private schools were fairly new, and that the difference in quality between public and private schools may be reduced with time as the private schools become better established. In fact, owing to an inverse movement in the quality level of the two sectors, the quality of private secondary education is now considered better than that of public secondary education. As a result, the best students, if their parents can afford it, are sent to private secondary schools, thus further lowering the average performance of the students in public secondary schools. Among the private schools, a large difference however still exists between religious schools (seminaries) — the best — and others. Based on the results of the national Form 4 exam for 1999, 19 of the 20 top schools were seminaries or private boys' schools.

Internal efficiency indicators reflect the overall low quality of education. At primary level, drop-out rates vary between 5 and 9 per cent per year while repetition rates vary from 1 to 11 per cent. Over all of the primary cycle, the drop-out rate (unadjusted for repeaters) (URT, MOEC, 1997) reaches 32.6 per cent for the students who began school in 1989 (and thus leaving primary school in 1995). The transition rate between primary and secondary schools reaches only 15 per cent (public and private schools taken together).

This deterioration of the quality of the public service is closely correlated to the decrease in public spending in the educational sector. The education budget, as well as the overall budget, started declining in 1980, after the Kagera War (against Uganda) prompting the financial crisis. The share of education in this budget has also declined, despite recent attempts at protecting this sector in the budget. During fiscal year 1998-99, social sectors as a whole represented 37.6 per cent of total (discretionary) recurrent expenditures (Ministry of Finance, 1999). For fiscal year 1998, the budgeted share of the education sector was 22.3 per cent, and its actual share was 25.11 per cent. During the preceding years, the actual share of the education sector fell continuously from a level of 31 per cent in fiscal year 1995 (Table 2.4). Basic education comprises about two-thirds of these amounts (Table 2.A3). In addition to the public allocation, the education sector receives important support from donors. It is estimated that, during fiscal year 1997, donor contributions to the education sector amounted to Tsh 12.7 billion, or 13.3 per cent of the total actual expenditure on education (URT and the World Bank, 1999).

According to the Public Expenditure Review (PER) (Vol. 1, World Bank, 1997), the unit cost in 1995-96 of university education was 107 times greater than primary education, while the ratio between the unit cost of secondary education and primary education was equal to 6. Both these ratios fell enormously during the 1990s, owing to the increase of government spending per pupil at primary level.

Until the early 1990s, primary education was free for all attending. Modest fees were then introduced, but they rose quickly to a non-negligible amount. In 1999, fees were Tsh 2 000. This accounts for only a small part of the total cost of primary schooling borne by households. Parents make various (so-called "voluntary") contributions for building, desks, etc., and additionally pay for uniforms and stationery supplies. These other contributions were estimated in 1998 to be more than Tsh 30 000 per year, an amount comparable to one month's minimum wage and 1.5 times the annual per pupil cost of teachers (URT and World Bank, 1999). The official policy is that no child should be excluded from basic education even if his or her parents cannot pay the UPE. In practice, the graduation certificate can be retained by the head teacher until fees are paid. Observed collection rate was 57 per cent in 1997 (PER, URT and World Bank, 1999). Significantly, parents have to pay for most of the supplies. Between 1994 and 1997, the main part of the cost of primary schooling was borne by households through the weight of the direct payments for supplies (63.4 per cent of the total cost[19]) whereas fees represented only 0.6 per cent of the total, and the government was contributing only up to 26.1 per cent. The sharing is more equalised at the secondary level where parental contribution represents 46.5 per cent and fees, 9.8 per cent while government contribution reaches 42.4 per cent. At the level of higher education, the cost is nearly entirely supported by the state apart from 10 per cent received from the donors (Mukyanuzi *et al*., 1999). This difference in the share of the cost borne by the state is even more striking when looking at absolute numbers. Mukyanuzi *et al*. (1999) estimate the per capita expenditure in primary schooling to have reached Tsh 15 455 in 1997 while it reached Tsh 70 736 for secondary schooling[20].

Table 2.4. **Recurrent Expenditure Sectoral Allocation for Education and Health – 1995/96 to 1999/2000**
(In billions Tsh)

	1995/96			1996/97			1997/98			1998/99			1999/2000		
Ministry /Sector	PE Actuals	OC Actuals	TOTAL Actuals	PE Actuals	OC Actuals	TOTAL Actuals	PE Actuals	OC Actuals	TOTAL Actuals	PE Actuals	OC Actuals	TOTAL Actuals	PE Estimates	OC Estimates	TOTAL Estimates
Discretionary Expenditure	154.09	107.88	261.97	199.23	132.3	331.53	218.81	201.18	419.99	264.34	280.45	544.79	273.05	315.16	588.21
Education :															
MOEC	7.20	3.13	10.33	9.58	2.41	11.99	10.94	7.76	18.70	11.00	8.53	19.53	11.94	6.08	18.02
MSTHE	8.60	8.02	16.62	7.74	11.58	19.32	8.18	13.18	21.36	10.43	22.33	32.76	11.59	19.16	30.75
Regional Admin.	0.19	1.16	1.35	0.22	0.7	0.92	0.15	0.63	0.78	0.18	1.91	2.09	0.15	0.71	0.86
Local Govt.	48.62	4.27	52.89	62.39	1.81	64.2	76.00	3.08	79.08	77.74	4.67	82.41	79.61	11.10	90.71
Total Education	**64.61**	**16.58**	**81.19**	**79.93**	**16.50**	**96.43**	**95.27**	**24.65**	**119.92**	**99.35**	**37.44**	**136.79**	**103.29**	**37.05**	**140.34**
% Disc. Exp.	41.93	15.37	30.99	40.12	12.47	29.09	43.54	12.25	28.55	37.58	13.35	25.11	37.83	11.76	23.86
Health :															
MOH	9.27	2.81	12.08	12.27	3.64	15.91	12.73	13.11	25.84	15.64	21.51	37.15	13.07	18.52	31.59
Regional Admin.	5.44	1.08	6.52	6.41	0.96	7.37	6.90	0.96	7.86	8.37	1.45	9.82	7.22	0.71	7.93
Local Govt.	10.48	3.68	14.16	13.76	0.18	13.94	13.41	0.80	14.21	13.72	0.91	14.63	14.50	2.63	17.13
Total Health	**25.19**	**7.57**	**32.76**	**32.44**	**4.78**	**37.22**	**33.04**	**14.87**	**47.91**	**37.73**	**23.87**	**61.60**	**34.79**	**21.86**	**56.65**
% Disc Exp	16.35	7.02	12.51	16.28	3.61	11.23	15.10	7.39	11.41	14.27	8.51	11.31	12.74	6.94	9.63

Notes:
PE: Personnel Expenditures.
OC: Other Charges.

Source: Mr Kibaja, Ministry of Finance.

Teacher training is a major concern. At primary level, 60 per cent of the teachers have only primary education background. Those teaching at secondary level should have at least a diploma, of which 70 per cent (82 per cent in public schools) do, while 17 per cent have a degree (13 per cent in public schools).

Expenditure Incidence

In this section, we analyse the HRDS to examine the progressivity of public expenditures and the extent that the government's actions redistribute resources to the poor. We employ traditional benefit incidence analysis and compare the progressivity of expenditures in the social sectors, particularly the components of health and education, both to each other and to the Lorenz curve that represents expenditure inequality and the 45-degree line. The limitations of incidence analysis are well articulated. Most importantly, it presents a static picture of the situation that exists at the time of the survey and fails to account for the behavioural response of individuals. Also, the average incidence analysis that we present is not necessarily an accurate reflection of marginal incidence. Nevertheless, data limitations preclude the application of the relatively straightforward procedures for addressing marginal incidence, so we proceed with the knowledge that our findings are limited in terms of their implications for the distribution of benefits that would follow from changes in expenditure levels.

Before presenting the results of our incidence analysis, a couple of other issues regarding methods are noteworthy. First, we use a discrete variable, whether or not an individual accesses a service, to measure benefits. The alternative of valuing services based on unit subsidies was not available because of the lack of disaggregated budget information. However, comparisons of concentration curves based on unit subsidies with a binary use variable indicate that, with the exception of very unusual circumstances, the results of the two approaches will be the same. Similarly, the use of unit subsidies creates a whole new set of measurement problems, such as the fact that such figures are usually derived from budget data which often poorly represent actual expenditure.

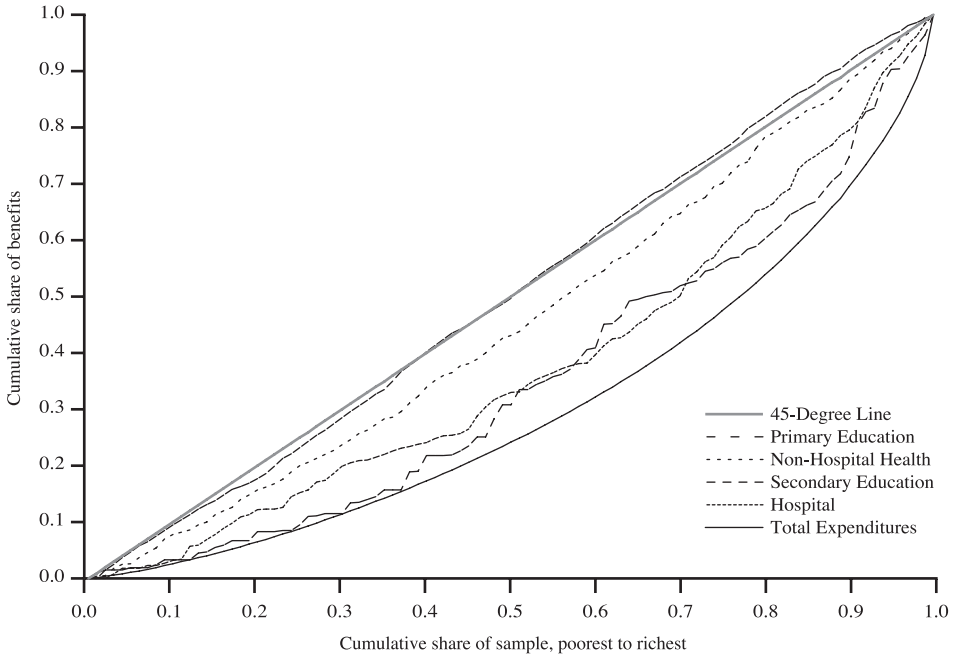
In addition to the use of formal tests of stochastic dominance, we examine the progressivity of social services using comparisons based on the use of cardinal measures, specifically the extended Gini coefficients[21]. The reason for doing so is that rejection of the null of non-dominance based on stochastic dominance is very demanding, as it implies that one distribution is preferred over the other under every imaginable social welfare function[22].

The concentration curves for per capita expenditure and for various health and education services are shown in Figure 2.1. These national level figures indicate that most of the services seem to fall between the expenditure curve and the 45-degree line[23]. The most progressive service appears to be primary education, with the least progressive being secondary schooling and hospital care. The lesser progressivity of secondary schooling and hospital care is, in part, explained by the fact that these

services are not only the most expensive but are disproportionately located in urban areas where fewer poor reside, resulting in demand being concentrated among upper income households. The results of the formal tests of stochastic dominance indicate that few services dominate each other and that there is much crossing of the concentration curves. Specifically, primary education and non-hospital care are the only services that are more progressive than the expenditure distribution. They are also progressive relative to hospital care and secondary education. Otherwise, we are not able to reject the null of non-dominance between pairs of concentration curves (Table 2.5).

When using the cardinal measures, the extended Ginis, we get slightly more information in terms of the ordering of various services. In particular, we additionally find that hospital services are more progressive than the expenditure distribution, non-hospital care is more progressive than hospital and secondary education, and primary education is more progressive than clinic-based medical care (Table 2.5).

Figure 2.1. **Concentration Curves for Health and Education in Tanzania**



Source: Authors' calculations.

Table 2.5. **Dominance Results and Extended Gini Comparisons for Public Expenditures in Tanzania, θ =1**

	Gini	Ante-natal	Primary School	45-degree	Non-hospital	Ante-natal Value	School Food	School Supplies	Hospital	Secondary	Water	Public Job	Expenditure	School Supplies Value	Electricity
Ante-natal	-0.0828	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Primary school	-0.0512		0 (0)	0 (1)	0 (1)	X (0)	0 (0)	0 (0)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	0 (1)	1 (1)
45-degree	0			0 (0)	0 (0)	X (0)	0 (0)	0 (0)	0 (1)	1 (1)	1 (1)	1 (1)	1 (1)	0 (1)	1 (1)
Non-hospital	0.0229				0 (0)	X (0)	0 (0)	0 (0)	0 (1)	1 (1)	1 (1)	1 (1)	1 (1)	0 (1)	1 (1)
Ante-natal value	0.0543					0 (0)	X (0)	0 (0)	X (0)	0 (0)	X (0)	0 (1)	0 (1)	0 (1)	0 (1)
School food	0.0594						0 (0)	0 (0)	0 (0)	0 (1)	0 (1)	0 (1)	0 (1)	0 (0)	0 (1)
School supplies	0.0934							0 (0)	0 (0)	0 (1)	0 (1)	0 (1)	0 (1)	0 (1)	0 (1)
Hospital	0.1775								0 (0)	0 (1)	0 (1)	1 (1)	0 (1)	0 (0)	1 (1)
Secondary school	0.2872									0 (0)	0 (0)	0 (1)	0 (1)	0 (0)	0 (1)
Water	0.2925										0 (0)	1 (1)	1 (1)	0 (0)	1 (1)
Public job	0.4015											0 (0)	X (0)	0 (0)	0 (1)
Expenditures	0.4355												0 (0)	0 (0)	1 (1)
School supplies value	0.4463													0 (0)	0 (0)
Electricity	0.5965														0 (0)

Note: Extended Gini comparisons are in parentheses.

Table 2.6. **Dominance Results and Extended Gini Comparisons for Public Expenditures in Tanzania, θ = 0.5**

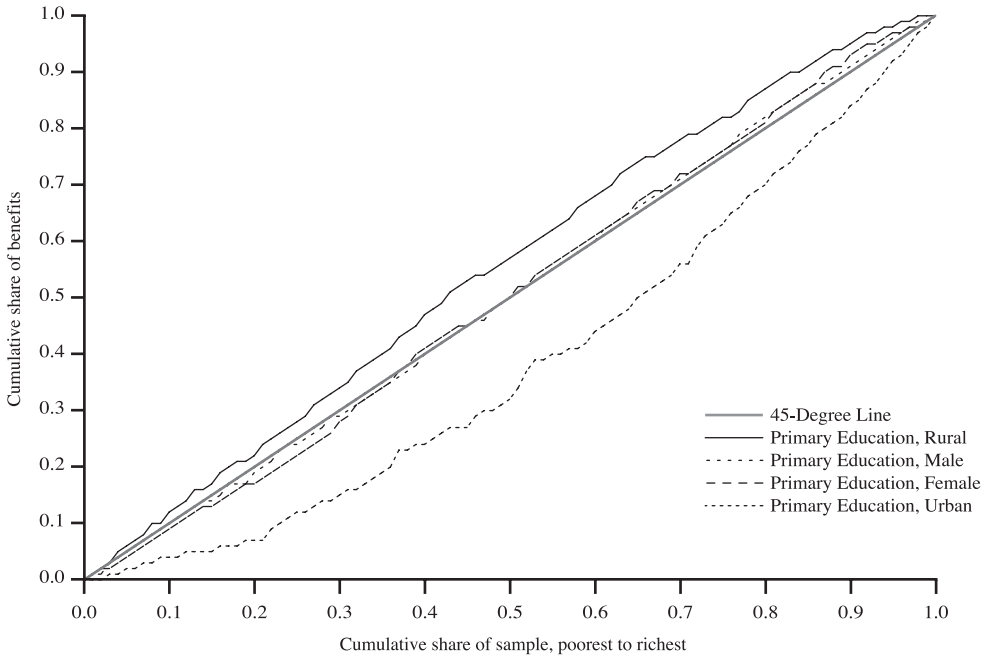
	Gini	Ante-natal	Primary School	45-degree	Non-hospital	Ante-natal Value	School Food	School Supplies	Hospital	Secondary School	Water	Public Job	Expenditures	School Supplies Value	Electricity
Ante-natal	-0.086	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Primary school	-0.013		0 (0)	0 (0)	0 (0)	X (0)	0 (1)	0 (0)	0 (1)	1 (1)	1 (1)	1 (1)	1 (1)	0 (1)	1 (1)
45-degree	0			0 (0)	X (0)	X (0)	0 (0)	X (0)	0 (1)	1 (1)	1 (1)	1 (1)	1 (1)	0 (1)	1 (1)
Non-hospital	0.007				0 (0)	X (0)	0 (1)	X (0)	0 (1)	1 (1)	1 (1)	1 (1)	1 (1)	0 (1)	1 (1)
Ante-natal value	0.07					0 (0)	0 (0)	0 (0)	0 (0)	X (0)	0 (0)	0 (0)	0 (0)	0 (1)	0 (1)
School food	0.119						0 (0)	0 (0)	0 (0)	0 (0)	0 (1)	0 (1)	0 (1)	0 (1)	0 (1)
School supplies	0.125							0 (0)	0 (0)	0 (0)	0 (1)	0 (1)	0 (1)	0 (1)	1 (1)
Hospital	0.154								0 (0)	0 (0)	1 (1)	0 (1)	0 (1)	0 (1)	1 (1)
Secondary school	0.193									0 (0)	1 (1)	1 (1)	1 (1)	0 (1)	1 (1)
Water	0.35										0 (0)	0 (0)	X (0)	0 (0)	0 (1)
Public job	0.379											0 (0)	X (0)	0 (0)	0 (1)
Expenditures	0.402												0 (0)	0 (0)	1 (1)
School supplies value	0.519													0 (0)	0 (0)
Electricity	0.561														0 (0)

Note: Figures in parentheses are extended Gini comparisons.

In order to allow for possible economies of scale, instead of using per capita income, we use a value of theta = 0.5[24], and we find that the basic story is not altered appreciably, although there are fewer cases where we reject the null. Specifically, for both the dominance tests and the Gini comparisons, we no longer find that primary schooling is more progressive than hospital use. Conversely, the alternative scale parameter results in hospital care dominating secondary education, although primary education no longer dominates clinic services according to the extended Gini comparisons (Table 2.6).

We next disaggregate the data by gender, and urban versus rural (the concentration curves for primary education are shown in Figure 2.2). The dominance test results are consistent with what is portrayed: we are not able to rank one curve as being above the other owing to the fact that we fail to reject the null of non-dominance between males and females; and the use of primary education and health clinics is more progressive in rural than urban areas. When we perform the same analysis for non-hospital care and other social services, we arrive at the same findings: that gender does not matter and that rural services are more progressive than those in urban areas.

Figure 2.2. **Concentration Curves for Primary Education in Tanzania, Disaggregated by Area or Gender**

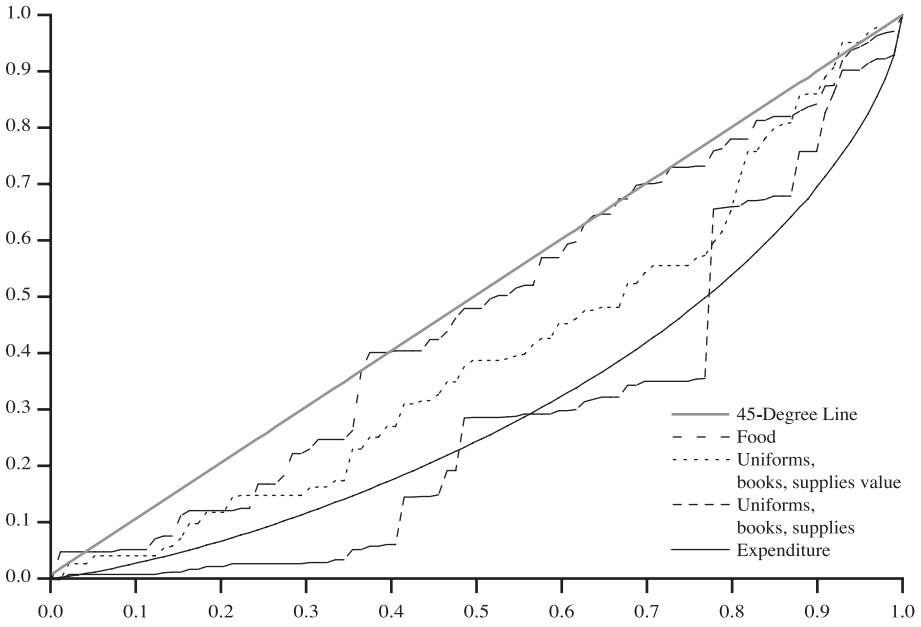


Source: Authors' calculations.

Finally, based on dominance tests and Ginis, we make comparisons of the progressivity of social services in Tanzania with other countries in sub-Saharan Africa for which there are comparable data. Our analysis reveals that the incidence of public primary schooling and public hospital care in Tanzania is more progressive than in Guinea, less progressive than in South Africa, and the same as in Ghana, in Madagascar, in Uganda, in Côte d'Ivoire, and Mauritania. Other elements of comparison can be found in Table 1.A11 of the Madagascar study presented in the same volume. Dominance tests show no difference in the progressivity of secondary schooling and non-hospital health services in comparison with the other seven countries mentioned above. In the case of secondary schooling, however, the Gini comparisons indicate that the distribution of benefits is less equitable than in South Africa but more so than in Guinea.

Beyond the issues of spending in health and education, we can also examine the incidence of use and access to a variety of other public services, some of which are sub-categories of health and education spending and others of which are public services, such as access to clean water and electricity. In Figure 2.3, we first show the concentration curves for two schooling related subsidies: the dichotomous variable for *i)* whether someone receives free food; and *ii)*, whether someone receives subsidies in the form of uniforms, books and supplies. In addition, there is another curve for the value of subsidies in the form of uniforms, books and supplies. The receipt of food expenditures appears to be most progressive, but in fact it crosses the curve for uniforms, books and supplies. Also, when we examine the curve for the value of the uniforms, books and supplies, it generally falls below the dichotomous variable. This indicates that the unit subsidy is higher for upper income children. Despite the difference in the concentration curves, we are not able to rank them unambiguously since the two curves cross at one of the ordinates[25]. In no case do these curves for the school subsidies in the figure dominate the 45-degree line or the expenditure distribution when testing for dominance. This applies to both the per capita measure and the equivalence scale of theta equal to 0.5. However, we get a much clearer ordering based on the extended Gini coefficient criteria. For example, according to the Ginis, school feeding dominates public sector jobs, water, electricity, and the expenditure distribution.

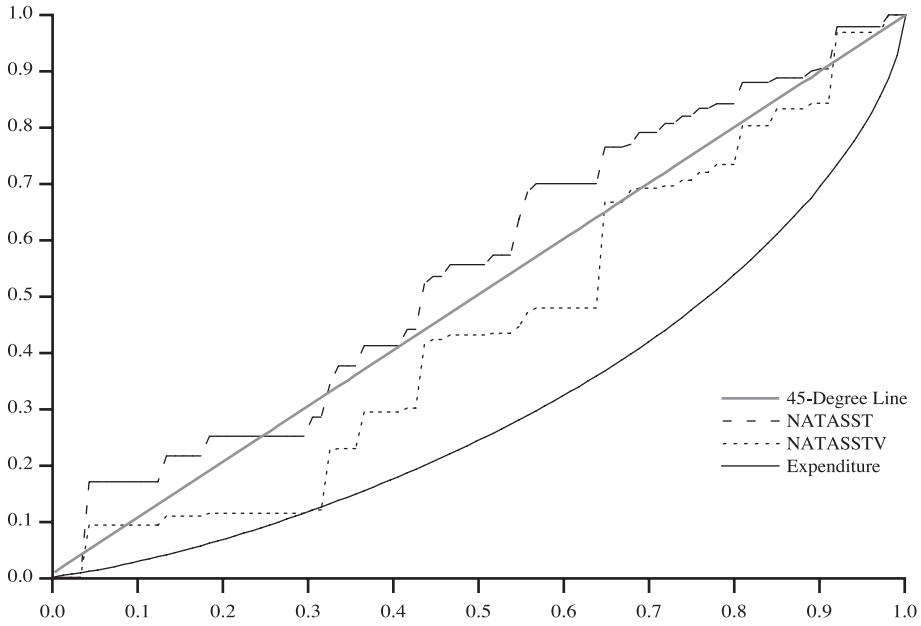
Figure 2.3. **Concentration Curves for Schooling-Related Subsidies**



Source: Authors' calculations.

Figure 2.4 presents information on antenatal care: one concentration curve is a dichotomous indicator of utilisation of the service, and the other curve is a measure of the value of the service. As with the education example, the value curve falls below the use curve. However, formal statistical tests, regardless of whether using the dominance or Gini criteria, and regardless of the assumptions regarding economies of scale, do not allow a rejection of the null of non-dominance between the two variables. While the bivariate indicator is above the 45-degree line for most of the range of the distribution, it also crosses the 45-degree line and is therefore not per capita progressive. Statistical tests indicate that the antenatal care value dominates the expenditure distribution only according to the Gini criteria for the per capita ordering. If the dominance and Gini tests were restricted to exclude the bottom ordinate pair, the antenatal care would dominate many others. But owing to the fact that no household in the bottom 5 per cent of the income distribution received such care, the service does not appear particularly progressive based on formal statistical test of dominance across the entire range of income distribution.

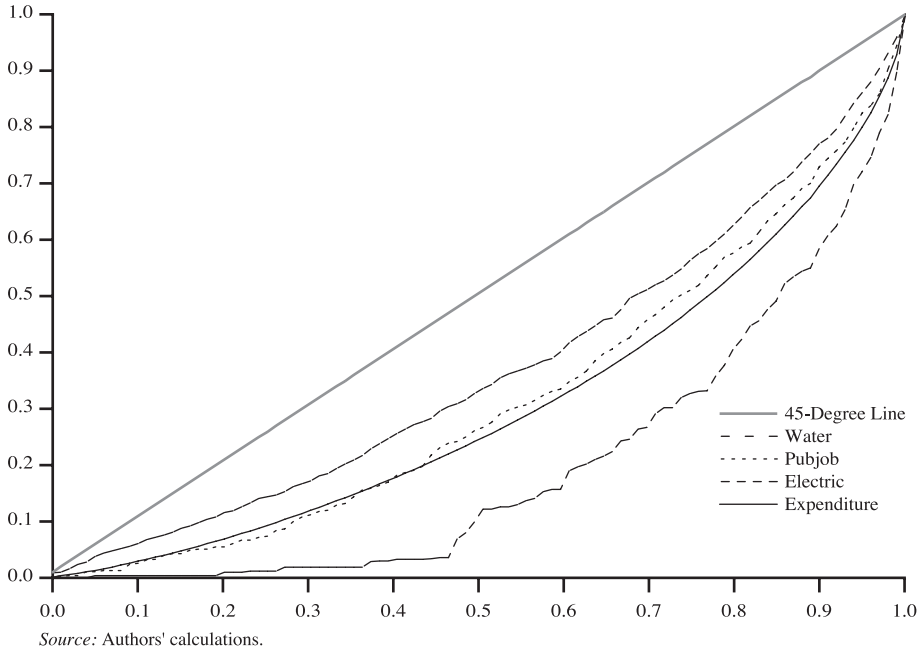
Figure 2.4. **Concentration Curves for Antenatal Care Subsidy**



Source: Authors' calculations.

The final concentration curves are for access to piped water (in and out of the home), electricity and public employment (Figure 2.5). In the case of piped water, it is arguably an alternative public health intervention to expenditures on health services. Electricity and public employment are two prominent types of subsidies that serve primarily as a benchmark for evaluating the progressivity of social services, since they are both expected to be highly regressive. Only piped water dominates the expenditure distribution, as it does public sector jobs and electricity. The least progressive service is electricity, indicating that the subsidies on the supply of electricity are quite regressive. In fact, access to electricity is the only concentration curve dominated by the expenditure distribution, regardless of how we scale household members. We cannot reject the null of non-dominance between the public employment curve and the expenditure distribution, regardless of the choice of test. When one considers that earnings among public sector workers at the higher end of the distribution are undoubtedly higher than those at the lower end of the distribution, it is implied that, in fact, public sector wage payments are likely dominated by the expenditure distribution.

Figure 2.5. **Concentration Curves for Access to Water, Electricity and Public Sector Employment**



Source: Authors' calculations.

Demand for services

Health

The analysis of the demand for health care is necessary in order to arrive at sensible policies that increase the access to services, particularly by the poor. We begin this process by analysing some descriptive data on health care usage, derived from the 1993/94 Human Resource Development Survey.

One crucial issue in terms of seeking demand for health care is a perception of need on the part of the population. In Tanzania, as in other African countries, this perception seems to be related to income levels, such that the poor are far less likely to report being sick (Table 2.7). For example, the percentage of the population reporting being ill or injured during the previous month in the lowest quintile is 13 per cent, compared to 23 per cent in the highest quintile. While it is unlikely that morbidity prevalence is actually higher among the rich, a number of possible explanations can be posited for this somewhat perverse finding. One is that the poor are simply accustomed to the regular onslaught of illness in the form of stomach and upper respiratory ailments and other diseases resulting from lack of hygiene and clean water.

A second possibility is that the poor simply cannot afford to be sick. They live on the margin, and a day away from work, whether it be spent at home caring for children or as income earners outside the household, has a prohibitively high opportunity cost.

Table 2.7**. Percentage of Population Reporting Sick or Injured in Last Four Weeks**

	Weighted HH Per Capita Expenditure Quintile (percentages)					
Region	1	2	3	4	5	All
All	12.8	14.0	15.5	17.1	22.6	17.0
Rural	13.0	14.2	15.9	17.6	21.3	15.5
Other Urban	12.0	13.5	15.4	17.2	22.2	17.3
Dar es Salaam	10.0	12.7	14.1	16.0	23.5	20.0

Beyond the issue of who reports being sick or injured, we find that nearly two-thirds of the sick and injured report seeking treatment outside of their home from hospitals, clinics and dispensaries[26]. However, unlike the reporting of illness, the probability of treatment conditional upon illness shows no clear relationship with expenditure level, although is only around 60 per cent overall (Table 2.8).

Table 2.8. **Percentage of Sick/Injured Who Sought Treatment**

	Weighted HH Per Capita Expenditure Quintile (percentages)					
Region	1	2	3	4	5	All
All	59.34	56.12	59.51	59.77	58.51	58.71
Rural	60.62	55.53	56.84	55.85	55.73	57.05
Other Urban	52.17	58.45	61.93	65.34	56.57	59.6
Dar es Salaam	100	48.15	64.77	57.2	61.41	60.61

Note: Excludes traditional care and self-treatment.

In terms of the type of care received, the poor are more likely to seek care in the public dispensaries, clinics and health centres[27] than individuals at the higher end of the expenditure distribution (Table 2.9). For example, 43.7 per cent of those in the bottom quintile seek care from public non-hospital sources in contrast to only 31.2 per cent in the uppermost quintile. Similarly, hospital care is a much smaller share of demand in rural areas, comprising less than 30 per cent of all care, as contrasted with over 45 per cent in Dar es Salaam and nearly 34 per cent in other urban areas. The poor are also much less likely to rely on private care. In the bottom expenditure quintile, 32 per cent of the care is from the private sector, as opposed to 41 per cent of the care for the households in the top quintile of the expenditure distribution. Once again, regional differences also exist in terms of the mix of private versus public care. For example, private sector is more important in Dar es Salaam than in rural areas.

Table 2.9. **Source of Health Care Treatment by Region and Expenditure Quintile**

		Weighted HH Per Capita Expenditure Quintile					
Region	Facility	1	2	3	4	5	All
All	Private hospital	8.31	8.81	11.53	8.72	8.58	9.13
	Public hospital	24.4	23.33	24.95	24.51	27.77	25.53
	Private other	23.59	29.29	28.92	31.88	32.4	30.16
	Public other	43.7	38.57	34.59	34.89	31.24	35.19
Rural	Private hospital	7.77	8.51	11.19	6.37	5.78	8.11
	Public hospital	24.6	20.57	20.9	19.12	23.12	21.67
	Private other	23.3	30.14	27.99	34.26	26.01	28.29
	Public other	44.34	40.78	39.93	40.24	45.09	41.93
Other Urban	Private hospital	11.67	10.4	11.17	8.6	6.82	8.82
	Public hospital	21.67	26.4	26.7	26.88	21.97	24.67
	Private other	23.33	27.2	29.13	25.81	31.57	28.61
	Public other	43.33	36	33.01	38.71	39.65	37.9
Dar es Salaam	Private hospital	0	0	14.55	13.33	11.11	11.56
	Public hospital	50	53.85	38.18	29.63	34.4	34.22
	Private other	50	30.77	32.73	40	35.47	36.15
	Public other	0	15.38	14.55	17.04	19.02	18.07

While the descriptive information on health care-seeking patterns is of interest, of equal importance is gaining some insight into the actual health care demand behaviour of individuals. In a recent paper, Sahn, Younger and Gennicot (2000) estimate health care demand equations for Tanzania. Specifically, they estimate a nested multinomial logit model of health care, distinguishing between four categories of services: public hospitals, private hospitals, public clinics and dispensaries, and private clinics and dispensaries. The base choice in the models is not care. The analysis is limited to rural areas since the discrete choice model assumes that there are a limited number of health care options available to people[28].

Two major policy issues are addressed: how the demand for health care services will be affected by changes in their price, and how consumers will respond to quality improvements. In the former case, the own- and cross-price elasticities of demand are shown in Table 2.10. The own-price elasticities are very high for public and private hospitals, as well as private clinics. For example, a 1 per cent increase in the price of public hospital care will result in a 1.86 per cent decline in the use of public hospitals. In the case of other public non-hospital services, the own-price elasticity is far smaller, being only –0.34. The substitution effects are also quite high, meaning that as the price of one type of care rises, consumers respond by not only reducing their use of that type of service, but they also seek care from other sources whose prices have not risen. For example, Sahn, Younger and Gennicot (2000) find an uncompensated elasticity of demand for private non-hospital services with respect to the price of public clinics, dispensaries

and health centres to be surprisingly high, 0.64. This indicates that as prices of public non-hospital services rise by 1 per cent, there will be an increase in demand for private non-hospital visits of 0.64 per cent, which will offset the decline in demand for public non-hospital visits. In the other direction, the price elasticity of public clinics, dispensaries and health centres with respect to the price of the private non-hospital alternatives is 0.58, implying a high, albeit slightly smaller, degree of cross-price response. There are also relatively high cross-price effects between public and private hospitals: a 1 per cent increase in the price of public hospital care would lead to a 0.42 per cent increase in the demand for private hospital care visits. In contrast, we find a situation where the substitution between non-hospital and hospital care is far smaller.

Table 2.10. **Own- and Cross-Price Elasticities of Health Care Demand**
(%Δrow/%Δcolumn)

	Probability of Choice	Public Hospital	Private Hospital	Public Clinic	Private Clinic
No Care	0.418	0.0757	0.0563	0.0536	0.0481
Public Hospital	0.057	-1.8590	0.3345	0.0795	0.0713
Private Hospital	0.05	0.4205	-1.6390	0.0795	0.0713
Public Clinic	0.333	0.1116	0.0837	-0.3429	0.5826
Private Clinic	0.142	0.1116	0.0837	0.6388	-1.6944
All	1	-0.053	-0.042	-0.039	-0.035

Sahn, Younger and Gennicot (2000) take into account the own- and cross-price effects to calculate the total demand for health care with respect to a price of a category. These values are all very low, the highest being –0.035 for private non-hospital care. That is, a 1 per cent increase in the price of private care will result in a large decline in the use of private care services (–1.69 per cent), but also a large increase in the use of public clinics and hospital care. After taking into account all the responses of consumers, we find that despite the large decline in private care visits from an increase in private care prices, the overall use of health services drops by only –0.035. Thus, Tanzanian health consumers appear to be very efficient at substituting between options to maintain overall levels of demand, regardless of price changes in individual categories of services. Of course, simultaneous increases in the price of all options would have a large impact on the overall demand for health care.

While the dimensionless elasticity numbers reported by Sahn, Younger and Gennicot (2000) are illuminating, their magnitude is in large part driven by the initial probability of using a specific category of service. Therefore, they present figures on the actual change in probability (not the percentage change as in the elasticities above), for a percentage change in price (Table 2.A4). The results indicate if the price of public non-hospital or hospital care is doubled, it will cause a decline in the probability of their use of 0.10; or that the decline in the probability of visiting a private hospital is 0.08 when the price of that category of care doubles. In terms of cross-price effects, while the elasticity of the use of private clinics with respect to the price of public clinics is 0.64, the change in probability in the use of private clinics with respect to a doubling of price of public clinics is only 0.07.

Using the demand estimates, Sahn, Younger and Gennicot (2000) calculate the change in probability of utilisation of health care options for discrete changes in the quality of public clinics and dispensaries. The results are found in Table 2.A5. They show, for example, that increasing the quality of doctor care from low to high causes a reduction in the no care option by 0.2541 for the entire sample. The large increase in demand as a result of this policy change is mostly found in private clinics. Another interesting finding is that there is an increase in the probability of choosing care at a public clinic by 0.110 as a consequence of improving the quality of drugs availability at public clinics, from low to high. This is mostly a result of a decline in demand in private clinics.

It is also possible to examine how these quality changes impact overall demand for any care. For example, the increase in the probability of demanding any health care as a result of raising the quality of drugs in public clinics is only 0.02. A similar pattern emerges when examining improvements in the quality of the health environment. The large, quality-induced increase in probability of demand for public clinics (0.27) comes largely at the expense of a decline in the demand for private clinics. Overall, there is only a 0.073 increase in the probability of seeking treatment as a result of an improvement in the quality of the environment from low to high. While not shown, the effects of quality on demand are similar for all expenditure quartiles.

These results are suggestive that individuals place a high value on quality. Sahn, Younger and Gennicot (2000), however, point out that while the models indicate that people are willing to pay significant sums of money to purchase higher quality care, as defined by the categorical rankings (poor, adequate and good) of clinic quality, the survey fails to define with any precision the characteristics of these categorical rankings. Thus, it is not possible to infer what the investment and recurrent costs to the government or the community would be of raising the ranking of a clinic from poor to adequate to good. This diminishes the policy relevance of the findings, since we cannot relate costs of quality improvements to changes in treatment received.

Education

The HRDS survey also allows us a reasonably detailed analysis of the demand for education. In fact, along with a relatively standard set of information regarding individuals and households, it contains precise information on the schooling history of all the young members of every household.

Descriptive analysis on the whole sample leads to results consistent with information obtained at a more aggregated level. Table 2.11 shows that among individuals older than seven years, 23 per cent have no education of any sort. A large gender difference is apparent with 27 per cent of the females above seven years as compared to 19 per cent of the males having no education[29]. About 65 per cent of the population above seven years of age have some primary schooling, and 9 per cent have some secondary education (7 per cent for the women and 11 per cent for the men). This varies vastly between regions, with Dar es Salaam and the Northern zone (Kilimanjaro and Arusha), the richest zones, having higher levels of schooling on

average (only 16 per cent of the population above seven years of age have no education and 11-14 per cent have some secondary education). The Central zone (which includes Dodoma), the South, and the Western zone have extremely high proportions of the population without any education (between 30 and 33 per cent) and only about 3 per cent with some secondary education. It is worth noting that Zanzibar is fairly atypical. In fact, as could be expected given that this is one of the poorest regions of the country, it has a high level of non-educated people (31.4 per cent), but at the same time nearly 25 per cent have at least some secondary education. The specificity of the education system in Zanzibar (the fact that there is no selection before Form 3 level, i.e. third year of secondary education) may help explain this result. People are also more educated in urban areas than in rural areas. The regional differences in the availability of education services are certainly a factor in this observation.

Table 2.11. **Education Level for the Population Aged 7 and Above**

	Per Capita Expenditures in Tsh	Without Education %	Some Primary %	Completed Primary %	Lower Secondary %	Upper Secondary %
Dar es Salaam	244251.7	16.7	25.6	41.1	12.3	2.0
Northern zone	155655.9	16.0	33.8	34.9	10.5	1.0
Zanzibar	147405.1	31.4	30.0	12.1	23.5	0.6
Coast zone	126761.2	24.1	34.7	31.9	6.8	0.6
Lake zone	117212.8	23.3	34.0	34.2	5.9	0.7
Southern Highlands	103157.8	21.4	34.8	31.6	7.0	0.9
Central zone	81181.4	32.9	25.3	37.5	2.6	0.3
Western zone	74435.5	30.6	25.2	36.1	4.8	0.3
South	71613.4	31.8	33.4	28.5	2.1	0.4
Dar es Salaam	244251.7	16.7	25.6	41.1	12.3	2.0
Other urban	149576.1	17.9	31.6	33.6	12.3	1.2
Rural	85408.0	30.0	32.8	31.3	3.2	0.2
Decile 1	33303.8	35.5	31.9	28.5	1.7	0.1
Decile 2	52855.6	28.4	35.5	30.4	3.3	0.2
Decile 3	67471.1	27.0	34.2	32.6	3.9	0.2
Decile 4	82639.3	24.9	34.2	31.7	6.0	0.4
Decile 5	101840.7	22.7	32.7	34.7	7.3	0.3
Decile 6	124191.1	21.2	31.4	35.5	8.2	1.0
Decile 7	154126.6	19.5	29.2	38.1	10.0	1.0
Decile 8	194817.9	17.0	27.9	39.2	11.6	1.0
Decile 9	270449.0	12.9	25.2	39.8	16.3	1.9
Decile 10	569944.1	10.8	20.5	33.6	25.3	5.1
Male		18.9	33.1	33.8	9.6	1.4
Female		27.3	29.1	34.1	6.7	0.4
Total	136596.2	23.2	31.0	34.0	8.1	0.9

Source: HRDS, 1993, authors' computations.

These variations in the average level of education are also apparent when disaggregating the population by deciles of per capita expenditures. In the first decile, 35.4 per cent of the population have no education while 2 per cent have at least some secondary education. In the top decile, the corresponding percentages are 10.8 per cent and 32 per cent.

Variation in literacy rates reflects these discrepancies by gender, regions and income group: Seventy-one per cent of the females 14 years or above are literate while 85.5 per cent of the males are literate (see Table 2.12). Sixty-eight per cent of the illiterate people are women; literacy rates reach a high of 89 per cent in Dar es Salaam and a low of 62 per cent in the South, a high of 91 per cent in the top decile and a low of 62 per cent in the bottom decile.

Table 2.12 also presents various breakdowns of enrolment rates. Net enrolment rate (NER) in primary school as measured by the survey is 52.6 per cent, a number consistent with the national figure of 53.7 per cent for 1993 (URT, MOEC, 1999*b*). This ratio is higher for girls (54 per cent vs. 51 per cent for the boys). This indicates that although girls receive less schooling on average than boys, they go to school at an earlier age. With respect to this indicator again, regional and income variations are wide, with NER of 41 per cent in the South and nearly 65 per cent in Zanzibar, and of 42 per cent in the bottom decile as compared to 64.5 per cent in the top one. Interestingly, regional variations do not exactly reflect income differences. In fact, Dar es Salaam has an NER of 53 per cent, similar to that of the much poorer area of Lake Victoria (52 per cent), while Zanzibar has a very high rate probably reflecting, again, its specificity. It is likely that these differences are more linked to the timing of education than to the total demand for education.

There is substantial evidence of late enrolment in school (see Mason and Khandker, 1996, Al-Samarrai and Peasgood, 1998, Peasgood *et al.* 1997, for example). This is a characteristic that Tanzania shares with many developing countries, in particular those in sub-Saharan Africa. From HRDS survey data, Bommier and Lambert (2000) find that although the legal age of school enrolment is seven, the observed age of entry for those children who are between 12 and 25 years old and who have ever entered school is 8.57 years on average (8.35 for girls and 8.80 for boys). In the survey, while 31 per cent of the children aged between five and 25 years have never been to school, this figure is only slightly above 6 per cent for those aged between 12 and 25. Nevertheless, a child has only a 50 per cent probability of entering school before age nine (see Figure 2.A4). Age of entry is higher for boys. It is lower in the Northern zone and in Zanzibar and higher in the South and in the Western zone. It shows no clear pattern with income, up to the 8th decile. In the top quintile, age of entry is markedly lower than in the rest of the income distribution.

Figures 2.A5 and 2.A6 give a clear picture of the importance of delays at school enrolment and of drop out rates by gender. Secondary net enrolment ratios computed from the survey are quite high compared to aggregate numbers, reaching 10.5 per cent, with regional variation between 3.6 per cent and 15.3 per cent. Here again, Zanzibar stands apart with 23 per cent secondary NER. By deciles, this enrolment ratio varies between 2.5 per cent and 31.8 per cent from bottom to top.

Table 2.12. **Enrolment and Literacy Rates**

	Primary NER	Primary GER	Secondary NER	Literacy Rates
Dar es Salaam	53.6	78.2	15.3	88.9
Northern zone	58.3	92.4	15.4	84.4
Zanzibar	64.8	91.6	23	65.8
Coast zone	52.3	84.9	8.1	77.3
Lake zone	51.9	80.3	6.6	78.6
Southern Highlands	57.2	83	11.2	77.2
Central zone	45	69	3.6	71.3
Western zone	44.7	64	7.1	70.1
South	41.3	68	4.3	61.8
Dar es Salaam	53.6	78.2	15.3	88.9
Other urban	59.1	86.8	15.7	82.5
Rural	47.9	76.1	4.5	70
Decile 1	42.2	65.4	2.5	61.8
Decile 2	48.9	75.4	5.3	70.7
Decile 3	50.1	80.5	5.4	74.5
Decile 4	53.9	79.6	9.3	76.1
Decile 5	52.9	78.5	12.4	80.9
Decile 6	55.3	85.2	10.5	81.3
Decile 7	57.9	86.8	13.7	82.9
Decile 8	62.2	93.8	15.4	83.8
Decile 9	60.9	92.9	18.9	88.8
Decile 10	64.5	89.6	31.8	91.3
Male	51	80.3	10.9	85.5
Female	54.3	79.9	10.2	71.3
Total	52.6	80.1	10.5	78.1

Source: HRDS, 1993, authors' computations.

Among those children who took the Primary School Leaving Exam, 8.6 per cent passed and were accepted for further study. Among those accepted, 26 per cent of them did not continue their education. Although the corresponding absolute numbers are very low (55 individuals report having only completed primary education even though they had been accepted for further education) this may indicate that secondary education enrolment is not completely supply driven. From the survey, it appears that 10 per cent of those who failed at the PSLE did nevertheless continue to a higher level of education. This could be due either to measurement error in the survey or to the fact that they continued their education in a private school. The survey fails to provide the information that would be necessary to discriminate between these two

possibilities. In particular, for those children who completed schooling, there is no information as to the system in which they studied (public or private) and for those who are currently going to school, the survey does not provide information as to their performance at the PSLE.

Nearly all the primary school attendees are enrolled in a public school. At the secondary school level, the distribution is more balanced, with 54 per cent enrolled in a public or a community school and 46 per cent enrolled in private school (one-third of the latter enrolled in religious schools). In the poorest areas and in Zanzibar, the percentage of children in a public secondary school is much higher. Religious schools enrol a larger share of the pupils in rural areas (nearly 19 per cent of secondary school students in rural areas as compared to 9 per cent in Dar es Salaam).

School expenditures reported in the HRDS Survey are questionable. Households were asked to report both the detail of their school expenditure and the total. They do not always provide complete information, and when they do, the sum of the detailed expenditures does not add up to the reported total. On average, examination of the detailed information leads to lower estimates of total expenditures than when only the total expenditures are considered. It is not clear which approach is correct. The purchase of uniforms is the largest expenditure for households in the top end of the income distribution in private schools. Tuition fees can be an important expenditure as well. It increases with the per capita expenditures of the household, to the point that it becomes the second largest item for households in the last quintile of the per capita expenditures distribution. The total cost of schooling increases with the level of education. It is higher in religious schools than in public school and is even higher in for-profit private schools. On average, for primary schools, total expenditures vary between Tsh 2 200 for households in the first decile and Tsh 19 300 for households in the last one, with uniform expenditures representing, respectively, 45 per cent and 22 per cent of these numbers.

This direct cost of education, however high, represents only a small part of total cost. According to Mason and Khandker (1996), who use two other complementary surveys on the labour force and on children's time use, opportunity cost of children's time is equal to 2-1/2 to 3 times the direct expenditures for primary schooling. Although higher in absolute number, this represents only 50 to 80 per cent of the direct expenditures at the secondary level. It should be noted that using the same data set that we do (HRDS), Mason and Khandker report much lower direct cost for schooling. In fact, they seem to base their estimates on the average of the detailed school expenditures reported by households. As noted above, the sum of the detailed expenditures is, on average, less than the reported total expenditures. As a result, it is likely that, although important, opportunity costs represent a smaller share of total cost than has been suggested by these authors.

During primary school, schooling expenditures represent only a relatively small share of total household expenditures, reaching 2 per cent for the first decile for the last year of primary schooling but below 1 per cent for the other deciles. At the secondary school level, it is far more significant, with schooling expenditure reaching 11 per cent of total expenditure in the first decile of the distribution.

A careful econometric analysis of education demand is needed in order to gain more insight into household education demand behaviour. As indicated above, there is substantial evidence of late entry at school, and this is a major concern. It is, therefore, important not to restrict the analysis of education demand to that of schooling duration but rather to focus also on enrolment age. Demand for education as well as for desired age of entry at school has been estimated in a recent paper by Bommier and Lambert (2000). Using maximum likelihood techniques to estimate simultaneously age of enrolment and schooling duration, they underscore the difference of schooling patterns between boys and girls. This estimation procedure permits unbiased estimates of age of enrolment. Their finding helps to explain that, although late entry may reflect low demand for education, it can be more specifically understood as resulting from relatively higher return to investment in a type of human capital specific to the family's economic activity.

For any individual aged between five and 25, the HRDS survey provides us with the information as to when he or she went to school for the first time, whether the individual is still attending school, and, if not, when he or she stopped attending school. The baseline hazard for schooling duration (computed from the estimation of a proportional hazard model) shows that the probability of leaving school rises sharply after seven years spent at school, which corresponds to the completion of primary schooling (see Figure 2.A7).

The estimations were conducted on a sample of 13 244 individuals aged five to 25. Table 2.A6 shows that apart from the variable "girl", all variables have opposite impacts on enrolment age as on schooling duration. For a given gender, enrolment age and schooling duration seem to vary in opposite directions. This is confirmed by the negative sign of r that shows a significantly negative correlation between the random terms of these two equations. The fact that enrolment age and schooling duration should be sensitive to the same parameters and that the effects should be of opposite signs is quite intuitive since a younger enrolment age and a longer schooling duration are both signs of a higher demand for education, as is formally shown in Bommier and Lambert (2000).

Interestingly, the impact of the variable "girl" is such that, other things being equal, girls enter school at a younger age than boys and remain at school for a shorter duration. On average, girls start school one-half a year earlier than boys. With respect to schooling duration, the last column of Table 2.A6 indicates that if a boy with a given set of individual characteristics has a 50 per cent chance to enter secondary school, a girl with a similar set of characteristics will have only a 45 per cent chance to do so.

Bommier and Lambert (2000) provide two explanations for this asymmetry between boys and girls. The first one suggests that this could be due to lower returns for pre-school experience for girls, relative to post-school experience. It may be that returns from experience in family economic activities are higher for boys since a wider range of occupations is open to them. Unfortunately, it is impossible for us to give more empirical support to this hypothesis, because the survey does not include any information that would allow us to identify these differences in the tasks performed

by boys and girls. One could think that such a difference between boys and girls of the same age would be linked to different activities in the family production unit, and it might be expected that this difference would not be the same in rural and in urban areas. This does not appear to be the case since there is no significant effect of the product of the dummy variable indicating rural areas and the "girl" variable. Such a difference could also be attributed to the pastoral activity of young boys, but here again, taking into account whether the household owns cattle does not change the impact of the "girl" variable in a significant way. It is nevertheless interesting to note that a study by Al-Samarrai and Peasgood (1998) using TADREG 1992 data set found that belonging to a cattle-herding family reduces educational demand for children compared to belonging to a farming household, but that this negative impact is stronger for boys than for girls. This finding is consistent with the explanation provided here.

The second possible explanation, complementary to the preceding one, for this willingness to send girls early to school but for a shorter period is linked with the existence of a bride-price. If this bride-price adds to post-school earnings for girls, parents will be willing to obtain this lump sum payment as early as possible in their daughter's life-cycle in order for its present value to be as great as possible. Anthropological studies indicate that in Tanzania marrying a daughter can indeed be an important source of income since the groom's family must provide numerous presents (Forster, 1995). Furthermore, beyond this visible income, there are certainly very important opportunity costs in delaying a daughter's marriage. Traditionally, an individual is supposed to give his daughter away through marriage, and failure to comply with this social obligation can be very harmful to his social relationships and can induce significant losses. Conversely, the social network acquired by marrying a daughter can also be analysed as a lump sum income that, in the same way as the bride-price itself, has a greater present value when received earlier. Hence, there are great incentives to have daughters married. Sending girls to school early might then be a way of readying them for marriage at a younger age. Unfortunately, the data at hand do not allow us to test this particular explanation any further.

In order to assess the impact of schooling costs on education demand econometrically, we first need to evaluate these schooling costs. As indicated in the second section, in Tanzania primary school was nominally free in 1993, but costs of supplies borne by parents were nevertheless important. Costs such as the purchase of school uniforms, books, or other supplies are not, however, systematically available in the survey (see above). The only direct costs that can be evaluated are transportation costs if we assume that they are related to the distance to school. This latter variable was therefore chosen as a cost indicator. This variable could also be seen as an indicator of the availability of the service. Nevertheless, given that nearly all children are within a reasonable distance of a primary school (see below), the interpretation of the result as a price effect rather than a supply effect is justified. It should be noted, however, that on average transportation costs represent a fairly small share of total schooling expenditures, so that we might not capture the full impact of schooling cost on educational demand through the distance variable. Given the absence of proper price information, it was not possible to estimate price-elasticities of demand as this was done in the case of health.

To measure the impact of the distance to school, four dummy variables were constructed (thus allowing for non linear impact), denoted $Dist_{\{i,j\}}$, equal to 1 if the distance to school is greater than *i* and smaller than *j*, and equal to zero in the reverse case. The thresholds chosen are one, three and six km. The reference category is that for which the school is situated less than one km away from the residence.

Regarding the impact of the distance to school on enrolment age, Tables 2.A6 and 2.A7 both indicate that the coefficients of $Dist_{\{1,3\}}$ and $Dist_{\{3,6\}}$ are significantly positive. This shows that children who do not live very near a school enrol later. The dummy signalling a distance to school greater than six km does not have an impact significantly different from zero. This probably results from the fact that such observations only account for 1.2 per cent of the sample.

When looking at the schooling duration equation, we find that the coefficients of $Dist_{\{1,3\}}$, $Dist_{\{3,6\}}$ and $Dist_{\{>6\}}$ are negative. The negative impact of distance is particularly strong when the distance is greater than six km. It shows that the farther away from school the children live, the shorter is their schooling duration.

The estimated effects of distance-to-school show a clear impact of schooling costs on both enrolment age and schooling duration. It is interesting to note that these effects are apparent even for relatively short distances (less than three km). An efficient policy to encourage educational demand could, therefore, be aimed at improving communication networks and public transport. Such a result is consistent with Victor Lavy's findings (1996) in the case of Ghana. It is also consistent with the findings of the Madagascar study presented in this volume.

It is essential to try to measure the impact of the availability of school supply on school demand, as it is one of the most obvious policy instruments available. Information on schooling supply is obtained through questions related to the proximity of government primary and secondary schools as well as through a few questions on the nearest non-government schools. Apart from the distance to the school nearest the household's dwelling, the survey includes a set of questions that assess the various dimensions of school quality (quality of the teachers, headmaster, environment, etc.). Most questions posed to the head of the household followed a pattern such as this: "How would you rate, between 1 and 5, the nearest government primary school in . . . (e.g. 'having well qualified teachers?' or 'teaching good written and spoken Kiswahili?')". The answers to these questions are obviously very subjective, and it is problematic to use them for the analysis of a household's attitude. However, the opinions of different households regarding a given school can be linked. In order to have quality indicators that do not relate the household's point of view, Bommier and Lambert (2000) constructed the quality variables from the average appreciation of the heads of all the other households using the same school. Such variables may still not be perfectly exogenous, as the opinions given by the different households of a small community may not be independent.

Three of the variables were used in the final estimation: the rating for the availability of school supplies, the quality of Swahili teaching, and the quality of teaching in mathematics.

The results show that the quality factor that most influences enrolment age is the quality of the teaching in mathematics. Consistent with the theoretical predictions of the model, the better this quality is, the younger the children enrol in school and the longer they pursue their schooling (although the impact on schooling duration is not significantly different from zero). The only other quality variable that has a significant effect is the quality of the teaching in Swahili that positively affects the duration of schooling (while the age of enrolment is not significantly affected).

These quality variables might also capture the impact of both other quality aspects not included in the estimation as well as unobserved community variables correlated with both school attendance and school quality. In order to control this latter problem, Bommier and Lambert (2000) introduced the average education of household heads, attempting to describe the community environment. When introduced in the estimation, as in Tables 2.A4 and 2.A5, it had no impact on the effects of the quality or distance variables.

Bommier and Lambert's estimation results also include a variable measuring the total amount of a household's cash expenditures. This variable has been introduced in order to account for a household's wealth, a major source of heterogeneity between households. Owing to the potential endogeneity of this expenditures variable, the corresponding parameter estimates should be taken with caution. However, the survey does not provide us with any other variable that could serve either as an instrument for expenditures or as a better wealth indicator. In fact, some information is available but only for the rural sector (e.g. available land, number of cattle). This variable has the expected sign, with expenditures having a negative impact on enrolment age and a positive one on schooling duration[30].

Table 2.A6 also shows that living in an urban area encourages earlier enrolment and longer schooling duration. An expected result, this could signal a difference in labour market opportunities.

The religion of the household's head has a relatively strong impact on schooling decisions. Children in Muslim households enrol in school later and for a shorter duration (nearly one year less on average) than children in Christian households (whether Catholic or Protestant).

It is interesting to note that running simple logit regression for having ever attended school, controlling for the same variables as above, suggests the rate of success at the PSLE in the region has a very strong and large positive impact. This result holds even if Zanzibar is excluded (Table 2.A8). Given the system prevailing in Tanzania whereby secondary school places are severely limited and are attributed conditionally on regional quota, the rate of success at the PSLE gives a measure of the rationing of secondary schooling in a given region. Obviously, it could also capture some differences in quality of primary schooling and/or average income between regions. Nevertheless, in the estimation presented in Table 2.A8, we control as much as possible for other sources of observable heterogeneity, in particular, for household expenditure and quality of the nearest primary school. The result, that the regional

rate of success at PSLE is positively correlated with probability of having entered school before the age of 15 years, suggests that parents anticipate the possibilities their children have for reaching secondary school level and make their decision regarding primary schooling of their children accordingly. If return to primary schooling is not high enough, and the human capital investment is rewarding only if some secondary education is obtained, the very limited availability of secondary schooling places may discourage parents. This is potentially important because it means that even if primary schooling supposedly has a higher social return than secondary schooling, it might pay, in terms of primary schooling enrolment, to direct a larger share of public resources toward secondary education.

Interactions and Externalities

In this section we attempt to understand the benefits that could accrue from further investment in either type of human capital by tracking various possible interactions between investment in health and in education.

We first look at the interactions between the investment in education of various members of the household. It is well known in the education literature that schooling decisions regarding one particular child of a household can be affected by the parents' education and related to similar decisions regarding the child's siblings.

In the HRDS, the information on the parents is only systematically available for children between seven and 15. These variables are, therefore, of limited usefulness in analysing the schooling duration. In Bommier and Lambert (2000), an estimation of the enrolment age equation restricted to the sample for which this information is available (i.e. children of the household's head who are under 15) is presented. It contains 4 725 observations. For this sample, the mother's and father's education levels are available, and these two additional variables take into account a major source of observed heterogeneity. Table 2.A7 shows that these variables have no significant effect on enrolment age in rural areas, but the mother's educational level has a significantly negative impact on enrolment age in urban areas. Thus, more educated urban mothers send their children to school at younger ages. The probability of ever going to school is also positively affected by the education level of the mother, while, here again, the father's education does not seem to be a significant determinant of the schooling decision (Table 2.A8).

The positive impact of parental education on children's achievement is a finding also seen in other studies. Al-Samarrai and Peasgood (1998) show that offspring of illiterate households have a 6 per cent lower probability of enrolling in primary school. This suggests a positive role for adult literacy programmes. Their data also indicate that a father's education has a stronger positive impact for boys and that a mother's education similarly more strongly affects the education of girls. This finding is also fairly common in educational demand studies for other developing countries and could reflect both a stronger preference for girls' education on the mother's side and a

greater bargaining power of educated mothers in household decisions. Unfortunately, Al-Samarrai and Peasgood do not control for household income so that the relatively strong effect of parental education could well be, as they acknowledge, actually an income effect.

Bommier and Lambert (2000) also try to assess interactions among siblings. For various reasons, one can expect that siblings' educational demands are not independent from one another, if only because they draw on the same household income. Specifically, they use information about the rank of the child among his or her siblings. Dummy variables identifying the eldest and the youngest child in the household have no impact on enrolment age in rural areas but are significantly different from zero in urban areas. In urban areas, the eldest begins school later while the reverse is true for the youngest. This result is consistent with the idea that there are economies of scale when having several children in school simultaneously, but it could be also explained in various other ways. An alternative explanation is that of a tight liquidity constraint. In fact, in the case where households do not have free access to credit, such a result could arise from the need for the eldest to work before entering school so as to accumulate enough money to finance his schooling. For the youngest child, the financial constraint is likely to be less of a problem since the work of older siblings might allow it to be reduced. Another possible explanation is the existence of some sort of accumulation process by the household. The youngest child will enter school earlier because the household already owns the necessary supplies (e.g. uniforms, books), so that the direct cost of schooling is lower. And because his older siblings can help him with his homework, the return to schooling is thereby improved.

The Al-Samarrai and Peasgood (1998) paper provides other findings with respect to the impact of the siblings on each other's education. The number of children in a household increases the probability of the children attending school while birth order has no effect on boys' enrolment but negatively affects the enrolment of younger girls.

An interesting way to analyse the impact of public spending on poverty is to try to evaluate its impact on outcome measures. With the available data, we cannot perform such a study with respect to education outcome. In particular, we do not have data on wages to allow us to estimate returns to education on the labour market. Mason and Khandker (1996) provide some information with this respect, using the 1991 Labour Force Survey. It is noteworthy that they find the return to secondary education to be higher than that of primary education. Based on the hourly earnings in the formal wage sector, they find the returns to education to be 7.9 per cent at the primary level and 8.8 per cent at the secondary level and to be higher for female than for male (12.8 per cent vs. 6.8 per cent at primary level). They mention casual indications that would suggest that these returns declined during the 1980s and are lower than in neighbouring countries. Sarris (1998) also provides some estimates of returns to education in Tanzania. He finds numbers ranging from 8 per cent to 12.3, which are comparable to those provided by Psacharopoulos (1985). As Mason and Khandker (1996) underline, these various findings should be taken with great care. In fact, the

vast majority of Tanzanians are involved in the informal urban sector or the non-wage agricultural sector for which no direct evidence of the returns to education exist. It would be essential to understand the returns to education in agriculture in order to appraise their role in influencing schooling decisions. In the absence of data that would allow such an estimate, the best that can be done is to base one's appraisal on what is observed in neighbouring countries. In Africa in general, but in particular in neighbouring Kenya, returns to education in traditional agriculture are very low or even nil. It is likely that the Tanzanian case is fairly similar. Assessing returns to education in Tanzania on the basis of these various estimates is nevertheless probably unreliable given the recent changes in the economic environment of the country.

In the health sector, information on outcome is more readily available in the DHS survey. The impact of public sector investments in the social sector on child nutrition can therefore be discerned simply by estimating reduced form models for stunting (or chronic malnutrition), where the height for age z-score is the dependent variable, and for wasting (or acute malnutrition), where the weight-for-height z-score is the dependent variable. These models are estimated for children up to 36 months of age using the DHS survey data discussed above. We can therefore examine the impact of education, health, and related infrastructure on actual outcomes. Since we have data for two time periods, we statistically test the parameters to determine whether the surveys can be pooled. We perform this test separately for each nutrition model and find that we can only pool the weight-for-height models. Therefore, in the case of the height-for-age models, we present separate models for the two time periods.

The first two columns of Table 2.A9 present the results where the dependent variable is the standardised anthropometric height-for-age *z* (HAZ) score. The set of predictors consists of characteristics of the child (e.g. age, gender, birth order); household demographic variables such as household size and age-sex composition, sanitation and access to water; characteristics of the parents (e.g. educational attainment, age and height); community characteristics where available (e.g. distance to nurse and doctor, vaccination prevalence); and variables not shown, specifically the month of the measurement (to control for seasonality) and region dummies.

Results indicate that the availability of prenatal care with a nurse has positive and significant effects on child nutrition outcomes. These effects are much larger in the more recent survey. We also find large and significant effects of post-primary schooling among mothers and fathers, in both survey periods. Access to flushing toilets also has large positive effects on nutritional outcomes. While the parameter estimate for piped drinking water is positive, as expected, it is only significant in the former period.

Among the other significant parameters in the models, we find that children of multiple births and male children are at greater risk of being malnourished. We also find that children below the age of one year are less likely to be stunted than children in their second year, presumably when the process of weaning begins. The model of acute malnutrition, as measured by the weight-for-height z-score, is found in column 3. The model explains less of the variation in observed z-scores than we found with

chronic malnutrition. Among the notable differences we do not find are that neither a father's education nor the type of toilet and drinking water has an effect on wasting. These observations are consistent with the general literature on the determinants of nutrition and may be explained by the more stochastic nature of acute episodes of short-term malnutrition measured by weight-for-age than the chronic malnutrition measured by height-for-age.

Conclusion

Poverty in Tanzania, measured by traditional utility-based metrics as well as by basic capabilities to function (Sen, 1987), has shown little sign of improvement and remains among the worst of any country in the world. Despite the many years of Tanzania's adherence to a socialist paradigm of development, with its people-first ideology, it is clear that the state has failed to provide for the basic needs of its population — either indirectly through the development of a vital market economy, or directly through the efficient provision of social services. Even the generous contributions of donors and the international financial institutions in support of the government's efforts to promote social development have failed to raise the living standards of the population to a level where even the most basic of needs are realised for the majority of the population. There is some room for disagreement as to the root causes of this failure. There is, however, no doubt that policies that contributed to economic stagnation, coupled with public expenditure policy which ultimately was not particularly progressive or efficient, are proximal causes of Tanzania's human resource crisis.

Given the tight budget constraint of the government, scarce resources have to be carefully allocated to meet policy objectives. As we are concerned with the impact of public expenditure policy on the poor, we can clearly identify improved progressivity and efficiency in social spending as a means of both improving distributional outcomes and enhancing the quality of human resources. Such a conclusion arises first from the incidence analysis presented in this paper. The results, reported in the third section, suggest that, among the various possible education and health sub-sectors, the most progressive public spending would be on primary schooling and non-hospital care, particularly in rural areas. Within these sectors, school feeding and antenatal care are the most progressive forms of spending, although the dominance results hold only when using the Gini criteria. This analysis therefore gives some guidance as to the most efficient sub-sector to channel fiscal resources, if trying to target the poor.

Although this type of analysis seems to lead to straightforward policy conclusions, its limits are now well understood. It provides a static picture of the beneficiaries of existing expenditures, but it does not give any insight as to who will benefit from a marginal increase of the expenditures directed toward one particular sub-sector. It also does not either give any information on the actual level or quality of services, or the actual outcomes, that the government expenditures provide. Although a measure

of the actual level and distribution of benefit would be crucial to assess correctly the redistributive power of each type of public expenditures, we are not able to offer such insight based on the available data in the Tanzanian case.

Nonetheless, to gain more insight into health and educational outcome of social sector spending, we conducted demand analysis for both health and education services.

Within the health sector, demand analysis indicates that consumers are extremely responsive to prices and the quality of health services. They substitute freely between public and private sector options, as well as between hospital and non-hospital care. Consumers are also willing to pay dearly for improvements in quality. This clearly implies that the state should be promoting a pattern of spending on health services that provides incentives for the public sector to improve the quality of health care personnel, the availability of drugs, and the cleanliness and quality of health centres, clinics, and dispensaries. Even if this involves significant increases in user fees, consumers are likely to be willing to pay for such improvements. Likewise, the positive role of the private sector in providing health care needs to be nurtured. There are undoubtedly ways that government can create incentives and an environment conducive to enlarging the private sector's role in health delivery. While such efforts, such as training more medical care personnel and providing incentives to open private clinics, may compete with investment in public sector, such private sector initiatives should be seen as complementary to a strategy that aims to ensure access to services for poor and non-poor alike.

Within the education sector, although primary education appears more progressive than secondary schooling, our findings suggest that this conclusion needs to be taken with caution for several reasons. First, as discussed in the second section, quality of primary education is a major problem. In fact, in order for the investment in schooling to yield reasonable returns, parents have to supplement the publicly provided service in various ways, including tuition payments. Thus, although attendance at public primary schools is rather progressive, the level of subsidy is in fact difficult to determine given that user fees are widespread and critical to the functioning of public education. While relatively little is known about the private fees paid to attend public school, the evidence available indicates that households in the top decile of the expenditure distribution pay tuition fees more than 100 times greater for each of their children than households in the bottom decile. In turn, this has implications for schooling quality, presumably implying that it is much higher in wealthier areas of the country. Although casual evidence suggests that quality of schooling is a determinant of educational demand, the HRDS data do not provide quality measures that permit confident measurement of this impact. Nevertheless, the quality of the teaching of mathematics appears to be the most important component that we could isolate to explain enrolment.

Second, findings of the fourth section also suggest that additional public expenditures in the secondary school sub-sector might be more progressive than they appear at first sight. Quite simply, there is evidence that improving the quantity and

quality of secondary schools may be an effective means to reverse the downward trend in primary schooling enrolment. In fact, it appears that a higher supply of secondary schooling places, as captured by the rate of success at the PSLE, induces a higher demand for primary education. Unfortunately, we do not have enough data to determine whether the opening of places in private secondary school can play the same role with respect to the incentives that it would provide for primary schooling as compared to the opening of places in the public sector.

If we accept the idea that primary school is the most progressive sub-sector, the question of how to increase demand for education, particularly by the poor, is essential. We find, like most studies about education demand in Africa, that reducing the direct cost of schooling would increase demand. More specifically, looking at the education demand analysis, it appears that distance to primary school is a fairly strong deterrent to such demand. The analysis suggests that improving transportation to school would increase the demand. Nevertheless, given that transportation is only a very small share of total cost, such a measure is likely to have a limited impact. Insofar as what is measured here can really be assimilated to a price effect, we can infer that reducing other costs would also have a positive effect on schooling demand. Note that the actual policy (discussed above) of increasing direct fees and rendering necessary the purchase of complementary inputs (like tuition) goes in the opposite direction.

Furthermore, results of the fifth section suggest that adult literacy courses might also effectively increase the educational demand at primary level. Given that illiterate parents are more likely to be found at the bottom end of the income distribution, public spending in this sub-sector is likely to be progressive compared to expenditure distribution.

Finally, it is worth noting that these results have been obtained on the basis of 1993 data. The situation in terms of the challenges faced by the government in providing basic health and education services has evolved notably in Tanzania since this time, and the policy conclusions provided above have to be viewed with some caution. The most important change with respect to the situation in the social sectors in the last decade has been the emergence of AIDS. The nature, magnitude, and consequences of the growing problem of AIDS in Africa has been the subject of careful study and related policy analysis (see Ainsworth and Over, 1998; UNAIDS, 2000). In the absence of precise data and careful analysis of this issue, we cannot arrive at policy conclusions in the context of the present study. Nevertheless, the prospects of the major demographic and economic consequences of the AIDS epidemic suggest that both in the domain of preventive and curative care, far more attention needs to be given to dealing with the growing problem of AIDS. Furthermore, if, as indicated by the World Bank country economic memorandum (2000), there is a high prevalence of AIDS among the poor, and the disease has the dramatic impoverishing consequences mentioned earlier in this paper, greater action on the part of government and civil institutions to combat AIDS would certainly benefit the poor.

In the final analysis, AIDS is just one manifestation of the human dimensions of economic failure and the related weakness in political, civil and economic institutions that grip Tanzania, like much of sub-Saharan Africa. The challenges posed by diseases such as AIDS, tuberculosis, and childhood malnutrition and the lack of good schools and low levels of education, along with related characteristics of Tanzania such as technological backwardness and ecological degradation, are daunting. The costs in terms of lost productivity are undoubtedly staggering, and the human dimensions are equally deplorable. Nonetheless, the financial cost of addressing the crisis in health and education is beyond the reach of the Tanzanian government and civil society; and apparently, the crisis in the social sectors is beyond the will of the international financial institutions and donor countries to tackle effectively. A renewed commitment on the part of the state and international community is thus immediately required to break the cycle of poverty and ignorance leading to a population characterised by low levels of education and widespread disease. Motivating and realising that commitment is the first step in what will inevitably be a long battle against lifting much of Tanzania's population out of the poverty trap in which it finds itself.

Notes

1. Conducting this study would not have been possible without the help of ESRF, Dar es Salaam, Tanzania, in particular through the person of Dr Haji Semboja. Sylvie Lambert expesses her gratitude to Antoine Bommier for his collaboration with her which served as a basis for part of the present chapter and to Moses Msuya who provided excellent research assistance during her stay in Tanzania. Numerous people took the time to answer our queries. We would like to thank in particular Alexander Baum, Frederick Kigadye, Faustin Mukyanuzi, Benno Ndulu, Josef Semboja, Isabelle Sévédé-Bardem, Paula Tibandebage, Tsidi Tsikata and Samuel Wangwe. We are also grateful to Pr Hans-Rimbert Hemmer for providing us with very useful comments.

2. For a more detailed discussion of Tanzania's economic performance, and in particular the effects of economic crisis and adjustment, see Sarris and van den Brink (1993), Sahn (1996) and Sahn, Dorosh and Younger (1997).

3. A detailed description of Tanzania's macroeconomic background since independence is provided in Bingsten and Danielsson (1999). A discussion on the process that led to economic stagnation is also presented in the Tanzanian case study of the OECD Development Centre (Azam *et al.*, 1989).

4. According to the World Bank (1999), in 1993 the Gini coefficient for consumption expenditures in Tanzania was 38.1 while it was 43.4 in Madagascar. Since it is not clear how comparable the data are in these two countries, no hasty conclusion should be drawn from these numbers.

5. The poverty line used is set at 50 per cent of the mean adult-equivalent expenditure level.

6. The national capital became Dodoma in the centre of the country in 1973, but economic activity as well as most administrative activity remain principally located in Dar es Salaam.

7. Sahn and Stifel construct an index of the household assets of the form

$$A_i = \hat{\gamma}_1 a_{i1} + \ldots + \hat{\gamma}_K a_{iK}$$

where A_i is the asset index, the a_{ik}'s are the individual assets recorded in the survey, and the g's are the weights, which we must estimate. Because neither the quantity nor the quality of all assets is collected, nor are prices available in the data, the natural welfarist choice of prices as weights is not possible. Rather than imposing arbitrary weights, they let the data determine them directly using factor analysis

which accounts for the covariance of the assets in terms of a much smaller number of hypothetical common variates, or factors (Lawley and Maxwell, 1971). In addition, it allows for asset-specific influences to explain the variances. In other words, all of the common factors are not forced to explain the entire covariance matrix. They assume that the *one* common factor that explains the variance in the ownership of the set of assets is a measure of purchasing power, or "welfare".

8. While mother-to-child AIDS transmission rates are around 5 per cent in France and the U.S., they are between 25 and 35 per cent in the developing world (UNAIDS/ WHO in Progress of Nations.)

9. Estimates are that at the end of 1997, over half a million Tanzanian children under 15 years of age had lost a mother or both parents to AIDS, a rate of approximately 36 per 1 000. Current estimates are of one million AIDS orphans.

10. Source: Mr Mjagila, in charge of the COBEC programme at MOEC

11. Madagascar ranks 147th according to this indicator.

12. Based on purchasing power parity figures, Tanzania's performance is even worse, ranking 209, with a PPP of $490.

13. The primary source of information for this overview is the World Bank Social Sector Review, April 1995.

14. Bingsten and Danielsson (1999) provide a comprehensive discussion on aid in Tanzania since independence. They point out in particular that the yearly aid in the 1980s reached levels that were far above the absorption capacity of the Tanzanian economy. They also underline the fact that the design of aid through "projects" generate a multiplication of administrative layers that is not conducive of good governance.

15. Tibandebage and Mackintosh (1999).

16. The longstanding relationship between donors and the government leads one to expect the government would adjust its spending in the absence of donor funds. Thus, government spending, net of donor aid, likely does not reflect the government's preferred division of health resources.

17. Until 1966, primary education had 8 levels — Standard 1 to 8.

18. For further details of the education system on mainland Tanzania, see Peasgood *et al.*

19. This cost is covered by the state, by voluntary contributions, fees, institution based income, household direct payment and external aid.

20. These numbers probably underestimate the actual difference between the per capita public spending at primary and secondary level. In fact, the figure indicated for primary schooling results from the ratio of basic education expenditure to the enrolment in primary school. The denominator is not perfectly correct though, given that basic education also includes adult literacy classes and taking the enrolment in these classes into account would nearly double this denominator (passing from 3.9 million to 7.25 million). Nevertheless, it is likely that per capita spending for adult literacy classes represents only a fraction of what is spent on primary schooling so that the numbers given by Mukyanuzi are overestimated but not too far from true numbers.

21. Yitzhaki (1983) shows that an extended Gini coefficient can adjust the weight given to each point on a Lorenz curve and thus give a clearer notion of how more progressive social welfare functions would rank distributions. The coefficient is defined as:

$$G(v) = -v * Cov\{y,[1-F(y)]^{(v-1)}\} / \bar{y} \quad v>1$$

where *y* measures households' welfare (consumption per capita); *F(y)* is the cumulative density function of the welfare ordering; $\bar{y}$ is mean welfare; and *v* is a parameter that affects the weighting of each point on the Lorenz curve. G(2) yields the traditional Gini coefficient, while values of *v* greater than 2 yield measures that give an even greater weight to poorer households. If we replace income (but not its distribution) in this expression with the value of benefits of a social service, we get an analogous measure of that service's concentration. By calculating the extended Gini coefficient for increasing values of *v*, we can gain a sense of how a more progressive (yet still cardinal) social welfare function ranks the value of a given public service.

22. See Sahn and Younger (1999) for a more detailed discussion.

23. Although there were some data on post-secondary schooling, we do not show them here since the numbers of individuals were too small to give reliable results.

24. Specifically, we define equivalent incomes as:

$$Y_i^{*=} Y_i/(A_i + cK_i)^{\theta},$$

where θ represents the elasticity with respect to household size (i.e. the size or equivalence elasticity), Y_i is household income, and A_i and K_i is the number of adults and children in the household, respectively. When $c = \theta = 1$, we have simple per capita scaling. We test the sensitivity of the use of the per capita scaling to the use $c = 1$ with $\theta = 0.5$.

25. According to the extended Ginis, the dichotomous variable dominates the value curve for this category of school services.

26. Self-care, care by traditional healers and spiritualists, as well as visits to the pharmacy are not counted as treatment for the purpose of this table.

27. In the remainder of this section, we will refer to public dispensaries, clinics and health centres as "public non-hospitals" or "public other".

28. This assumption is defensible in rural areas, given the distance between facilities. However, in urban areas, there are a large number of accessible options for both public and private care. Thus, it is not feasible to identify a limited choice set to model discrete demands.

29. Looking at individuals older than 21, we find the same proportion of non educated people on average but the gender gap is wider with 31 per cent of the women and 19 per cent of the men having no education. This reflects the fact that the increase in the share of enrolled children experienced since 1978 helped, narrowing the gender gap.

30. This impact is non-linear, the quadratic term being significant and of opposite sign to the linear one.

Appendix

Table 2.A1. **Recurrent Budget Health Sector Expenditures by Input for 1996/97**
(percentage shares)

	Total	Referral Hospitals	Regional/ District Hospitals	Health Centres & Dispensaries	Regional and MOH Preventative Service	Training	All Other Health[a]	Administration
Personal Emoluments	58	61	53	60	62	45	48	59
Travelling/Visits	0	0	1	0	0	1	6	10
Facility								
Operations/Maintenance	3	4	4	2	1	6	25	26
Travel and Treatment Abroad	1	8	0	0	0	3	0	0
Total School Costs	0	0	0	0	0	7	2	1
Food	2	2	2	2	0	20	0	0
Drugs	17	14	13	31	0	0	0	0
Materials and Supplies	3	1	2	2	11	0	6	0
Internal Subventions	12	9	22	0	19	14	0	0
Testing	0	0	0	0	0	2	0	0
Other	3	1	3	3	6	1	13	4
Total	100	100	100	100	100	100	100	100

Note: a) Includes Chemical Laboratory and TUKUTA.

Sources: World Bank, 1999, Vol. 2. Budgeted Expenditures from the recurrent budgets for Ministries and Regions and budgeted expenditures from the District recurrent budgets for 1996-97.
Ministry budgets include MO Health, MO Labour, MO Community Development, Prime Minister's Office.

Table 2.A2. **Budgeted Donor Health Spending by Programme, 1996/97**

	Donor Budget (Tsh MM)	Share of Total Donor Spending (percentages)	Donor Share of Total Spending (percentages)
TOTAL	**12 841**	**100**	**21**
Total Curative	2 369	18	6
Regional Hospitals	0	0	0
Regional and District Hospitals	1 112	9	7
Dispensaries/Health Centres	1 257	10	7
Preventive	10 472	82	63
Ministerial Administration	0	0	0
Training	0	0	0
Other	0	0	0

Source: Government Central and regional development budgets.

Table 2.A3. **Basic Education Shares of the Education Sector Public Resources**

	FY 1995	FY 1996		FY 1997		FY 1998
	Actual	Budget	Actual	Budget	Actual	Budget
GoT total recurrent and development expenditure	299 733	310 177	320 446	434 336	383 18	479 485
Grand total education expenditure - TSh million	79 165	84 776	79 098	91 515	95 467	106 947
Spending on education as a percentage of total recurrent and development expenditure (%)	26.41	27.33	24.68	21.07	24.91	22.30
Basic education - TSh million	49 174	54 298	51 602	59 197		68 895
Basic education as a percentage of total	62.1	64.0	65.2	64.7		64.4

Source: URT and World Bank, 1999.

Table 2.A4. **Change in Probability of Choice With Respect to Change in Price** ($\Delta Prob_i / \Delta \ln P$)

Prob-Price	No Care	Pb Hospital	Pv Hospital	Pb Other	Pv Other
NO CARE	0.0000	0.0122	0.0092	0.0474	0.0181
PB HOSP	0.0000	-0.0393	0.0108	0.0072	0.0024
PV HOSP	0.0000	0.0127	-0.0302	0.0054	0.0024
PB OTHER	0.0000	0.0102	0.0065	-0.1280	0.0544
PV OTHER	0.0000	0.0042	0.0036	0.0680	-0.0773

Table 2.A5. **Willingness to Pay for Quality Improvements**

	Improve Quality from :	
	Low to Medium	**Medium to High**
	% of Income per Capita	
Doctors	1.20	1.00
Drugs	0.88	0.63
Environment	0.21	0.61

Table 2.A6. **Age at School Enrolment and Schooling Duration in Tanzania**
Sample of the 5 to 25 Year 0lds

	Coefficient	Standard Error	Marginal Effects at Thresholds [a]
Determinants of the age at school enrolment:			
Girl	-0.457 ***	0.045	
Urban	- 0.221 ***	0.062	
Zanzibar	- 0.314 ***	0.113	
Religion			
Muslim			
Catholic	- 0.195 ***	0.059	
Protestant	- 0.174 ***	0.065	
Other religion	- 0.113	0.081	
Household yearly expenditures	- 0.372 ***	0.051	
Square of (Household yearly expenditures)	0.016 ***	0.006	
Distance to the closest primary school:			
dist ≤ 1 km			
1 km < dist≤ 3km	0.238 ***	0.051	
3 km< dist≤ 6 km	0.253 **	0.112	
dist< 6 km	0.284	0.23	
Average education of household heads in the cluster	- 0.029 *	0.015	
School quality:			
Supplies	- 0.039	0.054	
Swahili teaching	0.096	0.096	
Mathematics teaching	- 0.182 *	0.103	
Constant	9.835 ***	0.267	
Determinants of schooling duration (ordered probit):			
Girl	- 0.134 ***	0.029	- 0.053
Urban	- 0.020	0.039	- 0.008
Zanzibar	0.414***	0.054	- 0.161
Religion			
Muslim			
Catholic	0.293 ***	0.040	0.115
Protestant	0.308 ***	0.044	0.121
Other religion	0.106 **	0.054	
Household yearly expenditures	0.547 ***	0.035	0.160 [b]
Square of (Household yearly expenditures)	- 0.036***	0.004	
Distance to the closest primary school:			
dist ≤ 1 km			
1 km < dist≤ 3km	- 0.155 ***	0.034	- 0.062
3 km< dist≤ 6 km	- 0.110	0.070	- 0.043
dist< 6 km	- 0.732***	0.105	- 0.268
Average education of household heads in the cluster	0.083 *	0.010	0.057
School quality:			
Supplies	0.048	0.035	0.009
Swahili teaching	0.139 **	0.063	0.017
Mathematics teaching	0.090	0.070	0.012
Parameters			
log (o_u)	0.797 ***	0.006	
se_1 (first threshold)	0.130	0.190	
log (se_2 - se_1)	- 0.720 ***	0.043	
log (se_3 - se_2)	0.603 ***	0.014	
tan ($\pi/2$)	- 0.266 ***	0.028	
Number of observations: 13244			

Notes:
* significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level.
a) Ordered probit being non linear, marginal effects are observation specific and cannot be easily summarised. To give an idea of the order of magnitude of the observed effects, we report in this column the impact of change in an independent variable on the probability to reach at least a five level of schooling for an individual who had exactly 50 per cent chance to reach it in the first place. For dummy variables, this should be read as the marginal impact of setting this dummy to one rather than zero, other things being equal, while for continuous variables it indicates the impact of a change by one standard deviation. For example, the marginal effect of the girl variable is equal to 5 per cent. This means that if a boy has 50 per cent chance to enter secondary school, a girl with the same characteristics will have only 45 per cent chance to do so.
b) This number includes the effect of the square term is computed at the average level of expenditures.
Source: Bommier and Lambert (2000)).

Table 2.A7. **Age at School Enrolment (Censored Normal Regression)**
Sample of 7 to 15 Year Olds

	Coefficient	Standard Error
Girl	- 0.387 ***	0.061
Zanzibar	- 0.361 **	0.185
Urban	0.190	0.142
Religion		
Muslim		
Catholic	- 0.301 ***	0.080
Protestant	- 0.279 ***	0.088
Other religion	- 0.179	0.110
Household yearly expenditures	- 0.452 ***	0.081
Square of (Household yearly expenditures)	0.029 ***	0.010
Distance to the closest primary school:		
dist $\leq$ 1 km		
1 km < dist$\leq$ 3km	0.152 **	0.071
3 km< dist$\leq$ 6 km	0.286 **	0.144
dist< 6 km	1.039 ***	0.284
Mother's education	0.005	0.013
Father's education	- 0.014	0.013
Oldest	- 0.086	0.100
Youngest	0.049	0.130
Cross-effects:		
(mother's education)* Urban	- 0.083 ***	0.018
(father's education) * Urban	0.001	0.017
oldest * Urban	0.281 **	0.142
youngest * Urban	- 0.374 **	0.177
School quality:		
Supplies	0.000	0.072
Swahili teaching	0.191	0.129
Mathematics teaching	- 0.023	0.138
Average education of household heads in the cluster	- 0.043 *	0.023
Constant	9.339 ***	0.373
Ancillary parameter	1.959 ***	0.024
Number of observations: 4725		

* significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level.

Source: Bommier and Lambert (2000).

Table 2.A8. **Probability of Having Entered School for Children Aged 7 to 15**
(logit estimates)

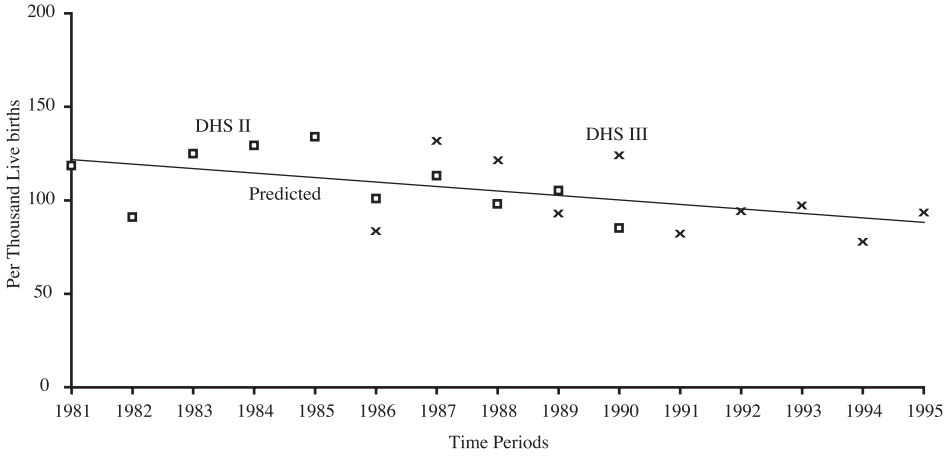
	Coefficient	**Standard Error**
Boy	-0.2634	-0.3476
Age	0.7577***	0.0941
Dar es Salaam		
Coast zone	2.4346***	0.6965
Northern zone	2.4437***	0.9341
Central zone	3.1554***	1.0251
Lake zone	1.7456**	0.7469
Western zone	2.5869**	1.0142
Southern Highlands	1.1633	0.8077
South	2.6558**	1.0722
Zanzibar	-10.5937*	5.5468
Distance to the closest primary school		
1 - 3 km	-0.2412	0.4152
3 - 6 km	0.9271	1.6161
Muslim		
Catholic	0.0826	0.5591
Protestant	-0.3795	0.5188
Other religion	-0.5447	0.8241
Household yearly expenditures	0.9743*	0.5478
Square of	-0.6540	0.0898
Average education of household heads in the cluster	0.0259	0.1497
School quality		
Teachers	0.9437	0.9403
Supplies	-1.1072**	0.5009
Swahili teaching	-1.3559	0.8555
Mathematics teaching	2.2015*	1.2085
Urban	0.0071	0.4678
Regional success rate at PSLE	17.8712**	7.7591
Mother's education	0.3603**	0.1831
Father's education	0.2033	0.1985
Constant	-13.4178	3.1400
Number of observations: 394		

* significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level.

Table 2.A9. **Determinants of Nutritional Status**

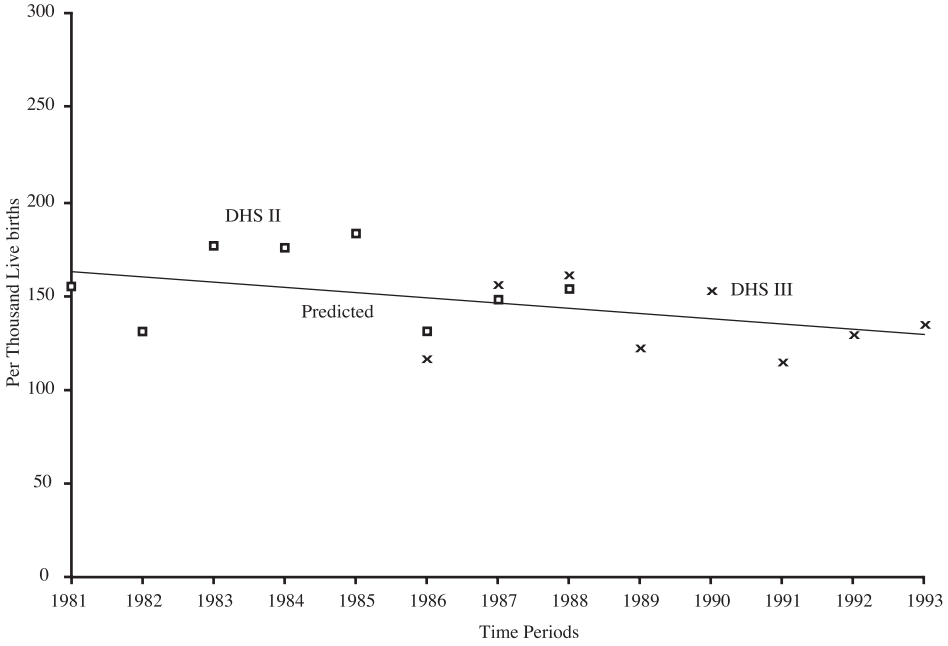
	Height for Age				Weight for Height	
	1991		1996		Pooled	
Variables	Coefficient	t statistic	Coefficient	t statistic	Coefficient	t statistic
Non-self cluster means						
Prenatal care w/ doctor	0 051	0 268	0 005	0 023	-0 044	-0 344
Prenatal care w/ nurse	0 007	0 081	0 445	4 497	0 139	2 345
Child vaccinated	0 167	0 657	0 307	0 983	0 319	1 848
Mother received tetanus injection	0 096	0 525	-0 066	-0 285	0 128	1 007
Child gender dummy (male=1)	-0 148	-3 587	-0 076	-1 613	-0 043	-1 526
Multiple births	-0 852	-6 446	-1 082	-6 988	-0 111	-1 244
Birth Order	-0 060	-3 169	0 004	0 181	0 007	0 520
Child dummy for age 3-6	1 226	21 023	1 385	20 854	0 931	23 614
Child dummy for age 7-12	0 583	9 725	0 715	10 379	0 270	6 645
Child dummy for age 25-35	0 024	0 456	-0 004	-0 072	0 231	6 385
No. of HH members age < 5	0 009	0 373	-0 013	-0 465	-0 016	-0 901
No. of HH girls age 5-15	0 005	0 246	-0 070	-2 549	-0 031	-2 071
No. of HH boys age 5-15	-0 055	-2 828	-0 031	-1 099	-0 008	-0 456
No. of HH women > age 15	-0 081	-2 539	-0 013	-0 288	0 027	1 768
No. of HH members	0 034	3 670	0 026	2 058	0 003	0 029
Household head gender (male=1)	-0 113	-1 653	0 019	0 281	-0 003	-0 070
Age of mother	0 054	1 729	0 090	2 338	0 010	0 460
Squared age of mother	0 000	-0 789	-0 001	-2 049	0 000	-0 697
Educ. of mother -- primary	0 107	2 108	0 013	0 206	0 075	2 161
Educ. of mother -- post primary	0 214	1 536	0 283	1 867	0 187	2 037
Educ. of father -- primary	-0 033	-0 576	0 111	1 605	-0 016	-0 416
Educ. of father -- post primary	0 304	3 003	0 293	2 543	0 040	0 584
Dummy for no info on father's education	-0 058	-0 654	-0 107	-0 950	0 007	0 142
Mother's birthplace (urban=1)	0 076	1 131	0 209	2 751	0 022	0 480
Flush toilet	0 654	3 320	0 606	3 037	-0 055	-0 439
Piped drinking water	0 127	2 201	0 047	0 804	-0 006	-0 156
Urban dummy	0 040	0 595	0 095	1 211	0 036	0 776
Constant	-2 976	-5 861	-4 203	-6 846	-1 232	-3 513
Number of observations	3 901 000		3 247 000		7 265	
R-squared	0.172		0.207		0.0933	
Adj R-squared	0.164		0.198		0.0874	

Figure 2.A1. **Infant Mortality in Tanzania**



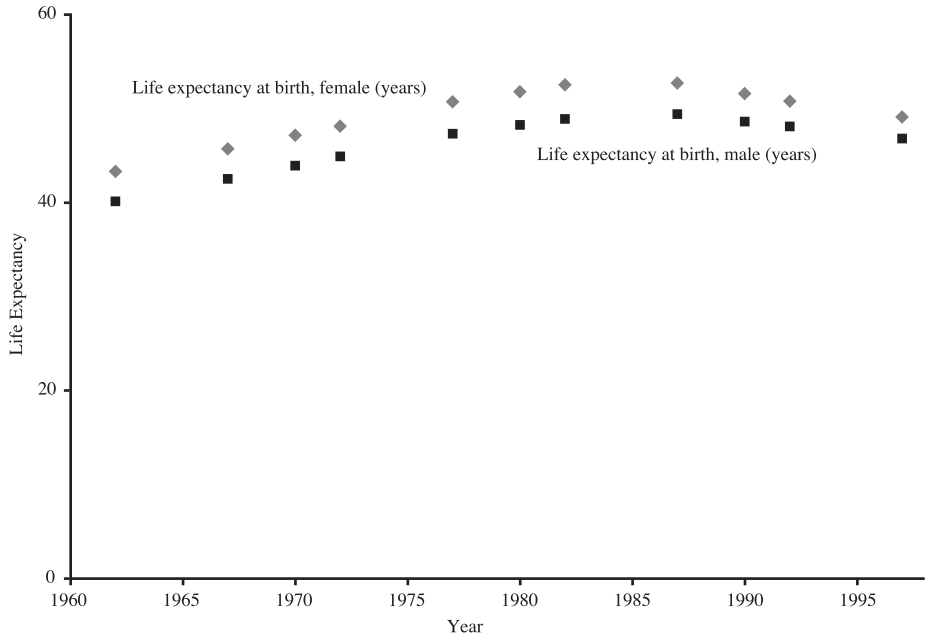
Source: Retrospectives from DHS II (1991) and DHS III (1996).

Figure 2.A2. **Childhood Mortality in Tanzania**



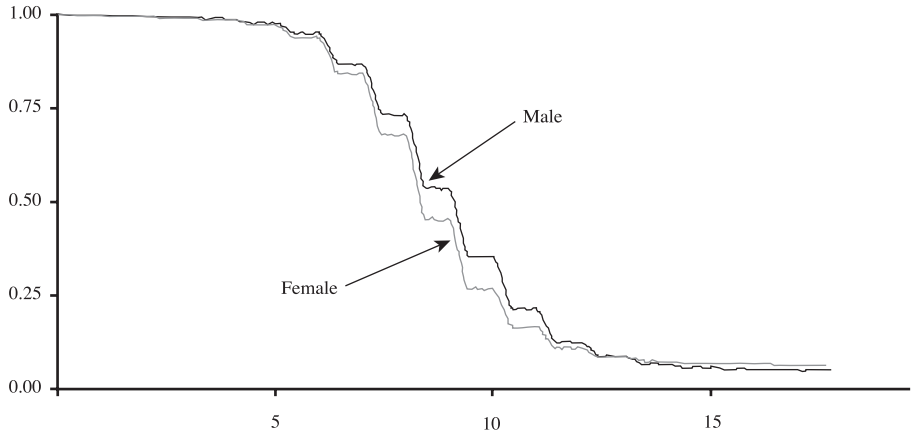
Source: Retrospectives from DHS II (1991) and DHS III (1996).

Figure 2.A3. **Life Expectancy in Tanzania**



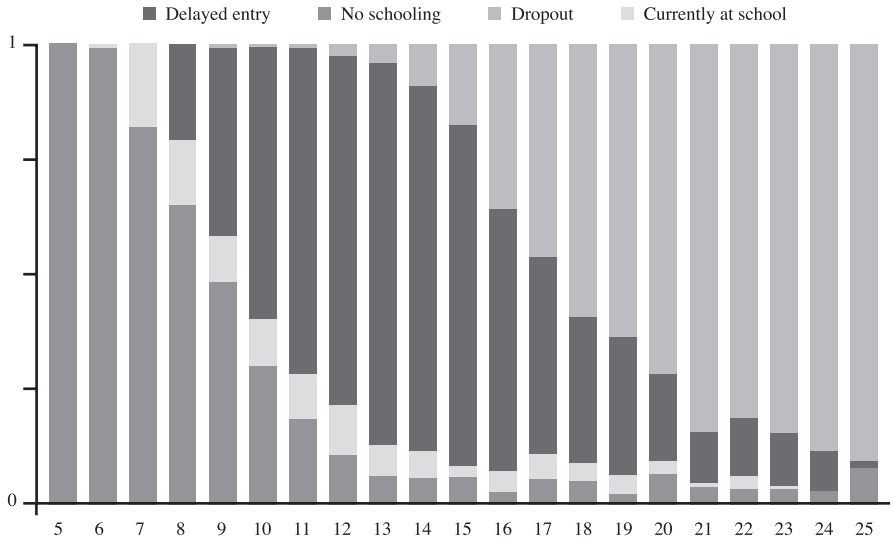
Source: World Bank, *World Development Report 1999.*

Figure 2.A4. **Kaplan-Meier Survival Function For School Enrolment**



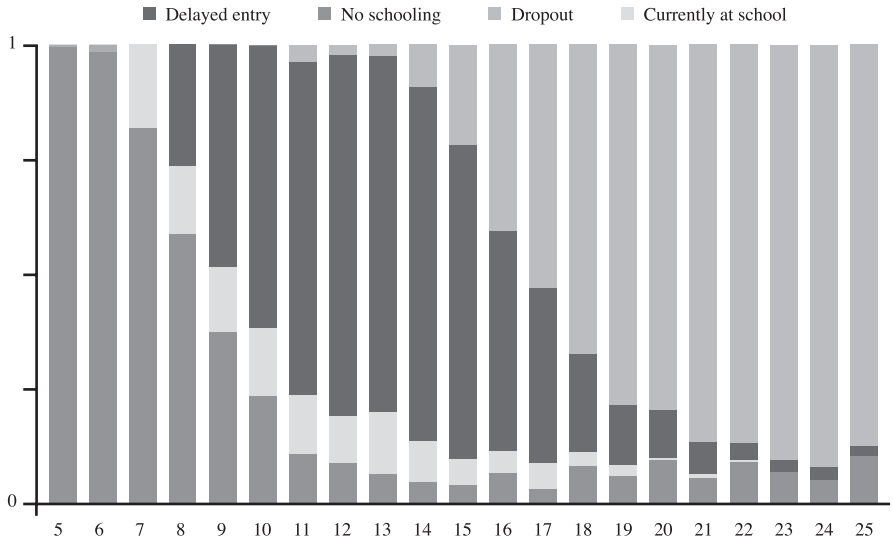
Source: Bommier and Lambert (2000).

Figure 2.A5. **Delays at School Enrolment for Boys Aged 5 to 25**



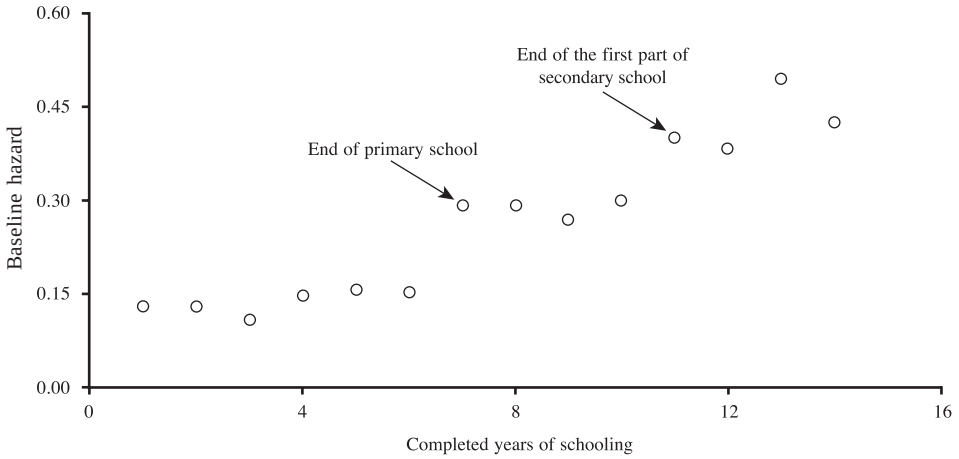
Source: Authors' calculations.

Figure 2.A6. **Delays at School Enrolment for Girls Aged 5 to 25**



Source: Authors' calculations.

Figure 2.A7. **Baseline Hazard for Schooling Duration**



Source: Bommier and Lambert (2000).

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Comments

Hans-Rimbert Hemmer

S. Lambert and D. Sahn have delivered an excellent country study on Tanzania. Their analysis is convincingly clear, and the results can be accepted thoroughly. Insofar my comments are not so much directed towards those aspects that are included in the study but on those that are missing. Because I am a macroeconomist, mainly researching in the fields of economic growth (which is a field of dynamic economics) and of poverty fighting (which is a field of dynamic economics too), my arguments come from a macroeconomic point of view.

I will structure my comments in accordance with the structure of the study, that means sectionwise. Especially, I do not want to discuss the econometric findings in detail. Instead I prefer to think about the plausibility of the results, and I will ask some questions about economic reasons for the indications shown. In this context, I have to confess that I was for a couple of years strongly involved in the German Development Assistance, that means in politics. Therefore my comments are going to have a political bias (and this is not in the least justified by the unreliability of Tanzanian statistics).

Comments on section: Introduction

What type of a country are we talking about? Tanzania is very poor, it has an unequal distribution of income, and it was for a long time socialistic. Is that an explanation? Or is it because Tanzania was for a long time overaided? Overaided with respect to investment finance, but underaided with respect to its ability to cover the recurrent costs of the development projects financed formerly? And did Tanzania suffer more or less than its sub-Saharan African neighbours from the economic crisis of the 1980s and 1990s? The authors of the report give us some data, and they also compare Tanzania with sub-Saharan Africa, with all developing countries, and with the least developed countries. Interestingly, according to the present data on income distribution and poverty incidence, it is hard to believe that there was really a socialistic period in recent Tanzanian history!

Comments on section: Supply of Health and Education Services

With respect to health, the report shows the development of the health service supply from independence until today. This sector development shows dramatic changes: After the optimistic period of the 1960s and 1970s which showed a remarkable growth reaching an almost complete coverage of Tanzania with health stations of different levels, the 1980s and 1990s can be interpreted as the time of backwash and deterioration. The expansion was heavily subsidised by foreign aid, and it led to a situation that Tanzania was not able to finance the recurrent costs needed to operate such a health system. This was typical for many development activities which concentrated on investment finance only without taking into account the running costs later on. As a consequence, since the 1980s the health policy has changed. The monopolistic position of public services has been abandoned, new assessment criteria started to be used, and user charges have been introduced. And finally, not only the amount of foreign aid but also its bias has changed towards more preventive than curative spending. The study explains this development solidly, including some information about past and present weaknesses of the Tanzanian health supply system.

A similar presentation is made with respect to education. In this second subchapter of the second section, the authors start by showing the development of the education system since independence. Here they figure out similar structures to those in health: the 1960s and 1970s are the expansion decennia, the 1980s and 1990s the years of backwash and deterioration — or is it consolidation? Similar experiences as in the health sector are identified: the end of public monopoly, the opening of the sector for private activities (in secondary education more intensive than in primary education), and the introduction of direct and indirect schooling fees. What is missing, however, is some information about informal education. Furthermore, in secondary education co-operation between the state and private industry goes on. As a consequence, important contributions to secondary education (especially in the field of vocational training) are given by industry. Here an important educational aspect is covered which should be looked upon more than it has been up to now in educational analyses.

Comments on section: Expenditure Incidence

This chapter analyses the extent that government actions — especially those in the social sectors, namely health and education — redistribute resources to the poor. The analysis is mainly based upon Lorenz curves. This is a static concept, but owing to data shortcomings no dynamic analysis could have been provided. The authors start with a methodological discussion showing the limitations of the analysis (again, owing to data restrictions). After that, they document that primary education has the most progressive effect followed by non hospital care; this progressive effect is much stronger than that of overall government expenditures. In the case of secondary schooling and hospital care, no remarkable difference to expenditure incidence has been found. This result is not surprising because it fits completely with the theoretical findings of development economics.

Additional calculations have been made by the authors with respect to prenatal care, public employment and electricity, all of them contributing much less to income redistribution than primary education and non hospital care. The authors not only present their statistical results but give also some explanations for the logic of their results.

However, a "perfect" incidence analysis requires the inclusion of the distributional effects of expenditure finance, especially of the domestic part via taxes. Clearly, this aspect could not be included in the study, but it should get more interest in the political debate about social spending schemes.

Comments on section: Demand for Services

A demand analysis is necessary to find out whether the supply structure of the services under consideration is appropriate to the needs of the population — especially of the poor. The health demand analysis, however, suffers from the fact that available data can be used only if one is aware of their shortcomings. In fact, many people who are ill are not registered for different reasons. This is especially relevant for the poor, who either do not interpret a certain phenomenon as illness (unlike the middle and upper classes; e.g. malnutrition or diarrhoea) or cannot afford to go to a health care station which, however, is the precondition of being registered. What could be found is the preference of different income groups for different health stations (the poor go more to local dispensaries, clinics and health stations, the middle and upper classes have more demand for higher level institutions like hospitals). The revealed preference, however, also reflects the difference in access to the services for different income groups.

The econometric estimations refer throughout the analysis to curative health care, not to preventive health care. Result of the estimations is "own price elasticities of demand", being linked to substitution effects between the public and the private sector. According to findings presented in the report, Tanzanian health demanders appear to be very efficient at substituting between options. This result, however, is based upon a static analysis. For dynamic purposes, estimates of the income elasticity are needed. Unfortunately, they could not be presented.

In the subchapter on educational demand, a very intensive and sophisticated analysis of the enrolment situation and its different facets is presented. This includes age groups, gender aspects, costs of schooling for the users — aspects which include some overlapping to the supply side analysis. But in the centre of the economic assessment are private net return calculations, but no single discussion of elasiticities takes place. It remains unexplained why the analysis of health demand follows completely different lines from the analysis of educational demand.

Additionally, the results received have limitations because their sectoral discussion is not properly linked with the macroeconomic situation in the country, especially the economic situation (that means first of all their employment situation) of the lower income segments in Tanzanian income distribution. And do we have information about the income impact of using the services under consideration (health and education effects with respect to labour income)?

Comments on section: Interactions and Externalities

The fifth section analyses which interactions between investment in health and education can be identified and what externalities — that is, consequences for other individuals or the society as a whole — do exist.

With respect to the Tanzanian education sector, the authors find the following interactions:

a) Influence of parents' education influences children's schooling.

b) The impact of siblings on each other's education seems to be positive.

c) The impact of secondary schooling on income generation seems to be higher than that of primary education.

With respect to the Tanzanian health sector, the authors find the following interactions:

a) Child nutrition is positively influenced by the availability of prenatal care with a nurse.

b) The same holds for post-primary schooling among parents and for flushing toilets.

c) A negative influence exists for children of multiple births and male children.

The question has to be asked, however, whether these interactions are really the important ones, as long as no dynamic interactions and spillovers are taken into account.

Comments on section: Conclusion

Poverty in Tanzania has shown little sign of improvement, in spite of the officially announced socialist development paradigm and huge donor contributions. Many explanations can be presented, most of them being linked to an inappropriate development policy of the government. But the policy consequences are not clear to me: What is the political message of the authors?

Final comment

What is generally missing? As a macroeconomist, I am mostly interested in an assessment of the contribution of the two sectors under consideration to human capital formation and to economic growth and income generation for the people affected. We know that human capital formation is more or less the most important growth contributor, and it is the most important source of private income. To what extent did the Tanzanian health and education system contribute to an economically valid growth process, and what happened after the change in policy after the end of the 1970s? The analysis presented to us is more or less static. Dynamic aspects are not at the centre of the report. Insofar the discussion of the report covers only the first step of a poverty analysis, leaving aside the dynamic consequences of the different actions under discussion.

Chapter 3

Results and Recommendations

Christian Morrisson

Results

Given the wealth and diversity of the analyses concerning Madagascar and Tanzania, some synthesis of the main points is in order before coming to our conclusions. Our focus will be on the shared results, assuming that these lessons can be meaningful for the other poor African countries.

The Impact of Education and Health Spending

The simplest indicator of access to a service is whether or not an individual can access it. There are two drawbacks to this indicator, however: it does not take differences in the quality of the service from one region to the next into account, and it does not allow for taking several services together. For example, if the quality of schools in a rural area where the majority of poor people live is very much lower than in urban schools, the benefits to poor people are overestimated[1]. Moreover, it is impossible to add together a year of primary and a year of secondary school to estimate the transfer received by a household with a child in each, which would be possible if the costs for each establishment were available. Calculating unit costs for each service can sometimes create unresolvable problems through insufficiently disaggregated data. For this reason, unit costs and the transfers received could be calculated only for Madagascar.

In both countries, each quintile receives approximately the same share of primary education spending. The data for Madagascar show that the enrolment ratios (public and private combined) for children in the first quintile are less than one-half the ratios for children in the fifth quintile. Poor families do have more children, and private

school enrolments go up with parental income. Therefore, the poorest 20 per cent of households benefit from the same total transfer as the richest 20 per cent, but they would receive much more if the enrolment ratios were the same for all quintiles.

Teaching quality also has to be taken into consideration. In Madagascar, the percentage of primary schools with an infrastructure considered satisfactory ranges from 14 per cent for schools attended by children in the first quintile, to 51 per cent for schools attended by children in the fifth quintile. Moreover, the average number of teachers per class in these two groups ranges from 0.77 to 1.50, especially since there are no teachers in many rural schools in the most underprivileged regions.

Secondary education has only a relatively progressive effect: the concentration curve is located between the bisector and the distribution curve for per capita consumption. Poor households have a higher share than their share of consumption, but clearly lower than their share of the population. The explanation is simple: enrolment ratios in public secondary school are much lower for poor people than for the fifth quintile. In Madagascar, junior high school education is relatively progressive, whereas in senior high school it is regressive. The distribution is more highly concentrated than that of consumption. By contrast, secondary school is relatively progressive in Tanzania. The only data available for higher education are for Madagascar, where it is clearly regressive.

Since unit costs are available for Madagascar, it is possible to aggregate the different transfers received for education. The impact of public education spending was relatively progressive for 1993 and 1997, the share of the poorest 40 per cent of students reached 27 per cent, whereas their share of consumption spending was only 17 per cent. This can be explained by the weight of primary school spending and for spending on the first part of secondary school which always have a progressive or relatively progressive effect. These apparently satisfactory results must be interpreted, however. For example, if the differences in quality were taken into account, we would have less than 27 per cent. Moreover, in the context of a levelling education policy (each child benefits from the same transfer) the poorest 40 per cent of households would have a share of more than 50 per cent (and not 40 per cent) given that more than half of these children come from the two poorest quintiles.

The same hierarchy exists for health care services in terms of progressiveness. The incidence of basic health service is more progressive than that of dispensaries, and above all, hospitals. In Madagascar, basic health spending is slightly progressive whereas hospital spending is relatively progressive. The same is true in Tanzania: the distribution of basic health is almost egalitarian, but for hospitals, it is barely relatively progressive.

Progressiveness in health care can be overestimated, just as it can be for education. For example, the transfer corresponding to a visit to a basic health centre is calculated by dividing the centre's budget by the number of visits, but the quality of the care varies considerably from one centre to the next to the detriment of the poorest people[2]. In Madagascar, the poorest people go to centres lacking in equipment, medicines and personnel. Sixteen per cent of patients in the first quintile consider that equipment is

of satisfactory quality, compared to 68 per cent in the fifth quintile. Medication is available year round twice as often in centres attended by the richest 40 per cent of the population, compared to the poorest 40 per cent. Finally, one-third of rural health care centres have neither doctors nor nurses. The health care analysis for pregnant women in Tanzania confirms this sort of bias. The distribution of the transfer estimated according to whether or not health care has been received is more progressive than the distribution of the transfer when its value is considered. This means that poor women receive poorer quality service.

These biases need to be borne in mind when health expenses are considered, but this assessment is only possible in Madagascar where unit costs are available. It shows a relative progressiveness that is greater than for education: the poorest 40 per cent of the population have a 33 per cent share compared to 27 per cent for education. This progressiveness can be explained by the fact that basic health care centres account for a relatively large share of health spending, but it does not reflect the real differences in terms of care, because rich households use the private sector more often than poor households. Therefore, in Madagascar, while some people see private doctors, others go to basic health care centres.

The Demand for Health and Education Services

While the incidence of social spending has been estimated since the 1970s, an analysis of the behaviour of households, particularly in terms of their reactions to variations in the price and quality of a service, has only been undertaken recently[3]. Whereas in the past, only the supply was considered, it is now clear that supplying a service does not necessarily correspond to demand[4], and that a study of the demand for education and health services was necessary. This awareness is linked to the adjustment programmes of the 1980s, several of which made recommendations on fees for public services and proposed, in particular, introducing or increasing a fee for access to education or health care. This kind of proposal can only be made if the consequences on the distribution of services among households are considered. When price elasticity of demand is high for poor people, and low or even non-existent for rich people, then any fees increase will lead to even more unequal access to health and education services.

It is therefore fortunate that these studies on Madagascar and Tanzania have analysed household demand for these services. Household demand for primary education in Madagascar (schooling fees, books, transportation) proves to be very sensitive to direct costs; price elasticity drops quickly as household income increases (the same is true for private schools), ranging from –0.51 for the poorest 25 per cent of the population to 0 for the richest 25 per cent of the population. We also observe a rather high elasticity of demand with respect to education quality (and more so for poor households than for rich households) and that parents react to higher public education costs by enrolling their children in private schools. Therefore, if the cost and quality of education were raised simultaneously, a drop in attendance rates could be avoided, even for poor families.

For secondary education in Madagascar, the only available data concern the distance between home and school. Therefore, the only direct cost that could be used was transportation cost. Here again, the elasticity of demand with respect to this cost is high, and has a negative coefficient. The demand for health services is equally price sensitive. We considered both direct costs (price of an appointment, transportation) and indirect costs (loss of income due to transportation time) for adults, but only direct costs for children. Whether for basic health services or for a hospital out-patient appointment, the price elasticity of demand is always significant and is higher for poor households than for others. The same is true for the demand for health services in the private sector. If a price increase for an appointment in a basic health centre is simulated (about 1 dollar rather than 0.50 dollar), the likelihood of making an appointment in this centre drops by half for the poorest compared to a very slight drop for the richest 25 per cent of the population.

The same pattern occurs in Tanzania. The price elasticity of demand is high for public and private hospitals and for private clinics, and it is significant but less high for the other public centres. Moreover, households know how to go from one sector to another if prices go up in the public sector. Finally, any improvement in the quality of care stimulates a clear increase in demand. For lack of data, transportation is the only cost that is taken into consideration for education. The further a child lives from a school, the later in life that child will go to school and the less long he will stay in school.

This set of analyses confirms two important facts. First, poor people react like all other households to the price and quality of a service: their demand switches from one sector to another if prices increase in the public sector, and it is always sensitive to the quality of the service. The second is the inequality induced by any price increase for a service, as Van de Walle (1998) has stressed, because the price elasticity of demand is much higher for poor households than for others. It follows that any increase reduces their access to these services more than for other households and leads to a more unequal distribution of education and health services.

The Benefits of Health and Education Services

In the past, when the argument was made solely in terms of supply, it was possible to neglect the gains procured through these services to poor people. But there is no clear relationship between the cost of a service (the reference used to estimate the impact of spending) and the gain that it ensures. For example, a very inexpensive vaccination can avoid an illness that is both widespread and leads to a considerable drop in income.

There is considerable literature on the benefits of education investments in developing countries (cf. Psacharopoulos, 1994), and we applied the usual methodology to the countries studied in this publication. In Madagascar, the estimations of hourly pay show high benefits in the formal and informal sectors since they are greater than 10 per cent. By contrast, the average education of the members of a farming family

has barely any effect on the total productivity of factors in the farm's production. This conclusion must be nuanced somewhat, since education makes it possible to reallocate work to outside the farm. If there are any non-agricultural job possibilities (in the formal and informal sectors), education can effectively reduce the poverty of agricultural families. In Tanzania, we also found high benefits for primary and secondary school (on the order of 8-9 per cent), but the limits of this estimation have to be acknowledged, since it is based solely on remuneration in the formal sector.

We also showed the impact of poorer health on incomes. In Madagascar, we were able to estimate a composite indicator of invalidity based on a doctor's diagnosis for the population of the capital. People recognised as being handicapped are less active in the labour market (47 per cent compared to 63 per cent) and when they do work, it is usually a job in a micro-enterprise and less in the formal sector, and they are paid less. Moreover, a national survey shows that more than half of all people who were sick during the last two weeks had to stop working for five days on average. These results show the costs to an individual of being unable to get health care and get better.

The Interactions Between Health and Education

It has long been emphasised that poor people accumulate handicaps in terms of education and health — more frequent untreated illness, the after-effects of childhood malnutrition — and that these handicaps are linked: a poor illiterate person does not always go to a health care centre even if the care is free of charge. In order to break this poverty cycle, education spending could have a positive impact on health and vice versa.

The Demographic and Health Survey (DHS) data for 1991 and 1996 confirm these externalities in Tanzania. Size is the most significant indicator of a child's health (because it reflects all the periods of chronic malnutrition), and is linked to the parents' education. The longer the schooling, the more striking the positive effects. Moreover, the fact that a doctor or nurse examined a mother during her pregnancy has a positive effect on the size of the child. Finally, children in urban areas go to school earlier if their mother went to school, whereas children of illiterate parents are less likely (–6 per cent) to be enrolled in school.

The Madagascar study brings several positive externalities to light. Children's state of health is linked to their parents' education. All other things being equal, the percentage of children who have gone to a health care service increases with the father's education level (it increases by half if the father went to university rather than being illiterate). The child's health depends on the mother's medical care during pregnancy, which is correlated with her level of education. On the other hand, neonatal mortality and infant mortality drop as a mother's education level rises (infantile mortality is divided by 2.5 if the mother goes from being uneducated to having finished high school). Children's school performance depends partly on their health. Therefore, the length of time a child goes to school is linked to the child's size and body mass

index. This suite of effects explains how certain children escape the poverty trap whereas others fall into it. If the parents have gone to school, the child has a lower risk of dying and is in better health, which will help him/her go to school longer and transmit the same advantage to his/her own children. In this way, positive interactions between health and education and between parents and their children are combined. Unfortunately, the same interactions work in the opposite direction when the parents are illiterate, which explains why poverty is transmitted from one generation to the next. These externalities lead to an underestimation of the benefits of education if only their effect on income is considered. If a person is educated, s/he will know better how to get health care, and his/her children will be in better health and will have greater chances of being educated. All of these effects contribute as much and even more to reducing poverty than the direct effect on income. By taking these effects into account, including the effects from one generation to the next, we can understand the impact of education on poverty much better than if we only measure unit costs and the differences in transfers received by households in a traditional impact analysis.

Recommendations

Governments have long wanted to fight poverty by making health and education spending their priorities, and the World Bank's 1990 and 2000 *World Development Report* put forth many scientific arguments to justify these choices. Ultimately, these choices are no longer even debated and have simply become givens. Our analyses, however, show that a government's intentions and the services that it really provides to the poor are often very different. Measures must therefore be recommended for intentions to become realities.

For a Realistic Policy

The double policy failure in Madagascar and in Tanzania bears witness to the danger of overly ambitious policy that oversteps a government's means. In 1975 in Madagascar, the new socialist Ratsiraka government decided to reform the education system profoundly. It was to be democratised thanks to fast growth in enrolments, to be decentralised and to use the local language. Every village was to have its primary school and every urban centre was to have a secondary school, the programmes were revisited and Malgache replaced French as the basic language. At the same time, the government launched an ambitious policy of basic health care by increasing the numbers of dispensaries and providing each town with a basic health care centre. It also undertook a broad programme of vaccination.

At first sight, all of these measures appeared to be entirely pertinent in the fight against poverty because they gave everyone — especially the rural poor — access to health care and education. The raw enrolment ratios in primary and secondary school

reached more than 100 per cent and 30 per cent respectively, as of 1980. In reality, it failed. Enrolment ratios dropped to 72 per cent and 18 per cent respectively in 1993. Many schools were opened but had none of the necessary credits to be run and some of them had no teachers. There were not enough schoolbooks in Malgache that corresponded to the new programmes, and teachers were not trained. Finally, French was reintroduced and the private sector, whose share of primary school enrolments doubled, compensated for the public sector insufficiencies. The same was true for health care. The situation deteriorated after a few years, as attested to by the rising rates of infantile mortality, the frequency of childhood illnesses and the return of cholera and the plague.

These failures were the result of an insufficient budget, which was linked in turn to the socialist government's economic failure (per capita GNP dropped by 26 per cent between 1975 and 1987). The drop in public revenues, together with a significant reduction in the share of health and education in public spending, resulted in a drop in current education expenses per inhabitant from $11 in 1982 to $5 in 1998, and from $3 to $2 for health care.

Tanzania adopted the same policies, succeeded at first and then experienced the same failure. In 1969, Tanzania targeted universal primary education, and in 1978, enrolment ratios reached 93 per cent for the first year of school. At the same time, a network of health care centres was created, which meant that in 1978, 90 per cent of Tanzanians lived within ten km of a basic health care centre, but the macro-economic policy errors led to a drop in exports and the reduction of GNP/inhabitant: the government did not have the means to realise its objectives. There was no budget to train and pay new teachers or to provide sufficient numbers of school books. Public school enrolment ratios therefore dropped significantly and the private sector needed to be called in. Education quality went down as well, as test results at the end of the first year of primary school, drop-out rates, and repeated grade rates demonstrate. Having built its network of health care centres, dispensaries and hospitals, the government no longer had the means to run them. As in Madagascar, these failures had to do with reduced public spending for education and health because of a reduced share of social spending in the budget, and lower state revenues because of the economic crisis.

These two failures indicate that a policy for fighting poverty through education and health spending cannot succeed without sustainable economic growth based on solid macroeconomic policy. The drop in per capita GNP makes any ambitious social policy untenable. A government can only make social spending its priority within the limits of real economic performance.

This double experience proves that a government should resist the demagoguery of making impossible promises like increasing enrolment ratios from 50 to 100 per cent in five years. Each project must consider the resources available and the time frame. To double the number of children in school requires a budget that increases in even higher proportion since new schools often have to be built in disadvantaged rural areas, teachers need bonuses to compensate for travel distances, and they need to be housed. Moreover, it is impossible to recruit a very high number of doctors, nurses or

teachers in a few years unless recruitment criteria are changed. These professions require many years of training; decisions can be made immediately to train more people, but the timetable needs to be respected. It is preferable to double enrolment ratios in 15 years, which is already an achievement, than to do it in five years with poorly equipped schools, insufficient numbers of school books, poorly trained and occasionally absent teachers, two classes for every classroom, etc. The goal is not political kudos from enrolment ratios, but to make solid education available to a growing number of children. When the state undertakes this kind of failed education programme, poor people benefit even less than predicted. On the one hand, the analyses of the demand show that they often react to poor quality by dropping out. On the other hand, families in the top 20 per cent will enrol their children in private schools so that the spread between them and poor families whose children have been poorly educated narrows less than predicted on the basis of the enrolment rates. It is preferable to accept a wait of 15 years so that all children from poor families are progressively educated under good conditions. For these children to have better lives than their parents, they do not need to enrol in school. What do they do need is to acquire education capital. Poverty will not be staunched in seven years by a low-level education for all of these children, but by high-quality education for half of them. Many factors handicap poor children in their education — malnutrition, lack of books at home, illiterate parents, poor housing, etc. If, in addition, the quality of the education is poor, most of these children will clearly fail in school and will acquire no training by the time they leave. Their earning capacity will therefore be the same as that of their illiterate parents. Education, under these conditions, does not reduce poverty.

Towards Equity

In the context of a policy of supply and of conventional benefit incidence analysis, we supposed that health and education services in all countries were of equal quality and that every service that was provided responded to a demand. Next, with the adjustment programmes of the 1980s, some countries introduced fees for what had previously been free services, which were usually independent of family income.

The analyses of education services in Madagascar, and of health services in both Madagascar and Tanzania prove that the homogeneity of services is purely illusory. The number and quality of teachers are better in urban than in rural areas and schools are better equipped; there are fewer trained staff and less medication in rural health care centres as compared to urban health care centres. Moreover, the distances to primary or secondary school and to health care centres are greater in rural areas where roads are often badly maintained, which increases travel time even more. These disparities explain the inequalities mentioned above: the quality of services provided to poor people is very often inferior to the quality of services provided to the richest 20 per cent of the population.

We often hypothesise homogeneous services because no disaggregated data are available. Moreover, this hypothesis seemed to be acceptable in the past for historical reasons. Until the 1950-60s in colonies and protectorates, these services were reserved for a minority and poor people were generally excluded. For example, primary school was usually available in cities only, secondary education was only available to children of European parents and of indigenous families with middle or high incomes. As enrolments were usually relatively low, and as some of the students and teachers were foreigners, the aim and objective was education of comparable quality to European education. Schools and health care centres already existed for poor people in poor neighbourhoods and villages, but they were not numerous. The government (before independence or during the first years after independence) could therefore provide services of equal quality. The situation changed completely when the number of students quadrupled or quintupled (when coverage rates rose in parallel with population growth), when many pupils from rural areas and poor pupils hampered by their social origin went to school. It would have taken considerable means in terms of credits and staff to ensure the same quality of education everywhere. In fact, the heterogeneity of services increased with enrolments, and the reduction in quality most often hit poor people the hardest.

The state has two options to improve the efficiency of these sources for the poor. The first is to improve the quality of services in disadvantaged regions so that the principle of equal services becomes a reality. The second is to modulate service fees. We discuss later (see “Towards an Efficient and Decentralised Policy”) how better resource management, decentralisation and local democratic control could improve the quality of services, but administrative reforms are not enough. Better quality services cannot be provided in countries as poor as Madagascar and Tanzania without increasing budgets. Under-equipped health care centres and schools need more money and the staff has to be better paid. Only large bonuses can convince qualified doctors or teachers to work in isolated villages. It is only by accepting higher unit costs in poor regions that the same quality service can be made available country-wide.

The second way is to vary the price of services as a function of their quality. For example, an appointment in a well-equipped urban health care centre would cost $1 whereas it would be free in the villages, so that the difference in price compensates the difference in service quality. There is a drawback: poor people living in cities would have to pay the same for their appointments as any other urban resident. This is serious, since the demand of poor people in Madagascar and Tanzania reacts considerably to price. Even a moderate fee like $1 could lead to reduced demand among poor urban households and consequently reduce the progressiveness of this service.

It is difficult to escape from this second solution. Indeed, whatever a government tries to do, it will always find it very difficult to improve the quality of services nationally to the levels of services in the capital. The less a country is developed, the more difficult the government will find it to apply the decisions made in the capital to the most distant regions. These difficulties of transmitting, applying and monitoring

decisions are typical of under-development. Consequently, service fees would have to be modulated to compensate for differences in quality, but this policy affects poor people in cities and creates a very serious inconvenience; another solution would be to modulate fees by service. One could, for example, provide free primary and secondary education, while asking for a fee at university level, if most students came from the fourth and fifth quintiles, as is the case in Madagascar.

The poor benefit particularly from improved quality, because it raises their demand for health care and for education. In Madagascar, ending double classes increased the enrolment rates for poor families more than for families in the fifth quintile. Moreover, children from poor families were not enrolled in school before, whereas the others switched from private to public school. In countries like Madagascar and Tanzania, where the majority of rural households are poor, higher quality services increase the demand and give more families access to primary education and to basic health care. Quality increases coverage rates for the poor and therefore increases the progressiveness of social spending.

Where fee differentiation exists, it has the same effect on progressiveness. By imposing fees on urban households that benefit from higher quality services, the net transfers to the advantage of households above the poverty threshold are reduced. Coverage rates do not change but the share of social spending going to poor people increases.

Countries with intermediary incomes could go even further to increase the progressiveness of transfers by differentiating fees for the same quality of the service as a function of household income.

However, in poor countries such as those in sub-Saharan Africa, it would be impossible to apply this policy because no income tax can be levied in countries where incomes are poorly known because of the size of non-salary incomes, for which there are no reliable statistics. In this case, self-selection is the only possible policy. For example, the development of private health care centres could be encouraged with for-fee appointments and free public sector appointments. If these public centres had only limited staffs, the long waits would encourage those sick people who could afford it to go to the private sector.

Developing the private sector could also be a way to differentiate between fee schedules. Whether the private sector receives no subsidy or a service subsidy that is clearly lower than its cost, households who use it pay a relatively high fee. In poor countries, only households in the 10th decile are concerned. The state should favour this sector since these households free up space in schools and health centres for the poor. Moreover, the state also eliminates several problems such as managing schools or applying differentiated rates. The private sector increases the provision of health care and education at zero (or low) cost for the state, and creates competition with public services, which stimulates them. Contrary to the criticism of selection on the basis of income, the private sector helps increase equity since it reduces the share of public spending on health and education that benefits the 10th decile and increases the share of the others.

The distance to a service is one element of the cost. Demand analyses show that in several countries such as Madagascar and Tanzania, distance has a negative effect on demand, whether for secondary education or for basic health care centres. Poor people are most penalised because they do not have their own means of transport and cannot pay for a transport service. The choices for siting high schools and health centres, road improvement, and subsidies for transporters are therefore effective means of increasing the number of poor people who have access to these services. Making services free of charge is not enough for poor people to be able to take advantage of them. Any equitable policy must consider the spatial dimension of rural poverty to some degree.

Finally, there are two ways to increase equity that are both opposed and complementary. The first is to increase specific spending which only benefits a minority of households, and the other is to extend basic services such as primary education to the entire population.

Specific spending is highly redistributive because it implies a natural process of self-selection. The Tanzania study on the impact of adults' literacy training suggests a process of self-selection because illiterate people are almost always poor. It is therefore certain that a state can choose many education and health care programmes that can have a very redistributive effect because of the self-selection of the beneficiaries.

The other strategy is to give the entire population access to a service, to reach a 100 per cent rate of coverage. Poor households are often the last ones to benefit from public services, for various reasons. The service might be provided first in the city where the population is less poor; rich people have more political means of getting access to a still uncommon service; rich people understand the utility of a generally available service whereas poor people do not. Lanjouw and Ravallion (1999) base their hypothesis of the "last beneficiary" on these observations: the more the coverage rate of a service increases, the more it is progressive. It leads to the fact that the observed progressiveness of a service is not a criterion for a budgetary choice since progressiveness varies as a function of the spending on the service. Therefore, an effective policy for reducing poverty is systematically to extend certain services to the entire population, even by making them obligatory, since the marginal incidence is more progressive than the average incidence. In very poor countries in South Asia, for example, the poorest people occasionally refuse to send their children — and particularly their daughters — to primary school, but food aid programmes based on school attendance have proven to be effective.

Even if a government is very tempted to make primary education compulsory, which seems justified in terms of equity, this may be a false solution, according to the Madagascar study. The government adopted this measure but it wasn't applied in rural areas. It seems that it is very difficult to reach total coverage below a certain threshold (for per capita GNP, for per inhabitant spending on primary education). A coercive administrative measure is only meaningful if it is applicable, which is to say that if the real rate is not too far from the goal of 100 per cent coverage, and if the

state has the means to finance 100 per cent education without lowering quality. Even in this case, it might be necessary to create a food aid programme for the poorest pupils to compensate parents for the opportunity costs of educating girls. This type of transfer in kind is preferable to financial aid which does not always go towards children's education or health care, whereas compulsory school attendance as the condition for parents to receive food aid does ensure that the child benefits from it. If parents reduce this child's share in family consumption, however, the real effects could be lower than what is hoped for.

This conclusion does need to be nuanced since the progressiveness that we have observed gives us some information about the increases in equity from higher spending. If primary education reaches a 70 per cent coverage rate, it is certain that the transition to 100 per cent will only benefit poor families (quintiles 1 and 2), since the children of other families are already going to school, in which case relatively progressive spending becomes progressive spending. This logic does not apply to a service that has only a 30 per cent rate of coverage, since the middle-income groups will benefit from increased spending.

Therefore, the most effective strategy is to generalise access to services that have an initial rate of coverage of between 50-80 per cent. Since resistance, such as the refusal to send girls to school, or ignorance can prevent total coverage, complementary measures such as conditional food aid might become necessary.

There is another obstacle to educating all children that has nothing to do with the opportunity costs for girls or with cultural resistance. Poor families are usually agricultural (small farm workers, agricultural workers), or artisans, small shop owners (informal sector). Some parents refuse to send their children to school or encourage them to stop going to school after two or three years because they consider that what the children learn in school is useless for the kind of work they do. In other cases, parents teach children their trade before sending them to school, because they fear that they will refuse to learn it after going to school for several years. These children are therefore enrolled in school very late and leave without having acquired basic knowledge. This hypothesis of family training before or after school is especially plausible for craftsmen who are ranked among poor but not the poorest (2nd quintile) and have a certain know-how. They think that it is better to transmit this know-how to their children, since practical training will have a greater return than school training. This hypothesis raises the problem of the adaptation of school programmes to jobs. For example, in an African country, a shopkeeper will not see the use of teaching his son any other language than the language of his clients. We might argue that the son has to know this language to be a civil servant or a salaried employee of a large enterprise. However, for parents living in rural areas in countries where adjustment programmes have blocked or braked public sector recruitment, these opportunities appear distant. This shows that the relationships between supply and demand need to be examined, rather than thinking in terms of provision, since demand depends on the returns on education and on other factors such as programme contents.

Towards an Efficient and Decentralised Policy

The authors of the study on Madagascar conclude by recommending greater decentralisation. At the same time, Madagascar reveals all the difficulties that decentralisation entails. Districts lack the capacities to manage resources. In many rural districts, less than one-half of the credits were engaged at the end of the years, and no materials were received for health care centres. The percentage of materials received by primary schools with respect to the amount ordered is lower in rural areas than in cities. A decentralisation policy was adopted: 40 per cent of the education and health operating budgets are locally managed, but decentralisation runs into lack of administrative capacity, obstacles and delays, bad circulation of information and an insufficient absorption capacity in some districts. These difficulties have a direct negative impact for poor people since they concern rural districts, especially in the most disadvantaged regions. These districts therefore do not monitor primary education and health services correctly, and as they have more poor people than elsewhere, the poor are the first victims of the management problems.

The Madagascar study reveals a dilemma. On the one hand, management and oversight of some local spending is desirable since it leads to better targeting for the poor, but the administrative underdevelopment of local governments means that they have considerable difficulty in managing spending. Consequently, improving local management seems necessary for conjugating equity and efficiency. Without considerable aid to local management, government decisions risk being little more than announcements with no impact on the situation of poor people.

For Long-Term Coherent Policy

To reduce poverty better through education and health spending, we need to shift from a policy of means to a policy focused on results. Traditional policies were framed within a logic of means. More resources were constantly being requested, particularly for the most redistributive services.

For households to cross the poverty threshold, however, they need to acquire a health capital and training capital that will enable them to increase their income in a sustainable way. This double accumulation needs to be the basis for judging and selecting health and education spending. If we think in terms of results, no expenditure made during the year can be taken in isolation because the results depend on the coherence of interventions, on the interaction among the measures, and on a dynamic vision of the obstacles in order to make them disappear.

Doubling education and health spending in a region can lead to paltry results or to reducing the number of poor people by half, if all the interventions are coherently co-ordinated. Without some overall vision, several expenditures can be engaged that are redistributive and yet ultimately ineffective in a disadvantaged region. For example,

creating a network of health care centres with nurses in a disadvantaged region without ensuring that medication is available and distributed. The poor people who go to these centres but cannot buy the medicines will not get improvements in health. This penury of medicines can result from a poorly run public service responsible for supplies, or from the corruption of the male nurses who sell the medicines and pocket the benefits. The means — spending more on health in a disadvantaged region — must not be confused with the goal of improving the health of poor sick people.

The history of education and health services in Europe is the source of the confusion between the means, and the results or objectives, which are the sole imperatives if poverty is to be reduced. Until the 18th century, these services were usually sold on the market, which meant that no poor people had access to them, or were dispensed free of charge to the poor by churches. As of the 19th century, states provided services such as free primary education to the entire population. In the 20th century, and particularly as of 1950-60, states play the same role in developing countries. This was appropriate since the majority of households lived in poverty and had no access to these services if they were not free. Once these services were available outside the market, however, things went awry. The reasoning was like that of a planned economy where only the supply was considered with no concern for demand. Under pressure from public-sector groups defending their own interests in the name of the interest of the whole or, even better, in the interest of the poor, spending for a service constantly increased without any concern for spending better. Michaelowa's study (2000) on five francophone African countries shows that the results of primary education (the percentage of children who have acquired minimal basic knowledge at the end of primary school) do not correlate with the share of spending on primary education in the GNP. This proves that we have to think in terms of results, and not in terms of the means.

Once we also consider demand, education quality must improve since this directly influences families' demand. Families are also concerned with the returns of education (the future gains that it procures), which depend partly on its quality. Therefore, households, including poor households, can, in certain cases, not send their children to school whereas we imagined that it was enough to provide even poor quality or ill adapted education for a demand to exist.

For a strong demand for school to exist, it has to provide high quality education that is adapted to the labour market. To adapt education better, it is desirable to decentralise primary education through junior high school completely since this will make it possible for families to participate in decisions with the representatives of professional categories (self-employed workers who are very numerous in developing countries, as well as employers or employees.) On the other hand, improving quality requires spending money better and perhaps spending more. Indeed, more money is sometimes needed. For example, the low salaries in Tanzania explain the drop in the quality of teaching which cannot be improved without considerably raising salaries. In other cases, money has to be spent better, which is to say that productivity needs to be improved. The poor performance of Senegal's primary schools compared to the

schools in Cameroon cannot be explained by the salary difference, and the problem is to increase the productivity of teachers. One example suffices to illustrate this goal: nothing justifies higher teacher absenteeism in Senegal than in Cameroon.

This example leads to a second challenge: efficiency. Competition between public and private schools can be used in cities. We have seen how private schools create a process of self-selection favourable to poor people. The second advantage is to create what can be very lively competition between schools if the state (or the district) grants scholarships to poor families to pay for private education. In rural areas where the majority of poor people live, this competition is impossible. In this case, the quality of education has to be better monitored, by giving more power to the heads of schools and to inspectors. Michaelowa (2000) shows that the performance of pupils depends very significantly on inspectors' visits. Increasing the number of inspectors and their visits will certainly improve teachers' efficiency. We could therefore propose that a teacher's salary include bonuses linked to inspectors' reports and to pupils' performance on general exams, common to all pupils of a region or a country.

Each case study has shown how many externalities exist for each service such that the final result of a coherent set of services is higher than the sum of the effects of each individual service. There are increasing returns if all health and education spending is engaged according to a programme that maximises the externalities according to a rational timetable (to take advantage of an externality, one expenditure must precede another). Once results become the criterion (increase the health and human capital of poor people), a programme is conceived to reach the objective at the least cost rather than asking for the financial means for this or that service because it primarily concerns poor people.

This strategy needs to be developed in a dynamic perspective, because the interactions among the variables linked to education and health are often framed in the long term. The health of young children depends partly on their mother's education. Similarly, we know that birth rates and the distribution of contraceptives are linked to this education. Later, the mother's education influences the demand for the child's education, as in Tanzania, and the child's school performance depends partly on his/her health (cf. Pollitt, 1990). Last, children's schooling in rural areas can facilitate the reallocation of some labour (cf. the Madagascar study) towards the non-agricultural sector. These effects appear over about 30-40 years. In rural areas, where girls' enrolment rates are lower than boys, this is the suite of effects that needs to be taken into account to decide on sending all girls to school as quickly as possible.

This dynamic vision leads us to consider the transmission of poverty from one generation to the next, which was undertaken in the study in Madagascar. It appears, in fact, essential to halt this transmission process to reduce poverty. We know how poor families accumulate handicaps: no inheritance, illiteracy, childhood malnutrition, poor health, no birth control, difficulty of access among rural poor to health and education services. The many interactions among these elements are comparable to the positive interactions described above, but have a negative multiplier effect. These families are therefore caught in the poverty trap with no hope of escape.

Once we understand this convergence of negative factors, we need to find the set of health and education services that make it possible to stop the process of reproduction that condemns children to lifelong poverty. To do this, we need to pay special attention to measures concerning the mother-child relationship since the transmission of poverty depends largely on this. We can hope that a network of maternal and infantile protection services established in or near basic health care centres will be an effective means of stopping the process of reproducing poverty. In poor countries, these centres can provide many services: medical supervision for pregnant women, distribution of food aid to mothers and children, manage country literacy training for mothers or distribute contraceptives. Moreover, the personnel in these centres know the families well and can target their aid to the poor. If a crisis arises (for example, a drop in agricultural production because of an exceptional drought) that reduces thousands of families to below the poverty line, definitively at times, this network can rapidly and effectively distribute outside aid in grain. In addition, in countries affected by AIDS, such as Tanzania, the centres could play an important preventive role for pregnant women. This example shows that health and education spending measures to reduce poverty cannot be selected by comparing the short-term effects of individual measures. It is only by considering the effects of the interaction of a coherent set of measures over a period of 30-40 years that we can imagine an efficient strategy in terms of results.

The traditional approach of thinking in terms of supply and of increasing the means appears outdated today. Now, the demand and the quality of the services need to be taken into account, management must be improved, and the results (state of health, knowledge, and expected earnings) must be the basis for judgement. To sum up, the public sector must be forced to become efficient to get the largest possible reduction of poverty for a given expenditure.

Poor countries such as Madagascar and Tanzania accumulate handicaps and are still in the first phases of human development. In Madagascar, more than two-thirds of the population live in extreme poverty (less than $1 per day), a significant percentage of families have no access to primary education or to health care centre services. The absolute priority is therefore to ensure that these families have access to these services. Moreover, when poor people already have access to services, they are of such poor quality that they do not meet the essential needs of education and health. The state is therefore faced with the double challenge of quantity and quality. Yet this state lacks the financial and administrative means. Past failures of a wilful policy of numbers without concern for quality, of supply independent of demand, despite considerable external aid in the case of Tanzania, show that the only hope is for these states to design new strategies and for donors to draw the lessons from the failures and concern themselves with the demands of poor people, with quality, coherence and the long term. It is clearly far more difficult for a donor to improve the management of health and education services and to achieve good governance than it is to finance the construction of a school, but no financial aid however considerable will reduce poverty unless policies and governance are changed.

Notes

1. Knowing unit costs does not avoid this inconvenience when only national unit costs are available.
2. Moreover, costs of getting to the centre vary. In Madagascar, 64 per cent of people in the first quintile and 3 per cent of people in the 5th quintile spend more than one half-hour in travel.
3. D. Van de Walle and K. Nead (1995) are an important step in this area.
4. This is proved by the reduction in school enrolments in rural primary schools in several sub-Saharan African countries after the adjustment programmes of the 1980s.

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