

# EDITORIAL

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In this number of DIALOGUE, we will be looking at two quite distinct subjects which are both at the heart of problems in the poorest countries : debt burdens and sanitary conditions.

At least since the crisis at the beginning of the 1980s, debt in developing countries has been a « legitimate » cause of concern for economists and there has been increasing criticism regarding its negative impact on development. In answer to this problem, the creditor countries, represented by the Paris Club, have introduced several programs and more recently, the Bretton Woods institutions have launched an initiative for debt relief for the poorest and more heavily indebted countries. However, the problem continues to be very worrying and over the last few months a wide range of organisations, going from the church to the media, have joined forces to call for more radical solutions. The G8 studied the issue once again at its meeting in Cologne this month.

Two years ago, DIAL launched a research program on the « sustainability » of debts in developing countries. The program has now been completed and the findings are due to be published in September this year by *Editions Economica*. Dialogue readers will find below a short presentation of the book's contents.

Sanitary conditions in developing countries are a constant preoccupation for aid organisations. Although it seems obvious that they have an impact on development in these countries, it is surprising to note that economic science has hardly studied this issue at all. As the Dialogue article on this subject points out, even the recent vogue for theories on endogenous development and human capital has led to very little research on the subject. DIAL felt duty bound to make up for this lack of information !

The DIALOGUE article on sanitary conditions is in fact the result of a survey carried out over a period of several years. It summarises past research and analyses the relations between health, employment, income and growth, based on the concrete case of Madagascar and inter-country comparisons. Its conclusions confirm that although improvements in sanitary conditions are obviously essential to the well-being of the populations concerned, they are also a sound economic investment for developing countries !

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## FROM MULTILATERAL DEBT REDUCTION TO DEBT WRITE-OFFS FOR THE POOREST COUNTRIES

One of the main points on the agenda of the G7 meeting to be held in June 1999 in Cologne, will be the drafting of a debt relief initiative for the poorest countries. More than ten years after the adoption of the first measures designed to reduce the debt of low income countries (Toronto Summit, 1988) and after more than two years' implementation of the IMF - World Bank debt reduction initiative for heavily indebted poor countries (HIPC), the results remain limited. A large number of non governmental organisations are pushing hard for a complete writing-off of debts.

In order to understand what is at stake in the current discussions, it is useful to take a quick look at the present situation in low income countries and to assess what has been done to date. Based on this information, we can then assess the current proposals.

### ***1. Low-income countries (LIC) have a specific debt problem***

The problems of debt in LICs are different from those in emerging countries, particularly due to the specific nature of external financing which is made up, for the greater part, of donations granted by bilateral organisations. International financing institutions grant very favourable conditions of financing to LICs (loans in which the donation factor can be as high as 80%).

However, these countries' authorities generally have no access to private financing. In the 1970s, a few private loans were granted. Despite the low amounts involved, they were often quite a heavy burden in terms of debt servicing.

In such countries, only the State is able to borrow from outside sources. Repayment difficulties are therefore above all budgetary problems, related to external but also internal debt. In the framework of structural adjustment programs, LIC governments agree not to have recourse to non concessional financing.

The debt crisis is illustrated in LICs by very partial repayments of debts due, amounting to about one third. In spite of this recurring failure to pay, public financing does not dry up suddenly - as private financing would - as the determining financial factors are complex (financial, but also humanitarian, strategic and political). However, default in payment does contribute to what has been called « aid fatigue » which leads to a slow erosion in public aid to development in real terms.

### **Why have the different processes not solved the problem ?**

What was initially diagnosed as a liquid asset crisis, led the Paris Club to reschedule debt repayment dates, year after year. This repetitive rescheduling was bound to become more and more ineffective, due to the Paris Club rules themselves, which fix a cut-off date during the first round, after which the new amounts due can no longer be taken into consideration.

Amounts due to private creditors stopped being repaid and lost all their value on the second market. Consequently, private financing flows rapidly disappeared. However, for certain countries such as the Ivory Coast and Senegal, this private debt - which continued to grow due to the unpaid debts - made negotiated rescheduling more complicated as all creditors should in principle receive the same treatment.

The G7 then came up with a number of innovations reserved for LICs. The amounts due were partially written-off (Toronto 1988). This initially amounted to about one third, but gradually went to one half, then to two-thirds (1994). In that year a second major innovation took place : the Paris Club agreed, in certain cases, to process outstanding debts, as long as this was a definitive solution, i.e. that the beneficiary State should not contact the Paris Club for help in the future.

This was a significant step forward and was combined with debt write-offs decided by certain creditors (France lightened debts in the Franc Area in 1989 and 1994). In addition, many northern States changed their procedures : they stopped making loans to LICs, limiting themselves to donations, except in the case of profit-making activities. All these issues were to bring non-reschedulable, multilateral debt into the spotlight.

Even the international organisations (IMF and World Bank), after long battles aimed at trying to ensure that debts due to them continued to have priority, untouchable status, also launched a debt reduction initiative for LICs at the end of 1996. This initiative is known under the name of debt reduction for heavily indebted poor countries (HIPC). Its aim is to cancel the part of the multilateral debt that exceeds what is considered to be an unsustainable threshold (a ratio of present value of external debt to exports of between 200 and 250%, a ratio of debt service to exports of between 20 and 25%), at the end of a long adjustment process and further reductions in bilateral debt (up to

80%). It should be noted that the planned debt relief is, to a great extent, paid for by the bilateral creditors.

The results of this initiative are meagre. Very few countries have qualified as eligible (Uganda, Bolivia, Burkina Faso, Guyana, Ivory Coast, Mali, Mozambique) and the amounts involved are very small. The process itself has come under much criticism. It is a slow process (in principle six years). So slow, in fact, that the International Financing Institutions (IFI) have agreed in certain cases to accelerate proceedings in view of past efforts in adjustment. It is also heavy and costly, as it includes a complex process of technical assessment of solvency, plus negotiation of new conditions to be added to those imposed for traditional adjustment programs. Given the difficulties in establishing an objective diagnosis, the choice of countries has proved sensitive to pressure. The first countries to have benefited from the initiative (Uganda, Burkina Faso) were not the most needy (they had to work on particularly pessimistic scenarios to « prove » the unsustainability of their debt). Other countries with similar problems were excluded (Benin, Senegal, Cameroon), although the burden of debt on public finances is higher in Senegal than in Burkina Faso. Others with extremely urgent problems (Mozambique, Nicaragua) were not considered to have priority. Also, the IMF's approach is based on a study of the sustainability in terms of external balance, which is not the most relevant criterion, particularly in countries in the Franc Area, a large proportion of LICs. In certain cases, the IMF has in fact used budget criteria (Ivory Coast), increasing the impression of a « political » handling of the issue.

### Unsustainable debt?

The assessment of debt sustainability in poor countries is a complex exercise which can give nothing but fragile diagnoses. Traditionally, debt sustainability is assessed with reference to a scenario based on the continuation of observed trends. In the case of LICs, the long term of loans granted means that forecasts must be made over periods of about a century, as this long time-scale is required if underlying trends are to be observed. Obviously, there is a high measure of uncertainty in such time-scales and the economies of LICs will probably (and hopefully) undergo major structural upheavals during this period. This is particularly true in terms of financing : forecasting on the basis of current trends implies that there will be an increase in the amounts of donations and (very) concessional loans. In these circumstances, it is quite possible that, in wishing to establish debt sustainability in a LIC, the process goes round in circles : in the end, sustainability depends on the good will of the creditors.

Nonetheless, the countries eligible to benefit from the HICP initiative were chosen on the basis of IMF

forecasts of this sort. With all reserves for the above points, similar work has been carried out by DIAL, although on a different technical basis (Moisseron and Raffinot, to be published shortly). The forecasts made for Benin, Burkina Faso, Cameroon and the Ivory Coast show that these countries' debts seem to be increasingly sustainable, according to traditional budgetary criteria. This apparent paradox is easy to understand. Ever since they have entered the process of structural adjustment, these countries have only had access to very cheap sources of financing, for limited amounts. They have benefited from substantial write-offs, for private and public debts. In these circumstances, it would be surprising if loans obtained in such favourable conditions gave rise to unbearable debt.

### Should debts be written off for these countries?

As the new millennium approaches, more and more voices are pleading in favour of debt relief for the poorest countries. The most important initiative, Jubilee International 2000, was launched by a series of religious organisations. Proposals are being multiplied in the run up to the G7 Summit in Cologne in June 1999 (O. Lafontaine, D. Strauss-Kahn, the United States, Great Britain, Canada, etc. have launched initiatives with high media coverage). They all agree that the HIPC initiative should be extended, in terms of the number of countries concerned and the scope of reductions granted. D. Strauss-Kahn's proposal, for example, plans to write off debt service obligations for one generation (thirty years), under Official Development Assistance. It is still not certain that the necessary financing can be found (total debt for all countries considered to be HIPCs amounted to approximately 180 billion dollars at end 1996, of which a third concerned Vietnam, Nigeria and Ivory Coast), nor that there will be agreement on how to share the burden between the creditor countries.

All this involves practical questions, but also deeper questions on the actual meaning of the process in hand.

### Reasoning behind debt write-offs

On a strictly economic level, the main argument in favour of debt write-off is based on the theory of the virtual burden of debt, or debt overhang. When it exceeds a certain amount, debt repayment apparently consists in a sort of tax on future revenues that discourages investment. Reducing debt should therefore re-launch investment and hence ensure better repayment of the remaining part. Writing-off part of the debt thus appears to be in the creditors' interests. However, in the case of LICs, this reasoning remains somewhat theoretical, as it is very difficult to

demonstrate, on an empirical basis, any impact whatsoever of outstanding debt on private investment.

Debt relief appears to be justified in that it decreases the costs weighing on a State and thus enables it to increase its spending. This raises the question of what to do to ensure that the relief goes in favour of sustainable development and is not wasted. This in turn raises practical questions, but also a deeper question on how development should be financed.

## ***II. Practical questions***

The proposed processes all have a common concern to avoid savings from debt relief from being wasted. This would appear to be difficult to put into practice

particularly as the effectiveness of the IMF and World Bank's condition-based processes are questioned, particularly with respect to LICs.

### Promoting social expenditure

One idea that is often put forward is to « swap » debt service write-off for investments of the same amount in additional social expenditure. The idea is of course commendable, but perhaps not so easy to put into practice. Firstly, it can lead to sudden growth in social expenditure that local authorities can find totally unmanageable, even with the help of NGOs. In addition, public spending is fungible and it is therefore extremely difficult to check whether an increase in expenditure related to debt relief is not used for undesirable purposes, via a reduction or stabilisation of other social expenditure. The EU, which agreed to take care of growth in public expenditure in the scope of certain structural adjustment programs, became well aware of the difficulties involved in the exercise. Generally speaking, administration in these countries is also under-developed and it is a somewhat biased approach to reinforce only the social sectors.

### Creating Debt Conversion Funds

The idea is to set up funds in local currency using the amounts of cancelled debt service to finance social projects. The concept has many disadvantages : a break in the unity of public finances, difficulties in managing such a fund and the disproportionate emphasis on social sectors. The experiment in debt conversion funds carried out in France in 1994 - following the reduction of the so-called Libreville debt (for Ivory Coast, Cameroon, Gabon, Congo Brazzaville) - is generally considered not very satisfactory, particularly due to the heavy procedures involved. This « interventionist » approach to the use of funds goes against the new means proposed for « contractual » management of development (as presented by the President of the World Bank, J. Wolfensohn in the integrated development framework). This is aimed at trying to encourage beneficiary governments to define their own development policies, associating players from the public and private sectors.

### **III. In-depth questions. Being fair to all**

Debt relief poses a problem of equity : those who benefit are those that are the most in debt, probably those whose public management was the most deficient. States with more prudent policies feel that they are treated unfairly. In order for debt

reduction to be fair, it could simply be made proportional to a given economic characteristic, unrelated to debt (e.g. population, GDP or public revenues). Table 1 simulates three different modes of debt reduction. The first (column 2) is fairly close to the mode used for the HIPC initiative. It is assumed that the debt relief is calculated to ensure that debt does not exceed 200% of exports of goods and services (based on 1994 data). This implies write-offs of approximately 63.8 billion dollars. The following columns show what would happen if the 63.8 billion dollars were distributed according to other criteria : in proportion to GDP (column 3) or the population (column 4). This illustrates the distortion introduced by the HIPC approach, which appears to be aimed at solving the problems of the creditors rather than encouraging the development of the debtors.

Failing this, a means must be found to favour countries that have managed their debt in a « virtuous » manner, for example by reimbursing part of their previous payments.

### What will debt relief cost the beneficiary States?

This question may seem strange. And yet, there is a risk that debt relief will result in a reduction in external financing at a later date. As debt relief falls within the scope of development aid, there is a strong incentive to reduce official flows of fresh money (in 1995, debt relief represented 11.5% of total aid - and this percentage is probably much higher for LICs). As far as private flows are concerned, it provides an excuse for reinforcing and furthering the exclusion of LICs from international financial markets.

### **IV. Conclusion : debt and external financing**

Reducing debt enables public expenditure to be increased in the beneficiary countries. In this sense it is an element of development financing and should be considered as such. It therefore seems inappropriate to maintain institutionally fragmented management : policies and projects on the one hand, with round tables, special assistance programs or other bodies to co-ordinate donors, and debt rescheduling in the framework of the Paris and London Clubs. On the contrary, if the flows which the different countries benefit from were considered globally, this would strengthen the coherence of external financing and improve the quality of the incentives which guide the economic policies of the governments in question.

**Table 1 : Debt in LICs and impact of different means of debt reduction**

	<i>Debt in 1996 (billions of \$)</i>	<i>HIPC Initiative theoretical relief on NPV/XGS* &gt; 200 % basis (billions of \$)</i>	<i>Relief proportional to GDP (billions of \$)</i>	<i>Relief proportional to population (billions of \$)</i>
Angola	9.40	0.82	1.20	1.11
Benin	1.45	0.10	0.75	0.57
Burkina Faso	1.20	0.20	0.88	1.07
Burundi	1.10	0.68	0.39	0.64
Cambodia	2.02	0.00	1.08	1.03
Cameroon	8.20	4.08	2.93	1.37
Cape Verde	0.20	0.00	0.20	0.04
Comoros	0.19	0.04	0.08	0.05
Congo. Rep.	4.70	1.94	0.65	0.27
Congo. Dem. Rep.	9.30	6.59	2.10	4.54
Ivory Coast	14.70	4.87	3.40	1.44
Djibouti	0.23	0.00	0.10	0.06
Eritrea	0.05	0.00	0.26	0.37
Ethiopia	9.50	7.75	2.07	5.84
Gambia	0.41	0.00	0.13	0.12
Ghana	5.00	0.19	2.16	1.76
Guinea	3.00	0.98	1.32	0.68
Equatorial Guinea	0.20	0.00	0.08	0.04
Guinea-Bissau	0.90	0.78	0.09	0.11
Guyana	1.40	0.00	0.23	0.08
Haiti	0.80	0.27	0.91	0.74
Honduras	4.00	0.00	1.39	0.61
Kenya	6.02	0.00	3.12	2.75
Laos	2.19	0.00	0.65	0.47
Madagascar	3.60	1.90	1.39	1.38
Malawi	2.10	0.67	0.75	1.00
Mali	2.80	0.65	0.90	1.00
Mauritania	2.10	0.77	0.36	0.23
Mozambique	5.50	4.66	0.54	1.81
Nicaragua	5.10	3.78	0.58	0.45
Niger	1.50	0.43	0.68	0.94
Nigeria	25.70	4.29	10.82	11.50
Uganda	3.20	1.01	2.11	1.98
Central African Rep.	0.80	0.15	0.36	0.34
Rwanda	1.00	0.69	0.46	0.67
Sao Tome and Principe	0.20	0.20	0.01	0.01
Senegal	3.14	0.00	1.75	0.86
Sierra Leone	0.90	0.55	0.32	0.46
Tanzania	6.10	3.68	1.99	3.06
Chad	0.91	0.00	0.39	0.66
Togo	1.28	0.00	0.48	0.42
Vanuatu	0.04	0.00	0.08	0.02
Vietnam	22.30	8.47	8.11	7.56
Yemen Rep.	5.60	0.00	1.84	1.58
Zambia	5.30	2.59	1.15	0.92
Zimbabwe	3.77	0.00	2.51	1.13
Total	188.90	63.76	63.76	63.76

Source : World Bank. Global Development Finance 1998. own estimates and calculations

\* NPV = Net present value / XGS = Exports of goods and services

## IN FAVOUR OF TAKING SANITARY CONDITIONS INTO ACCOUNT WHEN ANALYSING DEVELOPMENT ILLUSTRATION BASED ON THE CASE OF MADAGASCAR

The study of human resources has found an appropriate analytical framework with the theory of human capital. Much work has been done on the educational aspects in this field. With slight variations, it generally tends to validate the impact of skills on individual earning capacity and to demonstrate the significance of expected effects on dynamics over the long term. Studies on sanitary conditions are few and far between. This is partly due to statistical problems but, more generally, reflects the disproportionate interest that has been given to educational investments.

However, the scope of sanitary problems in developing countries justifies further questioning on the role of this factor. Despite major progress during the last century, the levels reached by the poorest countries, in particular sub-Saharan Africa, remain extremely low and far removed from those of developed economies.

And this progress even appears to be threatened at present, due to (i) the development of the HIV/AIDS pandemic, (ii) the ageing of the population and the development of new illnesses that are more costly to treat, (iii) the appearance of infectious agents, resistant to medicines, (iv) economic recession and the decline of national health systems, (v) a relative withdrawal of the international community, and finally (vi) the slowing down of medical discoveries that could be applied at low cost in developing countries.

Given the scope of past upheavals and those to come, and the impact of sanitary conditions in determining

This article summarises some of the main empirical results of research aimed at studying the role of health. It covers micro and macro-economic issues, concerning respectively, the characterisation of the effects of health on individual earning capacity and the role of sanitary conditions in the process of long term development and growth. Our aim was also to know whether it is possible to understand the specificity of the African growth process, generally observed in empirical studies, by taking into account the dynamic effects of sanitary factors<sup>1</sup>.

### ***1. The health dimension is neglected by micro and macro-economic, theoretical and empirical research***

Taking stock of knowledge on the human capital theory and the growth theory, highlights four major issues :

- the health dimension is generally forgotten in theoretical analyses. This is true for the modelisation of human capital, as ten years passed before a first health-related application was posited (Grossman - 1972) and this research program was rapidly put to one side in the following years. As far as growth analysis is concerned, there have only been a few rare attempts to take sanitary conditions into account. These findings may seem surprising given the recent renewal of interest in the role of human factors in growth.
- the concept of human capital is systematically seen as a homogenous stock. This leads to denying the

**Average Composite Disability Indicator (CDI) by age and gender**

Men			Women		
Between 20 et 40 years	Between 40 and 60 years	60 years and more	Between 20 and 40 years	Between 40 and 60 years	60 years and more
1.20	1.68	2.68	1.42	1.95	2.95

Source : Survey SET97, Madio, our own calculation

people's living conditions, it seems important to take a closer look at the ins and outs of health expenditure in developing countries. This is particularly relevant at the present time, as reforms to health systems are in progress in many developing or transition countries. Although the theory of human capital has the advantage of highlighting the issue of sanitary conditions, there can be no doubt that it neglects it in its concrete applications.

specific nature of different human factors, whether quantitative or qualitative, and neglecting the importance of their interaction.

- initial evaluations of the effect of health on individual earning capacity usually give ambiguous

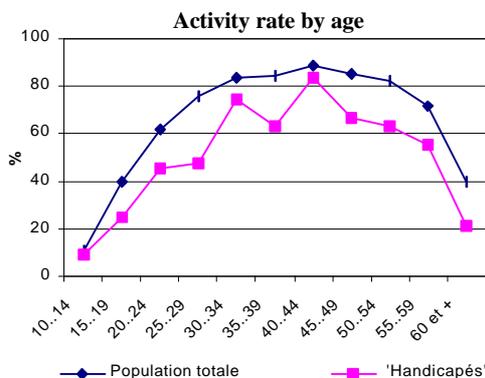
<sup>1</sup> That revealed by using an indicator (dummy variable) for the African region in cross-section based growth evaluations and measuring « significance ». To our knowledge, only two studies have managed to eliminate this indicator in such evaluations (Barro 1994 and Sachs & Warner - 1997).

results. However, they are usually subject to errors of measurement or significant econometric bias. Certain recent studies, which control all or part of these problems, highlight the existence of a relationship between state of health and employment. This is the case for the works of Schultz & Tansel (1997) on Ivory Coast and Ghana, of Lavy, Palumbo & Stern (1995) on Jamaica and Audibert & Etard (1998) on Mali. However, the results to date are not sufficient to measure and systematise the relationship between productive capacity and state of health.

- a review of empirical studies on the role of human factors in growth, suggests that variables related to education have a positive impact on growth. However, significant differences can be noted between studies based on panels and those using a cross-section and these differences have not yet been explained satisfactorily. As for health variables, they seem to have a significant effect on per capita income when they are taken into account in the evaluations.

## II. Micro-economic approach : the case of Madagascar

Madagascar is one of the poorest countries in the world, with a per capita income estimated at only 250 dollars in 1996. Nonetheless, the country was for a long time considered to be quite favoured in terms of availability of human resources, given the abundance and the high level of qualifications of its population. On the contrary, sanitary conditions remain mediocre, as shown by the approved indicators : (i) life expectancy seems low, taking into account the fact that Madagascar is still free from the Aids epidemic and that the island has never been faced with a major conflict or cataclysm ; (ii) certain ancient ailments such as leprosy or the plague persist at unexplainable



Source : Survey SET97, Madio, our own calculation

rates and finally (iii) Madagascar is one of the rare countries not to have sparked off either a demographic transition or an epidemiological transition.

To analyse the causes and implications of the existing

sanitary conditions, we used data collected during an original socio-economic survey carried out in Spring 1997 in the Madagascar capital under the MADIO project. The survey covered a maximal sample of 3,000 households representing approximately 15,000 individuals from the Antananarivo agglomeration. A wide range of health indicators were collected. Amongst other things, information is available on handicaps and chronic illnesses, plus anthropometric data (height, weight) for a sample group of adults (over 10 years), representative of the whole population.

With help from the medical research scientists from *CreDES*<sup>2</sup>, we developed a synthetic indicator aimed at evaluating the prevalence of potentially disabling health problems for the population of the Madagascar capital. To build the indicator, a doctor specialised in coding attributed a disability code for each element of medical information collected, going from 0 (no problems) to 7 (permanently bedridden) adapted to the individual characteristics of the survey. In the case of Madagascar, we looked at three types of information : self-assessment of state of health, declared handicaps<sup>3</sup> and, when appropriate, chronic illnesses. The Composite Disability Indicator (CDI) is taken as the maximal value of disability of these different elements of the calculation.

The indicator leads to the conclusion, for example, that 5% of the population over 10, that is approximately 35,000 individuals, suffer from an illness with a disability code of four or more. The distribution of potentially disabling health problems by age and gender complies with the usual findings. Thus, it is noted that women are over-represented in each age bracket and that the gap with men increases. It can also be noted that the prevalence and seriousness of potentially disabling health problems increases with age.

On the basis of this statistical information, it is possible to test the impact of « handicaps » on earning capacity.

A simple descriptive analysis demonstrates that people suffering from potentially disabling health problems are heavily penalised in terms of access to the labour market :

(i) They are frequently inactive. Although the overall rate of employment is relatively high in Antananarivo (63.4%), that of the « handicapped » sub population is significantly lower (47.3%).

(ii) When « handicapped » persons work, it is usually

<sup>2</sup> *Centre de Recherche et de Documentation en Economie de la Santé*, Paris (Centre for Research and Documentation in Health Economics)

<sup>3</sup> To be more precise, this covers mobility difficulties, disabling sight problems, serious dental problems, work-related disability and other health problems that are a handicap in everyday life.

in low productivity sectors. Although there is no significant difference between the two groups (handicapped and able-bodied) as far as belonging to the public and social sectors is concerned, 66% of persons suffering from potentially disabling health problems work in the informal sector and only 19% in the private, formal sector (against 59% and 26% respectively for able-bodied persons).

(iii) Average earnings are lower. In this respect it can be noted that « handicapped » people's remuneration from their main activity is systematically lower than average remuneration and that the gap increases the higher the activity is in the social scale.

A similar result is obtained for inactive people : « handicapped » people with no resources from employment have an average income of 127,000 Fmg, whereas other inactive people have an average income of 218,000 Fmg.

These preliminary analyses were followed by appropriate econometric evaluations, to control selective and endogenous bias and, as the case may be, the discrete nature of the variables. Two categories of implicit health indicators were tested : the degree of disability as measured by the composite indicator (CDI) and self-declared morbidity. Amongst the main results obtained, we retain that the impact of a « handicap » on the probability of participating in the labour market is significant and, from an econometric standpoint, very robust.

The potential hourly wage from a main activity is affected by the seriousness of the disability. As an example, gaining 1 standard deviation in the Composite Disability Indicator is equivalent, in terms of potential wages, to 0.7 years of additional schooling for men and 0.3 for women. However, in the case of informal activities where revenues are far lower (and less well known), we were unable to identify any impact whatsoever.

Another series of estimations more specifically concerns morbidity. It shows that, all things being equal, the average loss of income for sick people who do not completely stop working, amounts to about 16% during the duration of the period of sickness.

Using the data on morbidity, we also built an indicator for the potential state of health of the population. This indicator shows a negative relationship with earning capacity. Due to its general nature, this result confirms the need for taking

sanitary conditions into account when defining human capital.

We also sought to evaluate the impact of nutritional conditions on activity. In this more standard framework, we mobilised different anthropometric indicators such as height, weight or the Quetelet index<sup>4</sup>. It can be noted in particular that height, that reflects nutritional investments made during childhood and adolescence, has a positive, robust effect on potential earnings : all things being equal, the fact that a persons measures 10 centimetres more, can be related to an approximately 11% higher wage rate. Following the example of Haddad & Bouis (1991), we reject, for our data on Madagascar, the hypothesis whereby physical capacity is independent from height (the « small but healthy » hypothesis).

Finally, the study of the relation between medium and long term anthropometric variables and success at school confirms, in the case of Madagascar, the numerous results indicating that improvements in children's nutritional conditions favour their chances of survival and increase the return on educational investments. Thus, all things being equal, measuring 10 centimetres more, increases a child's potential schooling by more than one term.

In the case of Madagascar, characterised by the persistent precariousness of sanitary conditions and the alarming situation of the least favoured fringes of the population, the above estimations prove that improvements in the general state of health are an economic necessity as much as a question of social justice.

### **III. Macro-economic approach : analysis of the long-term growth process**

On the whole, the above analyses confirm that health has a significant impact on potential income on the micro-economic level. Theoretical analysis of the effects of sanitary conditions on growth also confirms these findings. In particular, a modelisation exercise demonstrated that increase in life expectancy favours and strengthens the endogenous growth mechanism, that is, the persistence of a growth process in the long term.

Empirical analysis of growth factors using ordinary international data bases, confirms these results. It

**Remuneration by socio-professional category (in thousands Malagasy francs) and deviation (in percentage)**

		Whole population	Persons suffering from invalidating health problems	Deviation
<b>FORMAL SECTOR</b>	<b>Managers and professionals</b>	658,8	471,4	-28,4 %
	<b>Employees</b>	178,3	162,3	-9,0 %
	<b>Blue collar workers</b>	75,0	71,2	-5,1 %
<b>INFORMAL SECTOR</b>	<b>Managers and professionals</b>	363,9	296,0	-18,7 %
	<b>Self-employed</b>	146,0	119,0	-18,5 %
	<b>Employees</b>	109,4	77,4	-29,2 %
	<b>Blue collar workers</b>	31,9	28,5	-10,7 %

has been shown that :

- life expectancy at birth is one of the most robust explicative socio-economic variables in growth equations based on cross-sections. On the contrary, this result is partially questioned in panel-based evaluations that mainly exploit the time dimension.
- other sanitary indicators, such as infant mortality rates, show a strong positive relation to growth in per capita income. This result was also found for an implicit health indicator built by a main component analysis using information gathered on health offer, sanitary environment and a population's eating conditions.
- finally, the combined use of an indicator on openness to exchange and sanitary indicators serves to fully explain Africa's « singularity » and to do away with the significance of the regional indicator.

Another legitimate question is whether sanitary variables do not also condition the very nature of growth or, in other words, if there are threshold effects related to human factors. In order to answer this question, we followed methodology described and applied by J-C. Berthélemy & A. Varoudakis (1994), which consists in classifying the sample according to special variables (in this case, life expectancy level and percentage of children in secondary schooling) and carrying out successive Chow tests, adding new observations one by one.<sup>5</sup> Our evaluations enabled us to identify three groups of countries in terms of their life expectancy levels and percentage of children in secondary schooling.

The less favoured group (22 countries) is characterised by a low initial average percentage of children in secondary schooling (about 3%) and by the precariousness of sanitary conditions (life expectancy at birth of hardly more than 45 years, over the period). In this case, human resources are too weak to enable sustained growth to be initiated. With an average annual growth rate in per capita income of 0.8%, such countries appear to be trapped in poverty.<sup>6</sup> It seems clear that development of human resources and in particular, improvements in sanitary conditions for the populations concerned, are prior conditions for setting off a sustained growth process.

The second group (36 countries) corresponds to countries with significant, but still insufficient, initial human resources. These countries are characterised by acceptable average life expectancy

(60.4 years) and a non negligible percentage of children in secondary schooling in 1960 (13.5% on average). Despite relatively sustained average annual growth in the period considered (1.96%), the performances of these countries are inferior to those in the third group. In addition, an internal convergence process can be noted, which may illustrate the appearance of a durable intermediate class on an international level.

The third group (29 countries) includes the most dynamic countries. These countries are characterised by a high initial level of schooling (49.4% on average) and high average life expectancy (72.2 years on average) ; they are also differentiated from the previous group by the high level of their investment rate (23.5% of GDP on average). Apart from non typical cases (particularly Sri Lanka and Panama), the countries in this group are mainly industrialised countries. They had the highest rate of growth over the given period, with an average annual rate of 2.75%. In these countries, growth prospects are not exclusively based on human factors, but are nonetheless conditioned by them. In this context, it is interesting to note that life expectancy makes a positive and very significant contribution to growth.

#### **IV. Conclusion**

The aim of the study presented above was to analyse the role that health plays in development. Study of existing empirical literature and the results of the survey carried out in Madagascar, together with econometric analyses on international data bases, showed the importance of sanitary variables and their close relationship with other socio-economic factors.

The micro-economic study demonstrated that improvements in sanitary conditions are essential, not only for the well-being of the populations concerned, but also for the effectiveness of other human investments and increases in individual earning capacity.

For its part, the macro-economic analysis proved the existence of the dynamic impact of sanitary conditions. In particular, it showed that there is no doubt a threshold of life expectancy below which the durability of growth processes is threatened.

The studies have also highlighted the importance of co-ordinating social policies. In a more general perspective, we would like to conclude by saying that we believe that it is urgent for more attention to be paid to the relationship between sanitary conditions and economic development, contrary to common practice in the last few decades.

<sup>5</sup> When the test is significant at the 5% threshold, this implies that the estimations made using the two sub-samples lead to significantly different coefficients and there is therefore a breakpoint.

<sup>6</sup> Madagascar belongs to this group of countries and even distinguishes itself amongst them by its low economic performance.

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