

Paper prepared for the IUSSP conference, Tours 18-23 July 2005
S-150: Population and Poverty Reduction in sub-Saharan Africa
Organiser: H.B. Kandeh

**Public Policies and Health outcomes:
Evidence from sub-Saharan Africa since 1960**

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(Draft paper)

Revised

November 3, 2004

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Abstract

This study is part of a broader study on the determinants of mortality trends in sub-Saharan Africa undertaken at CEPED in Paris. This part focuses on the effects on health indicators of structural adjustment programs implemented in sub-Saharan Africa in the 1980's, a highly controversial issue. Using an innovative method of demographic investigation, the authors present a new analysis of trends in child survival before and after the implementation of structural adjustment programs (SAP). Results from a series of case studies in Kenya, Uganda, Ghana, Zambia, Cote d'Ivoire, Madagascar, Mozambique, Benin, Cameroon and Rwanda show that trends in child survival evolved favorably after structural adjustment programs were implemented in most countries investigated. Even in countries where under-five mortality was rising before (Uganda, Ghana, Zambia, Madagascar, Benin), mortality trends were reversed after structural adjustment programs. For instance in Uganda, under-five mortality was rising from 0.165 in 1970 to 0.198 in 1981 and reversed after the 1983 SAP to reach 0.136 in 1995. In Ghana, under-five mortality increased from 0.138 in 1978 to 0.172 in 1982, and started decreasing shortly after the 1983 SAP, to reach 0.108 in 1993. In Zambia, under-five mortality increased from 0.164 in 1976 to 0.202 in 1992, to decline thereafter, reaching 0.188 in 1996. In Madagascar, under-five mortality increased steadily from 0.168 in 1973 to 0.202 in 1985, and declined after the 1985 SAP to reach 0.140 in 1997. In Benin, under-five mortality was no longer declining since 1980, but resumed its decline after the 1989 SAP, from 0.225 in 1987 to 0.137 in 1996. In countries such as Senegal, Kenya and Côte d'Ivoire, no change in long-term declining trends in child mortality was visible after structural adjustment policies were implemented. Reasons for these effects are investigated, in particular the role of the state in implementing and supporting public health policies.

Introduction

The health transition, that is a steady mortality and morbidity decline, is one of the most striking social phenomenon of the 20th century (Chesnais, 1986; Noin, 1983). It changed the daily life of human beings, their life cycle, their prospects, and had numerous economic consequences, the most obvious being increasing working life span and increasing healthy life span. In developed countries, life expectancy, which averaged 40 to 45 years in 1900, is now well above 75 years in 2000, and close to 80 years in the most advanced countries. Improving survival has been steady over the 20th century, outside of the war periods and of major epidemics such as the 1918 Spanish flu. Improving health conditions affected virtually all socioeconomic groups, all age groups, and both sexes. The most visible gains, and the most important for increasing life expectancy were those of the younger ages, especially the 0-4 years age group, which earlier accounted for the highest mortality and the largest number of deaths in the population. The probability of dying between age 0 and 5 years, also called infant and child mortality, and noted $q(5)$ by demographers, declined from values ranging between 200 and 300 per 1000 in 1900 (more than most African countries nowadays) to less than 10 per 1000 in 2000.

The causes and consequences of the mortality decline have been well studied for a long time in developed countries (Stolnitz, 1955; Preston, 1976; Preston, 1980; McKeown, 1976; Schoffield et al. 1991, United Nations, 1982). A steady mortality decline in European countries was visible at the time modern public health was developed in the second part of the 19th century. Before that time, there were cases of decreasing mortality (Sweden or rural France), as well as cases of increasing mortality (urban England, urban France), and only after this period was the steady mortality decline overwhelming through out European countries. Similarly, in countries of Asia, Latin America, and Asia, it is only after the installation of modern public health that mortality decline was sustained, and countries such as Japan, and later China which more systematically than others implemented the health programs developed in Europe had the fastest mortality decline.

Implementation of public health programs and the organization of modern medicine requires above all a modern state, and the success or failure of health policies depend primarily on the performances of the state. Even before hygiene was fashionable, before germs were identified, and before modern tools were available, the fight against infectious diseases was organized by the state through quarantines, confinement and other primitive

actions. Modern public health developed quickly after disease transmission was understood, when the germ theory of diseases was developed following the pioneer work of John Snow in England, Pasteur in France, Koch in Germany, and many others less famous researchers (Rosen, 1958). Modern public health was first focused on disease control through hygiene, vaccination, and nutrition. First public health programs undertaken by modern states in the 19th century focused on cleaning the water supply from pathogenic germs, improving sewage and waste disposal, improving ventilation of the houses, improving the feeding of children and adults, vaccinating against the most lethal diseases (especially smallpox), and providing health education. Special programs were aimed at the poorest strata of the population. All of those were primarily organized by the state, and often supported by local and charitable organizations.

Further improvements occurred in the 20th century with the fast development of preventive and curative medicine, with major advances in biochemistry and pharmacy which paved the way to a rapid expansion of efficient medical drugs. Furthermore, the quality and the quantity of the diet improved overall with increasing income, and individual awareness and attitudes changed towards better health with better prospects and mass health education. Last, increasing income and better management permitted the private and public financing of health care, both through market forces and through health insurance schemes. However, even with low levels of income and a low proportion of the state budget devoted to health services, some developing countries were able to achieve remarkable levels of life expectancy, a typical example being China, primarily through efficient use of local resources, and a special attention to equity in access to health services.

Even in countries where market forces play a large role in the health sector, the state continues to play a critical role in organizing public health, in financing many health programs and health research, in organizing and financing the training of health personnel, and in regulating through law the many aspects of health economics (Tanzi, 1995 and 1997, OMS, 1999). Therefore, public policies have been and continue to be central to the health transition and the sustained mortality decline, in both developing and developed countries.

Sub-Saharan Africa

The mortality decline affected virtually all countries in the world in the 20th century. If it started earlier in developed countries, it started between 1900 and 1950 almost everywhere in the world, even in the poorest countries of sub-Saharan Africa (Hill, 1991). Values of

infant and child mortality from 400 to 500 per 1000, which were still common in 1950 in Africa, are now between 100 and 200 per 1000 in most countries for which data are available. However, mortality decline in sub-Saharan Africa, although impressive compared to the poor economic performances of the continent, has not been as steady as it was in other developing countries and earlier in developed countries, and several cases of increasing mortality have been reported outside of major war or epidemic periods (Garenne, 1996; Garenne, 1997; Garenne, 1999; Garenne, Gakusi and Lery, 2000).

The most important cause of mortality decline in sub-Saharan Africa has been public health policies, as was the case in developed countries, although the other factors also played a role, in particular improving nutrition. Mortality decline started in the colonial period, probably around 1930 in most countries following the first hygiene and public health programs, the first vaccination campaigns, and improving nutrition with the development of market economy and modern transportation systems. Mortality indicators further improved after 1950 when antibiotics and antimalarial drugs became widely available, and when modern health services and health programs were implemented throughout the continent.

After independence, around 1960 for most sub-Saharan African countries, the newly installed states basically continued and developed the previous colonial health policies, and later implemented new programs with the help of international organizations such as the World Health Organization and UNICEF, the most visible being the primary health care programs (PHC), the maternal and child health and family planning programs (MCP-FP), and the expanded program on immunization (EPI).

The newly independent states were at first particularly fragile for a variety of reasons: lack of experience in modern state governance, lack of trained technical personnel, lack of expertise in economic affairs, low level of income, lack of capital, and an economy which was primarily designed for the needs of colonial powers (Gemdev, 1997; Zindzingre, 1998). Therefore, any peculiar difficulty, whether a political crisis, an economic downturn or even a severe epidemics, could potentially translate into major drawbacks for the health sector, whereas similar problems in more advanced and more stable countries did not affect the health sector, a good example being the steady mortality decline in Latin America despite repeated coups d'état and serious economic crises.

Furthermore, some newly independent countries had developed their own philosophy of development, often imitated from the policies of the former Eastern Block with special adaptation to the African case, the so-called African socialism (Sahn and Sarris, 1992). This was usually a very weak theory, which ended in most cases in poor economic outcome and

political crisis. The most radical countries cut themselves from the first world, and ended in severe isolation, one of the worst cases being Madagascar.

In the late 1970's and early 1980's, many African states faced a difficult economic situation: lack of economic growth, increasing budget deficits, negative trade balance, worsening terms of trade due to lower prices of export commodities, lack of investment (associated with political instability), and high interest rates. This situation further worsened by the consequences of several years of drought in many countries, and by the fast increase in gasoline prices, the oil shocks of 1973 and 1979.

In response, the World Bank (BIRD) and the International Monetary Fund (IMF) initiated a series of economic programs, called "Structural Adjustment Programs" (SAP) and Stabilization Programs (SP). These programs were implemented in the 1980's throughout sub-Saharan Africa, and even countries who did not benefit from the BIRD or IMF funds and expertise tended to follow similar policies. These were designed to improve state management, to attract foreign capital, to better use comparative advantages, and to improve market mechanisms (World Bank reports of 1989, 1992, 1993, 1994; IMF, 1998; Evans and Moore, 1992; Ben Hammouda, 1999; Duruflé, 1988; Bourguignon and Morrisson, 1992; Fontaine, 1994; Grellet, 1994; L'Hériveau and Chavagneux, 1992; Vinod et al. 1991). One of the questions that is often asked is whether the SAP had any effect on the health sector, and in particular on mortality levels. If some studies have explored possible impacts on the social sectors (Hugon, 1995; Guillaumont, 1995; NRC, 1995, Anand and Chen 1995), to our knowledge none had demonstrated either a positive nor a negative impact on mortality trends.

The aim of this paper is to present and discuss a series of case studies in sub-Saharan Africa, showing trends in child survival before and after structural adjustment policies. Needless to say that the authors had no preconceived idea about the outcome. Often in the development literature it is argued that structural adjustment policies tend to induce a reduction in investment in the public social sector, and in particular in the health sector, and therefore may have a negative outcome on health indicators. It could also be argued that by improving state management, the state managed sectors benefit from the programs, in particular the health sector, and therefore SAP's can be expected to have a positive outcome on health indicators. Furthermore, SAP's could interfere with other factors of mortality level, and in particular other independent negative factors could operate at the same time, such as the HIV/AIDS epidemics which started in the 1980's, as well as other independent positive factors, such as the UNICEF-sponsored international effort for vaccination (EPI), which also started in the mid 1980's. A systematic tendency across countries to increases in mortality

after SAP's were implemented would be interpreted as a negative effect on child survival, and a systematic tendency to decreases in mortality after SAP's would be interpreted as a positive effect on child survival, unless other obvious confounding factors would operate at the same time. This was the rationale for our analyses.

Data and methods

Child survival is one of the most sensitive indicators of success and failure of health policies, and indirectly of public health policies and state management. The most commonly used indicator of child survival: the infant and child mortality quotient $q(5)$, is often used by agencies in the UN system to evaluate country performances, instead of infant mortality or life expectancy, primarily because it is widely available in many developing countries who have conducted demographic surveys, and also because it better reflects the control of infectious and parasitic diseases and malnutrition among young children than the infant mortality rate, which is more influenced by complications of pregnancies, prematurity and other neonatal conditions. Therefore, $q(5)$ was used throughout this study as the child survival indicator, expressed per 1000 live births. Its meaning is straightforward, since it measures the proportion of live births who die before reaching their fifth birthday: $q(5) = 200$ per 1000 means that out of 1000 live births 200 are likely to die before age 5 years.

Data were taken from demographic sample surveys, primarily those of the World Fertility Surveys (WFS) and of the Demographic and Health Surveys (DHS). These surveys are based on the retrospective maternity histories among women in their reproductive ages (15-49 years). For each of the birth to these women, the surveys record the date of birth, and when applicable the age at death of the child. The data therefore allow to reconstruct trends in child survival for at least 20 years prior to the survey, sometimes more when the sample size is large enough. Since many countries have had several surveys between the late 1970's to the late 1990's, trends in child survival can be reconstructed since at least the 1960's, and often since the 1950's, that is about 20 years before and 10 to 20 years after SAP's were implemented in the 1980's. Every time this was possible data from WFS/DHS surveys were compared with independent data sources from censuses and other demographic surveys.

Data of structural adjustment programs and stabilization programs were taken from World Bank sources, quoted by Stewart (1995). We used primarily the date at which the first

SAP was implemented in a country as the reference date for our analysis of trends before and after. This is a rather crude estimate at this point, and further analysis will be conducted country by country later on.

Data on growth national product per capita, adjusted for parity purchasing power (GNP/PPP) were taken from the Penn World Tables data bank. Unfortunately, they cover only the 1950-1992 period, and in many cases only the 1960-1991 period, and have not been updated since. They however cover well the most critical period for our analysis, that is the 1980's and early 1990's.

The countries selected for this analysis were taken from the list of 32 African countries with WFS/DHS data. Only those with at least two surveys, and without any major civil war during the 1980's were selected (in the case of Rwanda, the period after 1994 was not considered). Among those, we started with a first list of 10 countries, 5 in which mortality increase was identified prior to the SAP, and 5 where mortality decline was steady before SAP's. More countries would be investigated in the second phase of this study.

Mortality trends were reconstructed for each of the selected countries using an innovative method. First, each of the available WFS/DHS survey was reanalyzed separately, and death rates were computed year by year for all available years from the original data, and compared across surveys for the overlapping years. Second, for each country, all surveys available were pooled together year by year, by weighing the survey estimate by the number of deaths in each year: this produced a series of pooled estimates of $q(5)$ for about 40 to 50 years. Third, a polynomial was fitted to the pooled estimates to identify points of reversals in trends. Fourth, linear or log-linear trends were fitted in each segment of steady mortality decline or steady mortality increase. Fifth, the significance of mortality trends was tested by simulating the stochastic process of yearly mortality estimates using a DBASE computer program.

It should be noted that our yearly estimates after reconstructing the trends do well represent the average yearly level of mortality over each period, but not the yearly fluctuations. In a few cases, the observed yearly values of $q(5)$ were significantly different from the trend because of a mortality crisis, such as the 1985-1986 famine period in Madagascar. These mortality accidents were considered as a noise for our trend analysis, and will be considered separately in a further analysis of yearly fluctuations of mortality.

Further analysis of the data will also attempt at discounting the net effect of HIV/AIDS vertical transmission from data on seroprevalence among pregnant women, and to include data on vaccination coverage as a potential confounding factor.

Demographic data were compared to income data published by the Penn World Tables (GNP/PPP: growth national product, corrected for purchasing power parity, per capita expressed in 1985 USD), in order to take into account economic performances of the countries.

Case studies

Case studies were grouped according to their mortality profile before SAP's were implemented: cases of steady mortality decline, and cases of mortality reversals (increases) prior to SAP's.

1. Senegal

Senegal had one of the highest infant and child mortality level in 1960, estimated at 289 per 1000. Mortality had been decreasing steadily during the colonial period, at least in the cities from which the data are available. For totally independent reasons, mortality increased slightly in the 1960's, most likely because of increased malaria mortality following the attempts at malaria eradication in the mid-1950's. However, since 1969 mortality had been declining steadily, from an estimated value of 319 per 1000 to 222 in 1980, 155 in 1990, and 117 in 1998, the last point available from DHS data. Structural adjustment programs were first implemented in 1981 in Senegal, one of the first countries in sub-Saharan Africa. This pioneer program was followed by other SAP's in 1986-1987, and accompanied by stabilization loans in 1980, 1982, 1983, 1985, 1988 and 1989. There was no visible change in mortality decline in the 10 years before and the 10 years after 1981 in Senegal (figure 1). Although economic growth was steady in the 1970's, a recession stroke the country in the mid-1980's. However, this recession did not have any effect on mortality trends. By 1995, child survival in Senegal was among the average of sub-Saharan Africa countries, that is a faster mortality decline compared to others since it started from a higher level. This occurred despite virtually no change in GNP/PPP over the 1960-1991 period. Fortunately, Senegal remained with low levels of HIV seroprevalence over the 1980's and 1990's. In conclusion, there was no evidence of any positive or negative impact of SAP in Senegal.

2. Kenya

Kenya was a model of mortality decline in Africa until 1980: it had one of the lowest level in 1960 (215 per 1000) and one of the fastest decline (107 in 1980). A first SAP was implemented in 1980, and further SAP's in 1983, 1986, 1988, and 1989, together with stabilization loans in 1980, 1982, 1983, 1985, 1988 and 1989. After 1980, mortality decline continued at the same pace for about 6 years (89 per 1000 in 1986), after which it stopped and even reversed for a few years (112 per 1000 in 1993), and later resumed its decline (104 per 1000 in 1998). The most obvious reason of mortality increase from 1986 to 1993 was HIV/AIDS, which spread rapidly in Kenya at that time. This point will be further explored in a second phase. Contrary to Senegal, GNP/PPP increased quite steadily from 1955 to 1991 in Kenya. As in Senegal, there was no evidence of a negative effect of SAP in Kenya, despite divergent economic trends.

3. Côte d'Ivoire

Côte d'Ivoire underwent a steady mortality decline before 1982, date of the first SAP, from 329 per 1000 in 1960 to 165 per 1000 in 1982. Other SAP's were implemented in 1984 and 1986. Mortality decline continued thereafter, although at a lower pace, reaching an estimated level of 138 per 1000 in 1994. The main reason for the decrease in the pace of mortality decline was most likely HIV/AIDS, which took off in 1986 in Côte d'Ivoire and reached a plateau of about 15 % among pregnant women in 1992. Economic performances of the country were good from 1960 (1120 USD per capita) to 1978 (2237 USD per capita), date after which income per capita decreased almost as fast as it has increased before, reaching a low value of 1104 USD in 1992, coming back to its 1960 level. Mortality decline occurred therefore quite independently from economic performances, and there was no evidence of an effect of SAP.

4. Cameroon

Mortality decline in Cameroon was steady since independence until 1989, date of the first SAP, decreasing from 267 per 1000 in 1960 to 138 per 1000 in 1989. Since then, mortality decline has been minimal until 1998, with the last available estimate of 137 per 1000. Cameroon is one of the few cases where mortality decline seems to have come to a halt

after SAP were implemented. Reasons for this effect will be further explored, but HIV/AIDS remained at too low a level to explain this stagnation of child survival in the 1990's. It should be added that Cameroon experienced a major decline in GNP/PPP from 1986 to 1992 (- 31 %).

5. Benin

Benin was the first case study where mortality decline had stopped before the implementation of structural adjustment programs. Mortality decline was clear after independence, and lasted for about 20 years, from estimated values of 355 per 1000 in 1960 (the highest in the sample of countries in this study) to an estimated 221 per 1000 in 1981. After this point, mortality stagnated, or even increased slightly to an estimated 225 per 1000 in 1988. In 1989, a SAP was implemented, and from that date mortality resumed a fast decline, down to 137 per 1000 in 1996, catching up with the lag in mortality decline of the 1980's. Economic performances were poor over the period in Benin, with virtually no economic growth between 1960 and 1991. Therefore, in Benin, SAP seemed to be associated with fast mortality decline after a period of stagnation, and despite no obvious economic growth.

6. Ghana

Ghana was in a favorable situation at time of independence and in the two decades following it, with a low level of mortality and fast mortality decline, from a level of 214 per 1000 in 1957 to 138 per 1000 in 1978. Thereafter, and for about five years (1979-1983), the country underwent a major political crisis, which we have described elsewhere (Garenne et al., 2000). It is beyond the scope of this paper to describe the crisis in details. In a few words, it occurred after years of mismanagement and corruption, and was associated with two coups d'état. During the crisis, child mortality increased rapidly, to an estimated value 172 per 1000 in 1982. The political situation became calm again in 1983, date of the first SAP. From that date on, mortality decline resumed, and by the mid 1990's it had almost recovered the lag in mortality decline of the early 1980's, with an estimated value of 104 per 1000 in 1994. Like in Benin, income per capita hardly changed over the 1957-1992 period in Ghana. But what was striking, is that, like in Benin, mortality decline resumed very quickly after SAP after a period of mortality increase.

7. Uganda

Uganda is one of the worst cases of political crisis in Africa in the 1970's, outside of countries who experienced civil war. During the Idi Amin years (1971-1979) and the few years of confusion following it (1980-1981), mortality increased dramatically, reversing a long term trend of mortality decline in the late colonial period, and the early post colonial period. Mortality was estimated at 206 per 1000 in 1962 (independence), and 165 per 1000 in 1970, following a path quite similar to that of Kenya with a time lag of a few years. Mortality almost doubled during the political crisis, reaching 198 per 1000 in 1981. After the main crisis, and especially after 1986, the political situation became more stable, and remained so since then, despite the rebellion movements in the North. A first SAP was implemented in 1983, followed by another round in 1988, accompanied by a series of stabilization plans in 1982, 1983, 1987 and 1989. During this period, mortality underwent a rapid decline, down to an estimated value of 136 per 1000 in 1995. Here again, the period just following the SAP corresponded to a reversal in mortality trends, from increasing to decreasing values, indicating a positive effect of SAP's on child survival. As in several other countries, income per capita hardly changed over the period in Uganda, despite a big spike in 1981-1983.

8. Zambia

Zambia is another case of severe crisis in the late 1970's and throughout the 1980's. The origin of the crisis is quite different from the other countries investigated. It is primarily due to an economic crisis following a fast decline in the price of copper on the international market (1975), combined with a vulnerable economy based almost exclusively on copper exports, and a generous so-called socialist state, which used to provide many social services. The crisis lasted for about 15 years, and was finally resolved with the change in government in 1991. Mortality was declining steadily until the beginning of the crisis, from estimated values of 243 per 1000 in 1964 (independence) to 164 per 1000 in 1976. After this date, it increased steadily, to reach a peak of 202 per 1000 in 1992. Since then, mortality has tended to decline, down to an estimated value of 181 per 1000 in 1998. During the crisis years, a first SAP was implemented in 1984-1986, but was stopped soon after (1987) for political reasons. Therefore, the effect of the SAP is more difficult to interpret than in other cases. Furthermore, Zambia was strongly affected by HIV/AIDS, and part of the increase in mortality in the

second part of the 1980's can most likely be attributed to the disease, as was the case in Kenya for instance. In any case, mortality increase after 1984 was just matching the earlier trend in mortality increase before the SAP was first implemented, indicating no negative impact of the SAP. If HIV/AIDS is taken into account, the SAP period was probably slightly beneficial. Furthermore, after liberalization was implemented, along with a series of new economic policies, mortality trends were reversed, as in other cases investigated above. It should also be noted that the period of mortality increase (1976-1992) paralleled almost exactly that of decline in income per capita (1975-1992). Correlation between economic performances and mortality decline will be further explored.

9. Madagascar

Madagascar represents the worst case of bad governance and negative economic growth among the cases studied, and one of the worst in any case in the continent. After a relatively good start following independence (1960), Madagascar underwent a series of coups and political crises for about 15 years (1971-1985). The political regimen controlling the country was one of the most radical in the continent, and one of the most negative for the economy. The results of mismanagement of the state were still felt 25 years after, and it is only after 1995 that the economy started to catch up again, after a steady decrease since 1971. Child mortality was declining steadily in the late colonial period and the early post-colonial period, from an estimated 211 per 1000 in 1960 to 168 per 1000 in 1973. After that date, it increased for 13 years, until a peak of 200 per 1000 in 1985-1986, which were also famine years, and during which mortality seemed to be even higher than shown by the trends. After 1986, mortality resumed a steady mortality decline, reaching a low 136 per 1000 in 1998. A series of SAP's were implemented during the four years from 1985 to 1988, and it is striking to note that those were the years were mortality started to decline again, after years of steady increase. As in other cases mentioned above, the new policies implemented after 1985 seem to have had beneficial effects on child survival, although they did not seem to have had any positive economic impact for many years.

10. Rwanda

Rwanda was also studied, primarily because of its wealth of demographic data (both DHS and WFS data), and also because it is an interesting case study for mortality increase

associated with bad governance. Needless to say that the period after the 1994 genocide was not included in our study, not counting the fact that no demographic data was available beyond this point when we started this study. As in all the other countries studied, mortality was declining steadily in the late colonial period in Rwanda, from 297 per 1000 in 1955 to 224 in 1965. However, in this case, mortality started to increase shortly after independence, which occurred in 1962. For about 10 years (1965-1975), mortality increased, up to a peak of 255 in 1975. After this point, mortality decreased to reach a low value of 138 per 1000 in 1992, the last point available. Reasons for the mortality increase were clearly linked with the poor management of the state during the first republic, due in part to the lack of technical expertise and to the lack of infrastructure after independence, and in part to the wrong economic choices. Change in mortality trends was clearly associated with better management after 1975, and the re-opening of the country to Western countries. Structural adjustment policies were implemented after 1985, primarily at the country's initiative, and without major loans from the World Bank and the IMF (the country is not in the list provided by Stewart). No change in mortality trends was visible before and after 1985, indicating no effect of SAP's. However, it should be noted that the changes occurring in 1975 in Rwanda could be compared, if not assimilated, to some kind of early SAP, and if so, then changes in mortality trends were clearly associated with changing economic policies.

Synthesis

A synthetic view of the overall effect of SAP's in the 10 countries investigated can be provided by comparing mortality trends before and after SAP were first implemented, the reference point being the mortality level achieved at that time. Results are shown in figure 2. Mortality levels were standardized so that 100 is the level of mortality in the year where SAP was first implemented. A value of 200 for the mortality indicator at time (t) means twice as high mortality level than in the reference year, and a value of 50 twice as low a mortality level. From the analysis of the 10 case studies, it is clear that SAP's have had overall none or a beneficial effect on mortality trends: in case mortality decline was steady before the SAP's, it continued at the same pace (such as Senegal, Kenya, Côte d'Ivoire, and Rwanda), with the sole exception of Cameroon where it stagnated thereafter. In case of mortality stagnating or increasing before the SAP's, mortality trends tended to reverse to steady mortality decline (such as Benin, Ghana, Uganda, Madagascar), with the sole exception of Zambia where the reversal occurred only after the political crisis was resolved. The cases of Rwanda and

Zambia were explored more in depth above, and the reversal in mortality trends after mortality increase were also closely associated with better governance. With the exception of countries affected by HIV/AIDS, Cameroon was here the only case where mortality trends were not as favorable after SAP's as could have been anticipated before SAP's. However, even in this case, mortality decline was not reversed, it only stagnated.

Discussion

In the development literature, many authors have argued that SAP's could lead to adverse effects, and in particular to increasing mortality. Reasons being invoked were either lower investment in the social sector in general and in the health sector in particular, or increasing inequalities. There is however virtually no evidence in decreased medical consumption (public and private) after SAP's were implemented. Although we have not had access to detailed data for all the countries investigated, there was clear evidence of increased health infrastructure, increased health personnel, increased drug consumption, increased used of health services over the period 1960-1998 in all the cases for which data were available. The only case of deteriorating nutritional status was in Madagascar, clearly linked to mortality increase in the 1971-1985 period, but this was not a handicap to mortality decline after 1986.

Our main hypothesis to explain the findings, that is a positive effect of SAP's in cases where mortality was increasing before, relates with the role of the state and improving governance. One of the first aims of SAP's was to improve the management of the state. It is likely that by improving its management, the state also improved the management of the health sector. Even if health and social investments did not increase in volume, although they did in some countries (5 out of 13 countries quoted by Hugon, 1998), it remains possible that their efficiency increased with the new policies.

It is difficult to infer strict causality from trend analysis before and after. This would certainly be hazardous in a single country. However, the fact that the same phenomenon repeats itself in several countries with quite different backgrounds, divergent trends in income, and a variety of political histories, indicates that positive forces associated with SAP's were at work. It quite unlikely that the observation that the five countries in which increasing trends in mortality were reversed within a year or two of SAP's was due to pure chance. Confounding factors always remain possible. Among the most visible, the EPI

remains a strong candidate. Vaccination programs were implemented throughout the developing world in 1985-1986, usually with great success. However, if EPI alone was at work, it would be difficult to explain two things: first, that mortality reversals occurred several years before EPI was implemented on a large scale (such as the case of Ghana and Uganda), or several years after EPI (such as Benin); and second that mortality reversals were long lasting. If EPI only had an impact, all countries (including Zambia and Cameroon) would have had a marked mortality decline just after 1985-1986, and only for a few years, after which the control of measles, whooping cough and tetanus would not longer be visible. The opposite was observed: when mortality trends were reversed, the effect was long lasting, and lasted to the latest year available in the time series.

On the opposite, we may have underestimated the positive effects of SAP by not discounting the net effect of HIV/AIDS. In countries with high seroprevalence among pregnant women, such as Kenya, Zambia, Côte d'Ivoire, and Uganda, infant and child mortality would have been lower if AIDS had not stricken mothers and newborns. We plan to improve our analysis by adding information on seroprevalence and discounting AIDS deaths in a later revision of this work.

Our analysis has been focused on countries as a whole. In future analysis we plan to include more information on social stratification, in particular to analyze urban and rural trends in mortality separately. Since an effect of SAP's was to increase rural income, and in many cases a negative effect on urban income, we may observe divergent trends in the two areas. Furthermore, SAP's may have increased inequalities in some countries, and here again their effect could have been different for the poorest strata of the society. The specific effects of SAP on the poor will require further work, and will be constrained by the availability of data.

Although the main pattern was quite clear, it should be remembered that each case study is specific, and that all those situations are complex. Cases like Zambia, where SAP were quickly abandoned after first being implemented, or Rwanda where the main change in governance occurred before SAP are examples that require more in-depth analysis than a mere correlation or a simple figure relating mortality trends with the first date of SAP. However, classic cases with change in government occurred at the same time as SAP and opening the country to the West and its ideas (as Uganda, Ghana, Benin, and Madagascar) remain striking examples of the interrelationships between the many aspects of good governance.

Acknowledgement

This study is part of a larger study on the demographic impacts of political crises and good governance in developing countries undertaken at CEPED in Paris. The study started about three years ago and was in progress in year 2000. The analyses presented in this paper are still preliminary, and will require further research in the next three years. The study is also the main focus of a research seminar at EHESS (school for higher social sciences in Paris) organized by the two authors since the fall of year 1999. The study was so far supported by CEPED and IRD in Paris on funds granted by the French Ministry of Foreign Affairs. It recently received a 3-year award from the Wellcome Trust for further analysis. The authors are independent from the World Bank and the IMF. Views expressed in this paper reflect the current stage of the analysis, and should not be considered definite. The authors would like to express their gratitude to Mr. Alain Lery, director of CEPED, who supported the study from the beginning, and gave the authors time and space to conduct the research.

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Table 1: List of countries investigated, with dates of SAP and AL

Table 2: Mortality indicators from reconstructed trends

Table 3: Economic indicators (Penn World tables)

Figure 1: Trends in mortality

Figure 2: Net effect of SAP on child survival

Table 1 : List of countries investigated, and dates of major programs

Country	World Bank Structural Adjustment Programs (SAP)	IMF Stabilization loans (SL)
Benin	1989	1989
Cameroon	1989	1988
Côte d'Ivoire	1982, 1984, 1986	1981, 1984, 1985, 1986, 1988
Ghana	1983, 1984, 1985, 1986, 1987, 1988, 1989	1983, 1984, 1986, 1987, 1988
Kenya	1980, 1983, 1986, 1988, 1989	1980, 1982, 1983, 1985, 1988, 1989
Madagascar	1985, 1986, 1987, 1988	1985, 1986, 1987, 1988, 1989
Rwanda		
Senegal	1981, 1986, 1987	1980, 1981, 1982, 1985, 1986, 1987, 1988
Uganda	1983, 1988	1982, 1983, 1987, 1989
Zambia	1984, 1985, 1986	1981, 1983, 1984, 1986

Source : World Bank, cited by Stewart.

Table 2 : Mortality indicators, from reconstructed trends.

Year	Senegal	Kenya	Côte d'Ivoire	Camero on	Benin	Ghana	Uganda	Zambia	Madaga scar	Rwanda
1955	308	256	385	302	400	223	254	332	230	297
1956	296	247	373	295	390	219	246	320	226	289
1957	284	239	361	287	381	214	239	310	222	281
1958	283	230	350	281	372	210	232	299	218	273
1959	286	222	339	274	364	205	225	289	215	265
1960	289	215	329	267	355	201	218	279	211	258
1961	293	207	319	261	347	197	212	270	207	251
1962	296	200	309	255	339	193	206	260	204	244
1963	299	193	299	248	331	189	200	252	200	237
1964	302	187	290	242	323	185	194	243	197	230
1965	305	180	281	237	316	181	188	235	193	224
1966	309	174	272	231	308	177	182	227	190	225
1967	312	168	264	225	301	174	177	219	187	228
1968	315	162	256	220	294	170	172	212	184	232
1969	319	157	248	215	287	167	167	204	181	235
1970	317	151	240	209	281	163	165	198	177	238
1971	306	146	233	204	274	160	168	191	174	241
1972	295	141	226	200	268	156	170	184	171	245
1973	285	136	219	195	262	153	173	178	168	248
1974	275	131	212	190	255	150	176	172	168	252
1975	265	127	205	185	249	147	179	166	171	255
1976	256	123	199	181	244	144	182	164	174	255
1977	247	118	193	177	238	141	185	166	177	246
1978	238	114	187	172	232	138	188	168	180	237
1979	230	110	181	168	227	147	191	170	183	228
1980	222	107	176	164	222	155	194	172	186	219
1981	214	103	170	160	221	164	198	174	189	211
1982	206	99	165	156	222	172	191	176	192	203
1983	199	96	158	153	222	168	186	178	196	195
1984	192	93	156	149	223	160	181	181	199	188
1985	186	89	154	145	224	154	176	183	202	181
1986	179	89	152	142	224	147	172	185	196	174
1987	173	92	150	139	225	141	168	187	190	168
1988	167	95	148	139	225	135	163	189	184	161
1989	161	99	147	138	218	129	159	191	179	155
1990	155	102	145	138	204	123	155	194	173	149
1991	150	105	143	138	191	118	151	196	168	144
1992	144	109	141	138	179	113	147	202	163	138
1993	139	112	139	138	167	108	144	198	158	
1994	135	111	138	138	156	104	140	195	153	
1995	130	109		137	146		136	191	149	
1996	125	107		137	137			188	144	
1997	121	106		137				184	140	
1998	117	104		137				181	136	

Table 3 : GNP per capita (Parity Purchasing Power Adjusted)

Year	Senegal	Kenya	Côte d'Ivoire	Camero on	Benin	Ghana	Uganda	Zambia	Madaga scar	Rwanda
1955		667				872	585	889		
1956		666				869	595	957		
1957		672				888	615	1034		
1958		640				824	577	856		
1959		602			1042	882	589	931		
1960	1047	659	1120	641	1100	894	598	965	1191	537
1961	1072	563	1155	660	1116	939	573	963	1179	506
1962	1104	589	1181	698	1079	930	585	939	1185	467
1963	1134	622	1281	677	1129	934	601	881	1152	448
1964	1133	622	1422	657	1129	904	606	910	1120	368
1965	1143	614	1400	673	1191	883	614	1110	1111	350
1966	1155	660	1407	676	1179	862	644	1033	1111	487
1967	1120	679	1400	740	1148	902	635	1098	1121	545
1968	1171	698	1515	785	1103	911	627	1123	1095	544
1969	1036	711	1497	808	1059	928	653	1042	1132	592
1970	1146	586	1615	804	1118	1059	647	1117	1146	647
1971	1137	749	1658	811	1098	1040	670	1140	1206	643
1972	1133	839	1655	815	1132	942	660	1185	1137	628
1973	1062	804	1694	830	1149	973	634	1163	1069	621
1974	1062	847	1721	902	1110	1091	627	1208	1014	624
1975	1123	837	1816	859	1052	914	618	1251	995	640
1976	1165	804	1970	888	1002	868	605	1174	930	656
1977	1156	843	2060	894	1023	918	602	1047	939	669
1978	1110	898	2237	972	1017	1027	574	1007	905	693
1979	1174	931	2228	1072	1056	949	572	950	995	715
1980	1134	911	1790	1194	1114	976	534	971	984	757
1981	1139	870	1790	1294	1177	936	892	1024	847	846
1982	1203	860	1697	1281	1018	795	978	940	821	821
1983	1188	836	1618	1342	1008	770	1095	840	795	834
1984	1127	833	1539	1403	1033	785	576	827	766	769
1985	1163	794	1545	1487	1108	792	540	808	769	776
1986	1155	857	1558	1499	1063	807	505	786	730	775
1987	1171	881	1520	1439	995	808	509	760	711	770
1988	1172	902	1419	1330	995	811	527	757	685	753
1989	1139	914	1336	1361	921	821	548	756	680	730
1990	1145	911	1213	1226	920	902	554	689	675	756
1991	1120	902	1158	1110	946	915	563	699	638	756
1992		914	1104	1029		956	547		608	762

Source : Penn World Tables.

Figure 1: Mortality trends

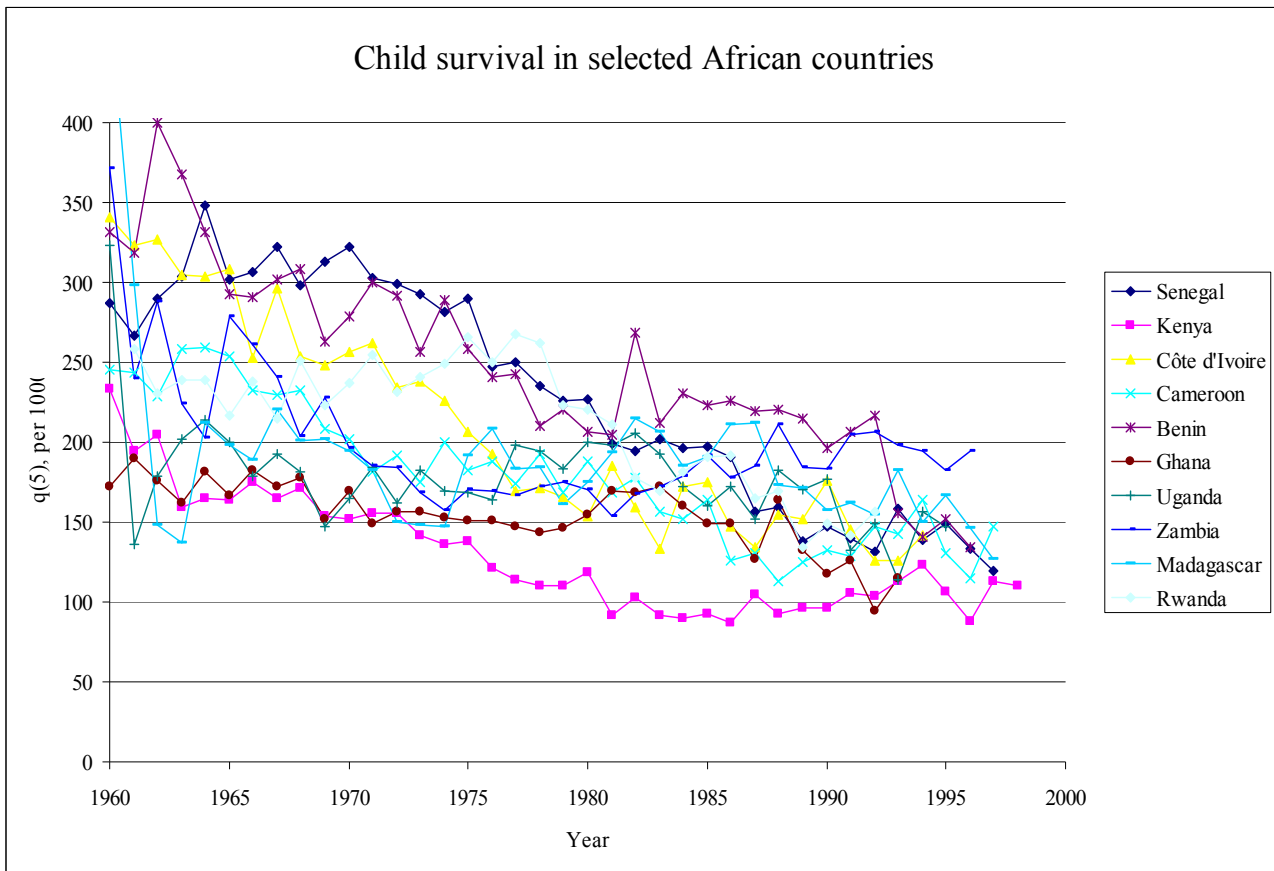


Figure 2 : Net effect of SAP's on child survival

