2nd Report on the World Nutrition Situation – Volume II: Country trends methods and statistics

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UNITED NATIONS   **NATIONS UNIES**

ADMINISTRATIVE COMMITTEE ON COORDINATION – SUBCOMMITTEE ON NUTRITION

**A report compiled from information available
to the ACC/SCN**

March 1993

UNITED NATIONS

ADMINISTRATIVE COMMITTEE ON COORDINATION – SUBCOMMITTEE ON NUTRITION

(ACC/SCN)

The ACC/SCN is the focal point for harmonizing the policies and activities in nutrition of the United Nations system. The Administrative Committee on Coordination (ACC), which is comprised of the heads of the UN Agencies, recommended the establishment of the Sub–Committee on Nutrition in 1977, following the World Food Conference (with particular reference to Resolution V on food and nutrition). This was approved by the Economic and Social Council of the UN (ECOSOC). The role of the SCN is to serve as a coordinating mechanism, for exchange of information and technical guidance, and to act dynamically to help the UN respond to nutritional problems.

The UN members of the SCN are FAO, IAEA, IFAD, ILO, UN, UNDP, UNEP, UNESCO, UNFPA, UNHCR, UNICEF, UNRISD, UNU, WFC, WFP, WHO and the World Bank. From the outset, representatives of bilateral donor agencies have participated actively in SCN activities. The SCN is assisted by the Advisory Group on Nutrition (AGN), with six to eight experienced individuals drawn from relevant disciplines and with wide geographical representation. The Secretariat is hosted by WHO in Geneva.

The SCN undertakes a range of activities to meet its mandate. Annual meetings have representation from the concerned UN agencies, from 10 to 20 donor agencies, the AGN, as well as invitees on specific topics; these meetings begin with symposia on subjects of current importance for policy. The SCN brings certain such matters to the attention of the ACC. The SCN sponsors working groups on inter–sectoral and sector–specific topics.

The SCN compiles and disseminates information on nutrition, reflecting the shared views of the agencies concerned. Regular reports on the world nutrition situation are issued, and flows of external resources to address nutrition problems are assessed. State–of–the–Art papers are produced to summarize current knowledge on selected topics. SCN News is normally published twice per year. As decided by the Sub–Committee, initiatives are taken to promote coordinated activities – inter–agency programmes, meetings, publications – aimed at reducing malnutrition, primarily in developing countries.

Preface to Volume II

The Second Report on the World Nutrition Situation is being published in two volumes, the first of which was issued in October 1992, in time for the International Conference on Nutrition. This gave global and regional trends in nutrition and related indicators, and covered women's nutritional status and diet–related chronic diseases. The second volume is in two parts. Trends in nutrition in fourteen countries are described in chapter 1. Details of methods and underlying data (for both volumes) are given in chapter 2.

Splitting the results into more than one publication follows the precedent set for the First Report on the World Nutrition Situation, which gave aggregate data, in November 1987. This was followed by the Supplement on Methods and Statistics (December 1988). The Update on the World Nutrition Situation (January 1989) then gave country–level data. Reasons for dividing the output include timeliness – getting the broader picture out before filling in details – and providing results in a concise format rather than one thick book.

Country–level data are intended to illustrate and promote understanding of observed trends in nutrition. They also, importantly, show the variety of situations, smoothed out in the regional data, from rapid improvement to stagnation or deterioration. As discussed in the text, the choice of countries was biased towards those with large populations. This means that the 14 countries together with China (as given in Volume I) include about 70% of the population of the developing countries, and some 85% of the underweight children. Certain other countries were chosen as having relatively improving situations, on the basis that more can be learned from success: seeing how it was that, say, Thailand achieved such improvement, is probably more informative than detailed analysis of why somewhere else failed to improve – although some understanding of the latter is also important. While knowing what to avoid is important, knowing what to do next is even more so.

The information at country level given here as indicators and described in the text is intended to cover many of the important factors that determine nutritional trends. It is presented descriptively more than analytically, to provide raw material for understanding the situation rather than presuming to try to provide the whole explanation for what are very complex changes. Indeed much more extensive analysis and data would be needed for such explanations than was possible in this project. Further steps in this direction are taken in the SCN's Country Programme Review project, providing more detailed case studies for many of the countries covered here.

The information chosen inevitably depends on the perspective taken, in turn influencing possible conclusions reached. This process then itself affects the way of thinking, hence modifying future perspectives. Thirty years ago this report might have focussed on protein availability; twenty years ago, on food supplies; and ten years ago, perhaps, on food distribution and entitlement. The framework here and choice of indicators includes food (household food security particularly), health environment and access to services, and caring capacity – with new emphasis on women's role and education.

The audience and their use of this report are seen as being both within the countries covered and in others in the developing world (which will usually have some features in common with those described here), as well as those in donor agencies, and many others with professional interest in nutrition and in developing countries. Chapter 1 is aimed particularly at people deciding or advising on policy, at programme managers and

planners, and at those in teaching and research. In Chapter 2 the basic data for both volumes, compiled and derived, are given to facilitate inter–country comparison, for research and other uses.

Much of the original material for Chapter 1 of this volume was provided by collaborators in the countries concerned, who compiled detailed case–studies. These are being published in the countries (see listing on page 120).

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Marito Garcia
John Mason
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March 1993
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Acknowledgements

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Marito Garcia
John Mason
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Foreword*

* As also given in *Volume I, Second Report on the World Nutrition Situation.* (October 1992).

This Second Report on the World Nutrition Situation comes at an important time. In the near future human well–being, to which nutrition is fundamental, could improve more rapidly throughout the world; but economic adjustments and mass migration are continuing threats. The results here show steady, if slow, progress in many countries in the last few years. The future may see the needed acceleration in these. But the picture for Sub–Saharan Africa is of great concern, where a deteriorating nutritional trend needs to be turned around.

Following publication by the SCN of the First Report on the World Nutrition Situation in 1987, and the Update on the Nutrition Situation in 1989 which gave country level data, support was secured for a five–year programme, beginning in December 1990. This allowed continued monitoring of the world's nutritional problems, thus helping the SCN to meet an important part of its mandate. We must emphasize our gratitude to SIDA (Sweden), IDRC (Canada), and FAO, who provided funding to supplement the SCN budget leading to production of this report. The programme for reporting on the world nutrition situation envisaged increasing emphasis on country level data, and for the present report detailed studies have been carried out by institutions in a number of countries. Some of these have been funded by UNICEF as part of SCN's Country Programme Review, for which we are most grateful; and results will be published in 1993. We decided to issue this Second Report in two volumes. In this first volume, global and regional results are given, with highlights on certain specific important issues. This allows more space in a second volume to do justice to the detailed information at country level. The Supplement on Methods and Statistics to the First Report on the World Nutrition Situation contained most of the data that was presented in the report itself, which provided a resource for further research, widely used, and the practice will be continued here by including details of data and methods in the second volume.

As for previous reports, the main intention is to integrate data from a variety of sources. The report depends heavily therefore on the statistical and analytical work of SCN member agencies. In particular, the method development, data compilation and analysis carried out by FAO, for its forthcoming Sixth World Food Survey and for preparing for the International Conference on Nutrition, provided fundamental data on food availability and the extent of inadequate food consumption. FAO data have also been analyzed for trends in availability of certain micronutrients. Data on child growth and women's health are compiled by WHO and UNICEF, providing direct measures of nutritional outcome, and the SCN through this project has contributed to these compilations. Sharing the analytical results has ensured that the same outputs and conclusions are available on nutrition throughout the UN system. As previously, we have also depended upon data compiled, analyzed and made available by the World Bank, by the UN Population Division, ILO and, through these, from other agencies such as UNESCO.

The audience for the SCN's reports is intended to be those who have a professional concern for nutrition in developing countries, as well as in donor governments and international agencies. They aim to give up–to–date and carefully–checked information, to provide the basis for determining future action, and monitoring current progress. At the same time, experience shows that the reports are used extensively for teaching and research purposes related to nutrition, and it is hoped that this will continue.

In preparing this Second Report, recent developments in understanding of nutrition and its causes are taken into account. The concept first emphasized by UNICEF, and central to the structure of the International Conference on Nutrition as prepared by FAO and WHO, is that nutrition is an outcome of three groups of factors: household food security, health environment and health services, and care. In other words, people should be well–fed, healthy, and well–cared for. This has guided the selection of indicators. In the regional results (this volume) and country data (Volume II) the indicators are clustered into food, health, and women's role and caring capacity, treating nutrition – indicated primarily by child growth – as an outcome.

The Advisory Group on Nutrition (AGN) of the Sub–Committee has guided the process of preparing reports on the world nutrition situation. Following the First Report, it was proposed that emerging issues should receive particular attention in the future. Thus a substantial part of this first volume covers four specific and important topics: micronutrients, women's nutritional status, diet–related non–communicable chronic diseases, and a preliminary look at projections of nutrition into the future. We would hope to continue the process of highlighting special issues, and to begin to incorporate indicators of these – for example, women's nutrition –

into the regular reports.

As before, this report represents a shared concern of the UN member agencies of the ACC/SCN. The last two years have seen considerable consultation, not only with UN members, but with other agencies and non–governmental organizations concerned. The preliminary results of this report were discussed at the SCN 19th Session in February 1992 as well as by the Advisory Group on Nutrition, and with those in member agencies concerned with the specific aspects of the data. We are particularly pleased to have been able to carry out this work in close collaboration with the International Food Policy Research Institute, and the many informal discussions with IFPRI have been much appreciated.

The aim of the SCN's member agencies is to promote the necessary action such that trends in nutrition improve. A particular focus for this effort is the International Conference on Nutrition (ICN), of December 1992. The indicators given in this report, while somewhat encouraging, need to show more rapid improvement in the future. They can provide a baseline, and a yardstick against which future progress can be measured. Nutritional goals have been proposed by the World Summit for Children in 1990, endorsed by the ICN, including reduction in malnutrition among under five children by half, reduction of low birth weight, virtual elimination of iodine and vitamin A deficiencies, and others; indicators of these and other such goals are included here. The report will be useful if it contributes to the planning and implementation of the necessary measures to meet such goals, and to monitoring progress along the way.

A Horwitz
Chairman, ACC/SCN

1. Nutrition Trends in 14 Countries

Introduction

The main aims of this chapter are (1) to describe as accurately as possible the trends in nutrition in fourteen countries over the last decade or so; and (2) to account in broad terms for the trends observed. This interpretation is partly facilitated by comparison between the countries available, but relies to a considerable extent on underlying theory. This in turn is based upon other studies, such as the SCN's review of country programmes (ACC/SCN, 1993).

The 14 countries were selected on the basis of several considerations. First, in the planning of the Second Report on the World Nutrition Situation, priority was given to obtaining direct estimates, from surveys, of trends in nutrition indicators in the countries with the largest populations that were not covered in the previous compilation, "Update on the Nutrition Situation," of early 1989 (ACC/SCN, 1989). Thus, particular attention was given to obtaining such data from six countries – Brazil, Egypt, India, Mexico, Nigeria, and Pakistan. Although information on China had been previously contained in the Update Report, it was also reassessed and put out as a distinct region in Volume I of the present report.

At around the same time, the SCN undertook case studies, supported by UNICEF, to investigate changes in nutrition in a number of countries and to lead to a workshop at the International Union of Nutritional Sciences (IUNS) meeting in 1993 (following a similar meeting at the previous IUNS in 1989). These were selected to provide experience of relatively successful attempts to deal with malnutrition and to mesh with UNICEF programming cycles. Thus, information was obtained for Indonesia, Thailand, Tanzania, and Zimbabwe. Colombia had also been included to begin with in this exercise, thus data were available and have been included on this country also. Bangladesh and Philippines data are also included, updating material from the previous report:

Bangladesh in part because it has the highest national prevalence of underweight children in the world; Philippines as having recent data, and being of concern for slow progress. Kenya was included since recently results of a fourth survey in 1987 were published that provided an exceptionally long time series for an African country. For context, other direct national estimates have been plotted, and to illustrate certain points in this introduction, some contrasting trends – for example Sri Lanka and Zambia – are noted.

Finally, it should be noted that of the 14 countries studied here, in two cases (Mexico and Nigeria) only one estimate of underweight prevalence was available and changes over time have been estimated from the

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models used for making the regional estimates described in Volume I. A full listing of the nationally representative anthropometric surveys available between 1975 and 1992 is given in Chapter 2 of this volume.

In Figure 1.3, the trends in underweight prevalences, based on direct survey results, are shown. These are compared with average regional trends, which were given in Volume I (in the panels in Chapter 2) based on interpolations for all countries in each region. The observed changes, as would be expected, show considerable variation around the average within each region. Of particular interest is to compare the trends observed in the last ten to 15 years with the regional trends that would be necessary in the future to meet goals proposed by the World Summit for Children (WSC; UN 1990) and the International Conference on Nutrition (ICN; FAO/WHO 1992b). As will be discussed further below, this comparison does indicate that the required rate of improvement to meet these goals has been attained in some countries in the past – the goals could be achieved. Many countries, however, are lagging behind. Some of these countries include those with the highest populations, such as Nigeria and India. Thus, the average rates of change by region are generally inadequate to meet the goals.

Indicators of Nutritional Change

The causes of malnutrition are now viewed as factors affecting food, health, and caring capacity. This framework was used by FAO and WHO in the preparation for the International Conference on Nutrition. It was introduced by UNICEF – food, health and care being called "underlying causes" – and is described in SCN documents (ACC/SCN 1991, a and b). The framework guided the selection of indicators, both at regional level in Volume I, and for countries in this volume. There have been some additions for the latter where these are meaningful and available, for example, those based on prices, information on breastfeeding, and government expenditures on health and education.

The framework of food, health, and care has been used here to help explain the observed trends in nutrition. These underlying causes of inadequate dietary intake and disease cause changes in nutritional status, for which the major indicator is prevalence of underweight preschool children. Basic causes, which include economic changes, and important human capital investments in such areas as education, health infrastructure, fertility control, etc., exert their impact on nutrition through food, health, and caring capacity. Thus, the underlying theory through which explanations for changes in nutrition are sought involves macroeconomic and other long–term policies, e.g. education, as well as those affecting current welfare (e.g. social security). Because nutrition is of particular interest here, the specific role of nutrition programmes is also an important consideration.

Trend data, which are presented in two pages of graphics for each country, are organized into seven clusters following the above framework of relationship of the various indicators to nutritional outcomes. The choice of specific indicators was limited by data availability, hence they are not necessarily the ideal. Comparability across countries and across time was also an important criteria in choosing the indicators.

The seven clusters of indicators presented as graphics for each of the 14 countries include: (1) nutritional outcomes – prevalence of underweight preschool children, and infant mortality rates; (2) economic factors – GNP per capita, and the country's debt service ratio; (3) food indicators – per caput food production index dietary energy supply or DES (in kcals/caput/day from FAO's food balance sheet), consumer price index, and the ratio of food price index to consumer price index; (4) health indicators – immunization coverage, percent of population with access to local health care, to potable water and sanitation, and percent low birth weight; (5) indicators of women's status and caring capacity – female secondary schooling rates, fertility rates given by births per woman, percent of reproductive–age women with access to ante natal care, maternal mortality rates, and trends in mean duration of breastfeeding which were available in 5 countries; (6) public sector expenditures – percentage of government budgets devoted to health and education and their respective per caput dollar values; (7) sub–national data on trends in underweight children were given for each country in the second page graphics and their location within the country as depicted in a national map. The definitions of these indicators are given in Chapter 2.

Overview of Nutritional Trends and Some Determinants

Against this background, by way of introduction to the individual case studies, some generalizations may be possible from looking at the comparison of individual country data, as shown in Figures 1.1, 1.2, and 1.3, and

Table 1.1. Given the important role of economic development – and progress in areas such as health and education that tend to go with it – changes in nutrition can usefully be compared with changes in per caput GNP.

The association of GNP with nutrition was displayed in Volume I (Box 1.2, p. 9), comparing percentage underweight children with GNP per caput on a cross–sectional basis. We can now also look at *changes* in these factors, for countries in which trends have been assessed by repeated surveys. In Figure 1.1, the trends for the countries contained in this report are plotted; Figure 1.2 gives the results for other countries with repeated underweight survey data. These graphs, which show "movement", combine three variables: changes in underweight, changes in GNP, and time; the unit of analysis is country and year. Thus, each point plotted represents the combinations of GNP and underweight at one point in time, and two points joined by an arrow show the change from the earlier data point to the later one. (Because anthropometric survey data are the less common, the data points are defined by when surveys were carried out, and the GNP then also taken for that same year.) The years are generally from early 80s to late 80s, the precise years being shown in the footnote.

The length of the arrow, thus, indicates the extent of change in GNP, underweight prevalence, or both: for example, Brazil and Thailand over the periods plotted had considerable changes in GNP, other countries such as Bangladesh or Colombia had much smaller changes – but the time period is roughly the same.

The slope of the arrow leads to a number of inferences. First, let us consider those arrows that tend to follow the average curve, steep at low GNP, then flattening out, much along the lines seen on a cross–sectional basis (Box 1.2 in Volume I). In those countries that follow this average slope, the improvement in under weight prevalence is what might be expected from the change in GNP – it being crucial to emphasize that this does not mean that all the nutritional improvement is due to GNP, because other factors such as extending health services and education tend to follow GNP. It does show that in countries such as Thailand or indeed India, the extent of improvement is consistent with that expected from changing GNP. The length of the arrow, as noted above, then indicates how much GNP and/or underweight improved.

Percent underweight preschool children (Below -2 s.d. weight for age)
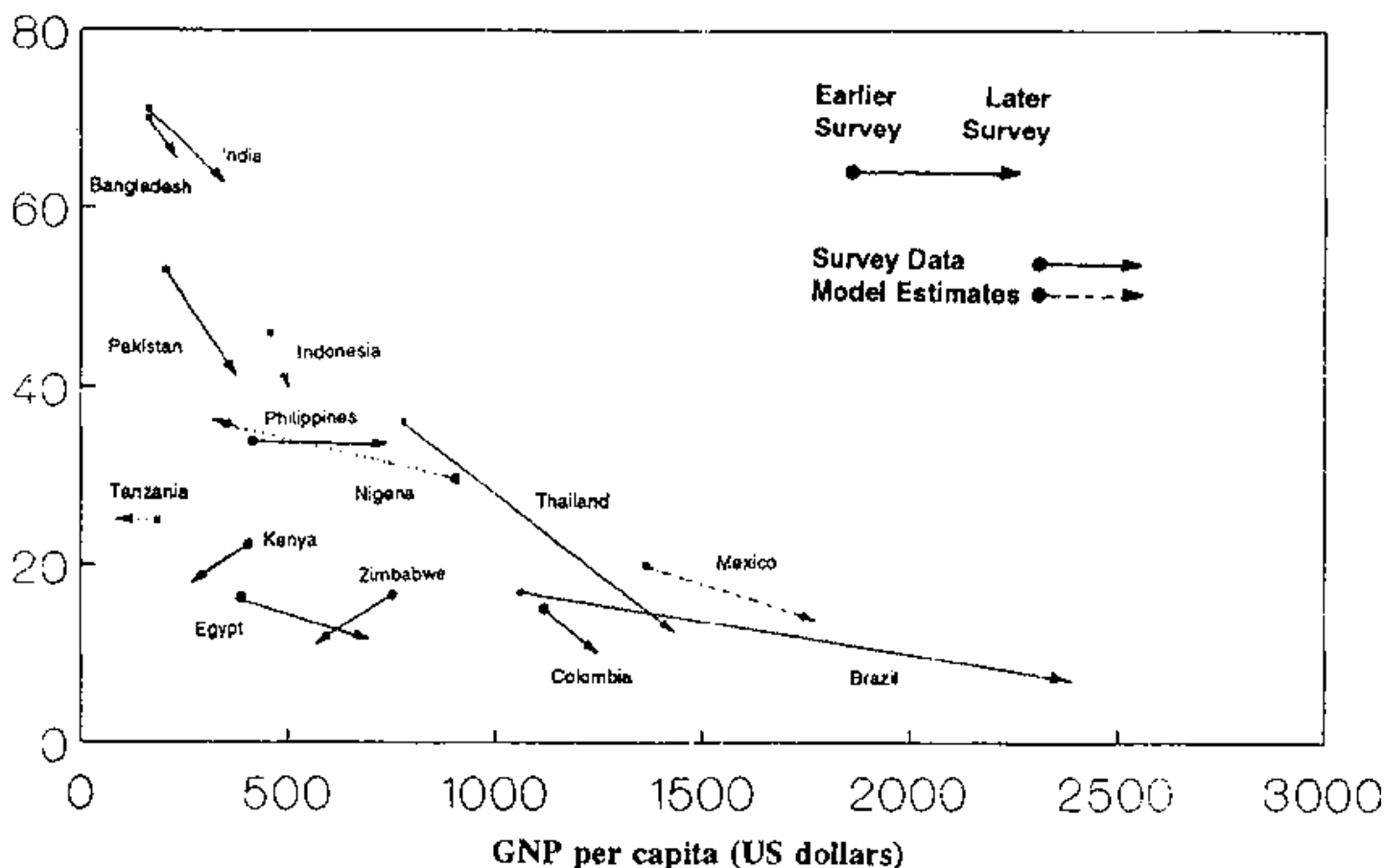
Figure 1.1 Changes in GNP and prevalence of underweight children (approx. 1980s)

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Percent underweight preschool children (Below -2 s.d. weight for age)
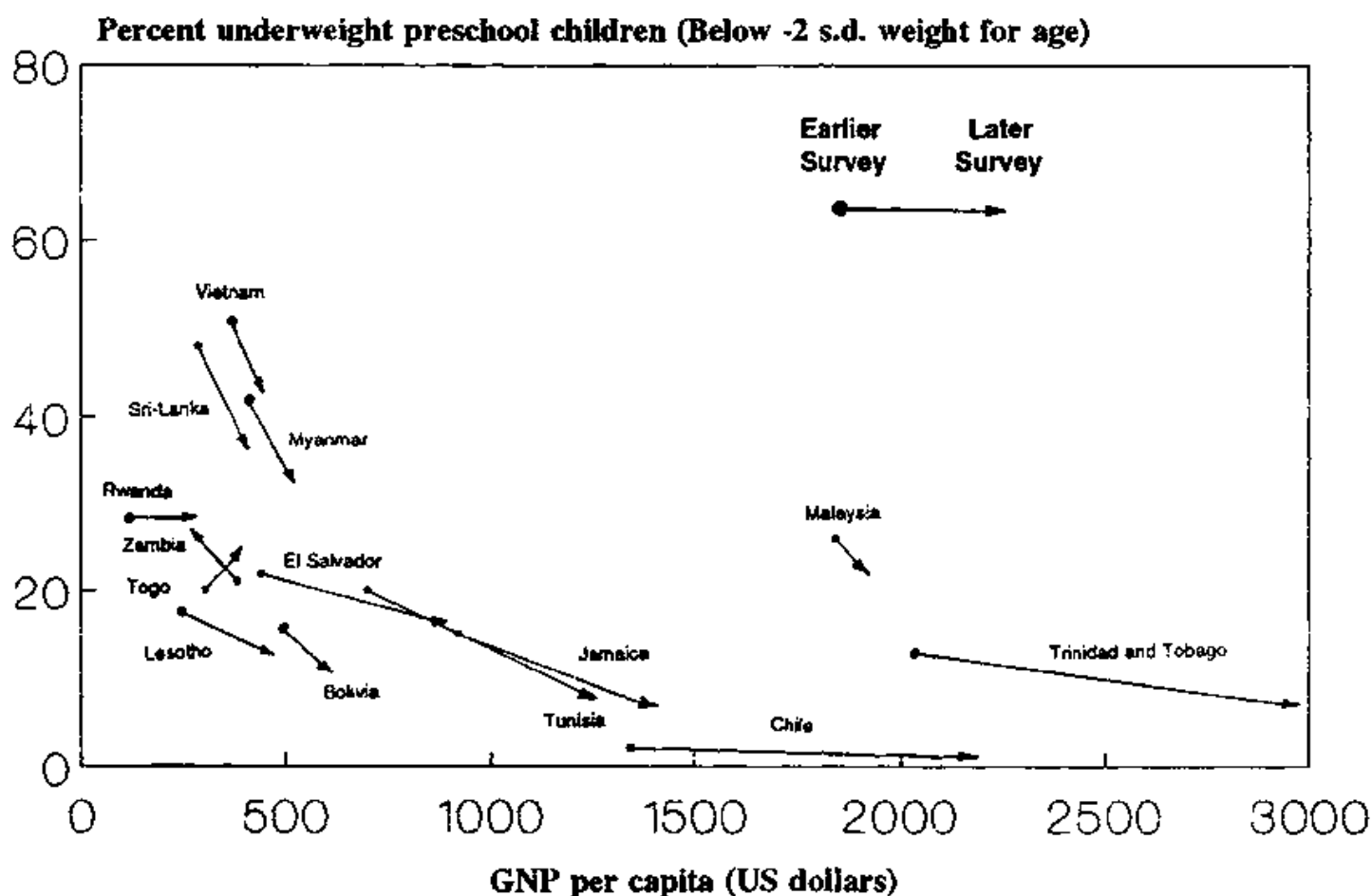
Figure 1.2 Changes in GNP and prevalence of underweight children (approx. 1980s)

Notes: Data on prevalence of underweight children and GNP per capita are given for the following survey years: Bangladesh (1981, 1989/90); Bolivia (1981, 1989); Brazil (1975, 1989); Chile (1978, 1986); Colombia (1980, 1989); Egypt (1978, 1988); El Salvador (1975, 1988); Indi(1975–79, 1988–90); Indonesia (1980,1987); Jamaica (1978,1989); Kenya (1982,1987); Lesotho (1976,1981); Malaysia (1983, 1986); Mexico (1975, 1988); Myanmar (1982, 1990); Nigeria (1980,1990); Pakistan (1977, 1990); Philippines (1978,1990); Rwanda (1976, 1985); Sri Lanka (1980,1987); Tanzania (1975,1991–92); Thailand (1982,1990); Togo (1977,1988); Trinidad (1976,1987); Tunisia (1975, 1988); Vietnam (1986,1989); and Zimbabwe (1984,1988). See Chapter 2 for sources of basic data.

Table 1.1 Summary: Nutrition and related indicators in 14 countries

Country	Percent underweight preschool children (< –2 s.d. WA)	Average annual change in prevalence underweight in percentage points per year(1980s)	GNP per capita, 1990 (US dollars)	GDP annual growth rate, 1980–90(%)	Public Expenditures (1990)				
					Education		Health		
					Percent of govt. budget	$/caput	Percent of govt. budget	$/caput	Kcals/caput/ (1990)
Tanzania	25.2 *(1992)*	–0.1	110	2.8	17.3[a]	3 [a]	7.2 [a]	3 [a]	2,181

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Country									
Bangladesh	66.5 *(1990)*	−0.4	210	4.3	11.2	3	4.8	1	
Nigeria	36.0 *(1990)*	+0.5	290	1.4	3.0	3	2.0	1	
India	63.0 *(1989)*	−0.7	350	5.3	2.5	2	1.6	2	
Pakistan	40.4 *(1990)*	−0.9	380	6.3	2.0	3	0.7	2	
Indonesia	39.9 *(1987)*	−1.0	570	5.5	8.4	8	2.0	2	
Kenya	17.0 *(1987)*	−0.8	640	4.2	19.8	18	5.4	5	
Egypt	10.0 *(1988)*	−0.7	610	5.0	13.4	34	2.8	6	
Zimbabwe	10.0 *(1988)*	−1.3	640	2.9	23.4	22	7.6	19	
Philippines	33.5 *(1990)*	0.0	730	0.9	16.9	19	4.1	5	
Colombia	10.1 *(1989)*	−0.6	1,260	3.7	19.1[a]	24[a]	5.1[a]	6[a]	
Thailand	13.0 *(1990)*	−2.8	1,420	7.6	20.1	40	6.8	12	
Mexico	13.9 (1988)	−0.3	2,490	1.0	13.9	68	1.9	7	
Brazil	7.1 (1989)	−0.8	2,680	2.7	5.3	30	7.2	37	

Note: See Chapter 2 for sources of data.
[a] Data for 1985.

The slopes of the arrows point to where the improvement was greater or less than that which might have been expected from changes in GNP. For example, Indonesia appears from this plot to have shown a more rapid improvement than might have been expected from GNP – perhaps due to successful outreach of nutrition and health programmes – whereas in the Philippines, for example, although GNP did show some increase, there was little improvement in nutrition, possibly related to the political problems of the mid–80s. Similar conclusions can be applied to others of the movements shown.

However, there are a number of arrows going in a reverse direction, essentially from Africa. In two of the cases shown – Zimbabwe and Kenya – the reversed but downward direction of the arrows shows that nutrition improved somewhat even though GNP decreased during the 1980s. Tanzania, which suffered from severe recession against a background of very low per caput income, at least maintained its nutritional status in the face of this recession. Nigeria suffered a substantial fall in GNP per caput over the period, and some deterioration in nutrition is estimated to have occurred during this time (hence the long reversed and upwards arrow).

The policy implications of such results need more extensive analysis than can be given here. An important question concerns how far nutrition can be improved beyond that expected from GNP changes; another relates to circumstances where nutrition has been protected in the face of economic recession, and how this was achieved.

With such considerations in mind, some generalizations can be made from the trends over time at national level, as shown in Figure 1.3. In Latin America and the Caribbean, there is considerable consistency in the improving trend observed during the 1980s, although there is some concern as to whether this can be maintained in countries such as Brazil (as discussed later in the case study). Nonetheless, it is clear that there are indeed circumstances under which the goal of halving the 1990 prevalences by the year 2000 could be achieved. In both Middle America/Caribbean (bottom left–hand chart in Figure 1.3), and South America (bottom right–hand) there is a real prospect that, if progress can be maintained or re–established at the level of the early 1980s, malnutrition is on its way to being a problem of the past, although important pockets of severe poverty may remain, such as North East Brazil, where malnutrition may prove more intractable. A very similar picture emerges for countries in the Near East and North Africa.

Figure 1.3 Trends: Prevalence of underweight children, 0–59 months (Percent children < −2 s.d. weight–for–age, NCHS)

Sub–Saharan Africa (Percent underweight preschool children)

Near East and North Africa (Percent underweight preschool children)

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South Asia (Percent underweight preschool children)

South East Asia (Percent underweight preschool children)

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Middle America and Caribbean (Percent underweight preschool children)

South America (Percent underweight preschool children)

Notes: See Chapter 2 for sources of data by country. The nutrition goals are taken from the
Plan of Action: World Summit for Children (UN 1990), and from the International Conference
on Nutrition's World Declaration and Plan of Action (FAO/WHO 1992b).

In South East Asia, rapid progress in nutrition was made in several countries (see Figure 1.3). These have
tended to be where there has been good economic growth, coupled with vigorous community–level nutrition
and health programmes. Well known examples are Thailand and Indonesia, and indeed the results reported
from Malaysia, Myanmar, and Vietnam, are also encouraging in the apparent trend of improvement in
underweight prevalences. In contrast, as shown in the figure, the Philippines' nutritional situation is lagging,
having shown little improvement in the last decade, and should be the focus of particular concern. If the

nutritional improvement in countries such as the Philippines were to accelerate to that of others in the region, and the levels of these others were maintained, then there is an exciting prospect that the improvement over the next decade could indeed be roughly in line with the WSC and ICN goals.

The trend in South Asia is dominated by that in India. The rates of change in most countries in this region were around 0.4 to 0.9 percentage point reduction in prevalence per year (similar to that observed in Brazil, Colombia, Egypt, and Mexico, see Table 1.1). The rate of improvement in Sri Lanka (see Figure 1.3), estimated from repeated surveys, was faster than the average for the region in the 1970s and early 1980s, probably due to a combination of factors including investment in education and support for food consumption (e.g. through food stamps). A parallel improvement was observed in Kerala State in India between 1976 and 1989 (based on Indian NNMB data, and plotted in Figure 1.3), and this with Sri Lanka again provides evidence that a rate of improvement can be achieved substantially higher than that seen on average. The factors in Kerala that contributed to this are probably similar to those in Sri Lanka, particularly the high education level of women, and effective outreach of programmes giving access to food. Bearing in mind that a substantial majority of underweight children in the world are in South Asia, these observations are encouraging, but also provide a caution that unless the average rate of change can be significantly accelerated, the nutrition problem will not be effectively addressed for many decades to come. Extending the regional trend line for South Asia into the future shows it would not reach 10% for about 100 years. We need to see an accelerating rate of improvement, which, in turn, means that a continuation of the present policies and programmes is not enough.

The picture in Sub–Saharan Africa, shown at the top left of Figure 1.3, is of substantial differences in trends between different countries, with a static regional average trend. On the one hand, there is room for optimism from the data available in that in Zimbabwe in particular, and also probably Kenya, substantial improvement was shown over the '80s "although effects of recent drought are not fully taken into account. However, there is evidence from several countries – Togo and Zambia are shown in the figure from direct estimates – of a deteriorating situation; time series data are not available for Nigeria, which accounts for about 20% of the African population, but an important recent survey showed an unexpectedly high prevalence of underweight there. There is concern that the Nigerian situation may be particularly poor and deteriorating. It is clear from the available data that unprecedented efforts are needed in many parts of Sub–Saharan Africa to prevent a continued deterioration in the nutritional situation. On the other hand, there is evidence from Tanzania and Zimbabwe, for example, that vigorous community–level programmes can help to protect and improve nutrition. Among the measures that are urgently needed, it is likely that more widespread adoption of such programmes is important.

Implications for Policy

The observed changes in nutrition can usually be accounted for, at least in general terms, by the basic causes that affect food, health, and caring capacity. More important, perhaps, is the link between the policies undertaken by governments and the programmes stemming from these. Thus, as discussed in the context of Figures 1.1 and 1.2, the observed nutritional trends are usually understandable in terms of the interplay between GNP and related developments, and specific programmes aimed at nutrition. More precisely, the effects of economic growth and of expenditure in the social sector (on health, education, and social welfare) are related as might be expected to the nutritional outcome. In many countries reviewed in this chapter, economic growth resulting in substantial poverty alleviation has contributed importantly to nutritional change.

Beyond this, there are various policies and programmes that have a more direct impact on household food security, health, care, and hence nutrition – which can perhaps be seen in two ways. First, there are the centrally organized and financed programmes that increase food intake – examples are the Public Distribution Scheme in India, the operations of the rice agency (BULOG) in Indonesia, food subsidies (e.g. in Mexico) in Latin America, and the extensive food subsidy in Egypt. Household food security has also been affected positively by food policies that maintained stable relative food prices, as demonstrated in Brazil, Mexico, Kenya, Pakistan and even in the Philippines during the economic recession in early to mid–80s. The prices of basic foods relative to non–food expenditure items remained stable even during periods of hyperinflation in countries such as Mexico and Brazil. This contrasted the high relative food prices that accompanied the economic downturn in Tanzania.

Second, there are a number of widespread and sustained specific nutrition programmes that operate at community levels, such as ICDS in India, UPGK in Indonesia, health and nutrition programmes in Thailand, and the African community–based programmes in Tanzania and Zimbabwe.

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While the number of examples here is not adequate to draw firm conclusions, partly because many other factors operate, the following hypotheses would be worth further testing, and the preliminary results here would tend to indicate that they may turn out to be true. First, in times of economic growth, those countries that also support nutrition programmes do achieve a more rapid nutritional improvement than countries growing at similar rates without programmes. For example, Indonesia and Thailand, having good growth rates and extensive programmes, have certainly achieved substantial improvement in nutrition; in contrast, Brazil and Egypt have had similar economic growth rates but less in the way of nutrition programmes, and a slower rate of nutritional improvement. (This remains true when Figure 1.1 is plotted using log GNP.) It is likely that the improvement in India, while less rapid, is indeed partly due to poverty alleviation and food distribution programmes, and to the ICDS – arguably the largest nutrition programme in the world. Second, in times of economic decline or stagnation, nutrition programmes (particularly community–based in Africa) protect or buffer the nutrition of vulnerable groups. Where these are extensive this may indeed be reflected in national prevalence trends. Examples here might be in Tanzania and Zimbabwe, which have extensive nutrition programmes, in contrast perhaps to Nigeria or Zambia.
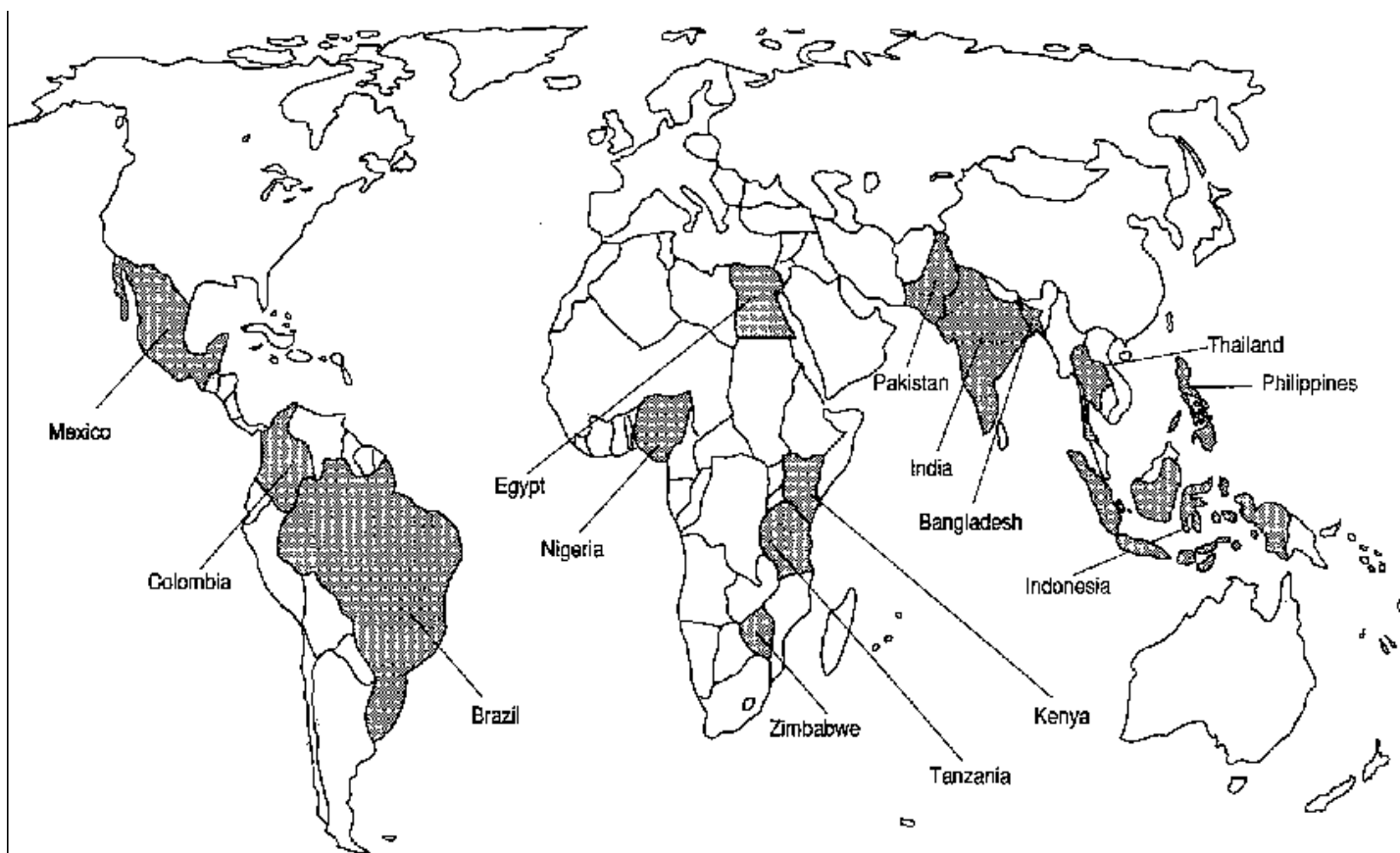
Fig. 1.4 Location map: Case study countries

India

India has the second largest population in the world, after China, estimated at 844 million in 1991. The most populous states are Uttar Pradesh (139m.), Bihar (86m.), Maharashtra (79 m.), West Bengal (68 m.), and Andhra Pradesh (66 m.), Population is growing at an annual rate of 2.11% and is estimated to reach one billion (1,022 million) by the year 2000. Every year during the last two decades, the country has been adding 11 to 16 million people (equivalent to the population of Australia) to its population. The growth is fuelled by a fall in the mortality rate from 22.8 per 1,000 in 1951 to 10.2 in 1989, which is greater than the fall in the birth rate from 41.7 per 1,000 to 32.0 during the same period. The majority of India's population (74% in 1991) live in rural areas of the country, although the urban growth rate is well ahead of the rural rate, due to migration.

Trends In Nutrition

A comparison of two surveys carried out in the mid–1970s and late 1980s basically showed that the situation has remained static with respect to food consumption at the household level, although there has been a

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significant improvement in the dietary intake and nutritional status of preschool (1 to 5 year–old) children. (It should be noted that these surveys, carried out by the National Nutrition Monitoring Bureau (NNMB), sampled 10 states with a bias towards southern and central states.) The percentage of underweight children (i.e., below –2 s.d. NCHS weight–for–age median), particularly those severely underweight, declined in all states to varying degrees. Overall for the country, the prevalence of underweight children among 1–5 year olds fell from 78% in 1975–79 to 69% in 1988–90. (For comparability of prevalence figures elsewhere in this report, recalculated prevalences for 0–59 month old children, of 71% in the 1975–79 period to 63% in the 1988–90 period are used in the graph.) Most of this reduction was in the more severe grades (less than –3 s.d. median) which dropped from 38% to 27% in this period. The decline of severe grades was highest in Maharashtra, while in Gujarat and Madhya Pradesh, it was minimal. Severe stunting and wasting in under–fives also declined. The reduction in the prevalence of severely underweight children appears to have been driven by the reductions in severe stunting, indicating a more long–term change. A fall was reported in the prevalence of clinical signs of malnutrition, such as marasmus (1.3 to 0.6%) and kwashiorkor (0.4 to 0.1%) during the same period.

Vitamin A deficiency has decreased in prevalence from 2.0% in 1975–79 to 0.7% in the 1988–90 survey. The problem of iron deficiency is still widely prevalent, particularly among pregnant and lactating women (e.g., in villages outside Calcutta, 90% of the population are anaemic). Iodine deficiency, while varying markedly by region, is also very common; it is estimated that more than 54 million people in India are currently suffering from goitre and 8.8 million (roughly 1% of the total population) from different grades of mental/motor handicaps.

The under–five mortality rate has fallen from 282 deaths (per 1,000 live births) in 1960 to 149 in 1988 (the average for developing countries in 1988 was 121). The all–India infant mortality rate (IMR) also fell from 129 in 1971 to 91 in 1989, although there is still a wide variation among states, ranging from 28 in Kerala to 123 in Uttar Pradesh (1988 figures). States with the highest IMRs (between 97 and 123) are clustered in the central–northern heartland – Rajasthan, Uttar Pradesh, Madhya Pradesh, Orissa, Bihar, and Assam. Factors found to be associated with these high infant deaths include early marriage and motherhood, low levels of education, and low socio–economic status.

> *Note:* Based mainly on *Nutrition in India,* by V. Reddy, P. Rao, M. Shekar and S. Gillespie, National Institute of Nutrition, Hyderabad (1992).

Economic Trends

In 1990, India's per caput GNP was US$350. The GNP per capita grew by 3.2% a year from 1980 to 1987, a rate which is considerably better than the 1965–1980 period's rate of 1.8% a year. Overall during the 1980s, there was about a 32% increase in per caput GNP at constant prices. While the Government of India has continued to be guided by the principle of economic growth with equity, in practice the economy has been two–track – with conventional growth on the one hand and special poverty alleviation programmes ostensibly for those groups not benefiting, on the other. Since the late 1970s, the government's economic policies have tended towards liberalization of trade, with flexible exchange rates to encourage the growth of exports. The value of the rupee has steadily fallen against the US dollar (US$1 was equivalent to 9 rupees in 1980–81 compared to 26 rupees in July 1991). Foreign debt has risen, due partly to a disappointing export growth and reluctance on the part of the government to raise taxes, thus creating the need to borrow from other countries for revenue. The debt service ratio was 9.1% in 1980, rising to around 32% during 1986, then dropping to 26% in 1989. Debt grew from 5% of the GDP at the end of the 1970s to 10.1% of GDP in 1985–90. By March 1990, the total amount India owed to foreign creditors was US$63 billion.

Food Security – National Level

The near famine food–crisis of the mid–1960s preceded the bold 'green revolution' gamble on a technological package of a semi–dwarf wheat and dwarf rice varieties, irrigation, and complementary inputs. After the US PL480 food aid programme was halted in 1971, India struggled to become more self–reliant in food in a difficult economic environment of global food crisis and oil price hikes. There were also unfavourable weather conditions including droughts, especially in Western India, and severe floods during 1974 in the Northeast. Yet India came through the early 1970s crisis period with the two pillars of its food strategy – a political commitment to self–reliance in food and a determination to prevent famine – strengthened by these experiences. The "green revolution," which enabled farmers to cultivate crops with much higher yields, has helped agriculture keep pace with population growth, and led to national self–sufficiency. There are now signs, however, that it is running into diminishing returns (recent yields in wheat and rice per acre have not seen any improvement). Although the technologies involved have been shown (by the mid–1980s) to be

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scale–neutral, despite an early bias towards richer farmers, they are still only effective if a constant supply of water and fertilizer can be assured. In the villages dependent on rainfed agriculture (usually poorer), there has been no "revolution," and here lies a challenge for the future. This is also reflected in comparisons by state: the "green revolution" has been most effective in Punjab, Maharasthra, Andhra Pradesh, and Kamataka.

The decade up to the beginning of the Seventh Plan in 1985 saw large increases in per caput production of wheat and, to a lesser extent, rice, as the use of inputs and the area irrigated expanded. The food production per caput index, with 1979–80 as base (=100), indicates an increase early in the 1980s followed by a levelling off in the mid–1980s, a drop in the drought years 1986–87, then a marked increase to 1990. The drought was the worst since before independence, driving the agricultural strategy off–course, and necessitating the importation of cereals on a significant scale in 1988–89 (even though the drought broke in mid–1988).

Agriculture remains by far the most important area of the Indian economy, accounting for about 63% of the labour force in 1985–1987, although its importance has decreased over the years. In 1989, it accounted for 28% of GDP, compared to 43% in 1973, indicating low agricultural labour productivity. About two–thirds of the crops cultivated for domestic markets are grains, mostly rice, wheat, sorghum, and maize.

In the past 20 years, the food production strategy has had built–in biases. While it has been dependent on wheat and rice, the growth in output has been concentrated in the northwestern states and in the regions of irrigated rice. Its impact has been relatively disappointing in the densely peopled, poorer eastern states that now contain much of the unutilized potential for irrigation and for higher productivity rain fed rice. The dryland areas of the centre and south were also not sufficiently involved, and despite anticipated linkage effects, the strategy has not yet had a substantial impact on the structural problem of rural poverty. It now appears that the intensification of production has been associated with environmental degradation and pressures on renewable rural energy resources have become even more severe. The focus of planning has hitherto see–sawed between a desire to maximize growth in food production on the one hand and a concern, not so powerfully articulated, for regional equity on the other. Regional equity is now of paramount importance. Easily available means of growth in foodgrains production have now been exhausted and there are probably diminishing marginal returns to the most productive land.

Food Security – Household Level

In the decade from 1978, the Indian Planning Commission reported a drop in the percentage of people living below a national poverty line from 48.3% to 29.2%. The improvement to the early 1980s has been attributed in part to the success of several targeted poverty alleviation programmes, while economic growth in the mid–1980s was felt to have been the main driving force behind the more recent change. There are marked variations by state, with percentages "in poverty" (in 1987–8) ranging from 40.7% in Bihar to 7.0% in the Punjab. In terms of numbers, the greatest concentration of poor people occurs in the states of Uttar Pradesh (42.2 m), Bihar (33.6 m), and Madhya Pradesh (22.3 m), all neighbours.

The average Indian per caput income, when corrected for inflation, rose by Rs 515 between 1980–81 and 1988–90, although the purchasing power of the rupee was declining and forcing the consumer to continuously alter allocation of resources between food and non–food necessities.

Since the mid–1970s, just as food production had been fairly stable at the household level, calorie and other nutrient consumption has remained more or less unchanged. In the 1980s, calorie consumption per adult equivalent was around 2,300–2,400 kcals, according to NNMB data. Of the seven states for which data are available, figures ranged from 2,614 in Madhya Pradesh to 1,871 kcals/AEU/day in Tamil Nadu, in 1988–90. There was some indication of reduced inequality of consumption as the energy intakes of landless laborers increased slightly during the decade, unlike other occupational groups. The calorie intake of preschool children also increased, suggesting an intrahousehold adjustment.

(Estimates in 1990)

Population	: 850 million	IMR:	: 92
Population Density	: 258 per sq. km.	GNP US$ (Per Capita):	: 350
Population Growth Rate	: 2.1% per annum	Urban Population:	: 27%

CHILD GROWTH AND SURVIVAL

Underweight preschool children (Percent below –2 s.d. weight for age)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

Debt service ratio (Debt service/exports)

FOOD

Food production index (Per caput, 1979–81=100)

Dietary energy supply (Kcals/caput/day)

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Consumer price index (1980=100)

FPI/CPI ratio (1980=100)

HEALTH

Measles: Children

Tetanus: Pregnant women

Immunization coverage (Percent)

Population with access

Access to local health care (Percent)

Low birth weight (No. < 2.5 kgs./100 live births)

Access to potable water & sanitation (Percent)

The main types of actions that affect the underlying household food insecurity–related causes of malnutrition in India were the Public Distribution System (PDS), and the poverty alleviation programmes, such as the National Rural Employment Programme (NREP) and the Integrated Rural Development Programme (IRDP). During the 1970s and 1980s, the large and costly buffer stocks of grain procured by the government to provide a food security net became the symbol of self–reliance. The PDS involves the distribution of subsidized foodgrains via a network of fair–price shops to the eligible poor with ration cards. States differ as regards the coverage, efficiency, and effectiveness of the PDS, with states with a better infrastructure (e.g., Punjab and Haryana) often being better served, despite the lower relative need vis–a–vis poorer states, such as Bihar, Orissa, and Uttar Pradesh. Better rurally–targeted PDS schemes such as those implemented in the states of Kerala, Tamil Nadu (and to a lesser degree in Andhra Pradesh) were more successful.

The poverty alleviation programmes were either of the asset– endowment type (e.g. IRDP) or wage employment (e.g. NREP). As regards reaching the poorest of the poor (who will also be the most nutritionally vulnerable in most cases), the NREP was the most successful. It had the advantage of being self–targeting in that the wages, while reasonable, were only sufficient to attract those workers who do not have any other work options. Where it was designed to improve community–owned assets in resource–poor areas, it was also of particular long–term value. And, finally, the large degree of women's participation in the NREP (particularly in Tamil Nadu and Andhra Pradesh where female participation was 44% and 42% as compared to 20% nationally) was also likely to have been nutritionally beneficial. The NREP certainly offers potential for driving future nutritional improvements if a guarantee of an increased number of days work per year to fewer poorer people (particularly women) in resource–poorer areas can be achieved through more decentralized planning. Evaluations of the Integrated Rural Development Programme (IRDP) have suggested that its nutritional impact has probably been relatively limited.

Health and Control of Infectious Diseases

Financial outlays under different five–year plans indicate that overall investment on the social sector is low. As a percentage of total plan outlay, the shares for education and health are significantly lower in the seventh plan (1985–90) than in the first plan (1951–56). Even within the education and health sectors, allocations for elementary education and primary health care have declined relative to higher education and curative care, respectively.

India, thus, ranks low among developing countries in per caput health expenditure, despite the relatively developed and widespread infrastructure. In 1986–87, the combined state–level per caput expenditures on health, family welfare, and water supply, ranged from Rs. 44 in Maharasthra to Rs. 15 in Bihar. While the government's spending on health and family welfare has been steadily increasing in absolute terms, the proportion of plan outlay spent on health care has been declining from plan to plan (it was less than 2% in the 1985–90 plan). Within the health sector, the order of priority has been on family planning, hospitals and dispensaries, communicable disease control, rural health including mother and child health, and education and training.

There is a strong urban bias in the pattern of health expenditure and the rate of utilization of the rural health budget is low. Urban areas have greater access to health services, safe water, and sanitation facilities. About 54% of the population were defined as having access to health services from 1980 to 1986 (80% for urban areas, and 47% for rural areas). Only 2% of houses in rural areas had sanitation facilities, compared to 31% in urban areas (on average for developing countries, the respective comparative figures are 14% and 61%). With respect to access to safe water, 16% rural as compared to 76% urban population used a tap as a major source of drinking water.

The total expenditure on education increased from 1.2% of the GNP in 1950–51 to about 4% in 1986–87, against an optimal target level of 6%. Per capita expenditure also increased steadily from Rs. 20 in 1970–71 to Rs. 113 in 1986–87, although when corrected for inflation, this increase is not much. In real terms (at 1980–81 prices), the state–level per caput expenditure on education in 1986–7 ranged from Rs. 103 in Kerala to Rs. 37 in Bihar (as with health, by a factor of three). The share of education as a proportion of plan outlay in the public sector has fallen through the plan periods. Within the education sector, the share of elementary education has been falling from 56% in the first five–year plan to 29% in the seventh plan; higher education has benefitted at the cost of primary education.

WOMEN AND CARE

Secondary schooling

Total fertility rate (Births per woman)

Antenatal care (Percent)

Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

Health budget (Percent of government expenditures)

Education budget (Percent of government expenditures)

TRENDS REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN

100
80
60
40
20
0

■ 1975-79
▢ 1988-90

MAHARASHTRA GUJARAT MADHYA PRADESH ORISSA

100
80
60
40
20
0

■ 1975-79
▢ 1988-90

KERALA TAMIL NADU KARNATAKA ANDHRA PRADESH

Gujarat Madhya Pradesh Orissa Maharashtra Andhra Pradesh Karnataka Tamil Nadu Kerala

Prevalence of underweight children, 12–72 months (Percent < –2 s.d. weight for age, NCHS)

India spends a greater percentage of its GNP on education than it does on health. In terms of education outcomes, the literacy rate (expressed as a percentage of the adult population) rose from 34% in 1970 to 43% in 1987, and 52% in 1991. These figures, however, mask a high disparity between adult female and male literacy rates, between states and also between scheduled castes and tribes and the rest of the population. The 1981 census reveals that while the literacy rate for the whole population was 36%, the corresponding figures for scheduled castes and scheduled tribes were 21% and 16%, respectively.

Women and Care Factors

In developed countries there are slightly more females than males. In India, this ratio (expressed as number of females per 1000 males) continues to be the reverse, with a persistent declining trend i.e., from 933 in 1981 to 929 in 1991. This indicates a disturbing disparity in the survival of men and women in the country.

Women generally occupy a very under–privileged position in Indian society, although there are significant regional variations. Discrimination against females is generally more pronounced in north India (particularly Rajasthan, West Bengal, Uttar Pradesh, Punjab, and Haryana), and may not be significant in many parts of southern India, although female infanticide has been reported in the southern state of Tamil Nadu. Where it does exist, discrimination begins early in life, with more females than males dying in infancy and childhood. In contrast to most of the rest of the world, female mortality is greater than male mortality up until the age of 35. It has been shown that if India had the female–male ratio prevailing in Sub–Saharan Africa (around 1.02) then, given the number of Indian males, there would have been 37 million more women in India in the mid–1980s. The average age of marriage in India is one of the lowest in the world (18.3 years in 1981) with child marriage still prevalent, despite being illegal. Child bearing also begins early, with 8% of the births in India occurring to mothers less than 19 years of age. Family size tends to be large. The average Indian woman has from 6 to 7 pregnancies, giving birth to 5 or 6 live infants. Four to five of these will survive to reach the age at which they can reproduce. In India, as in many developing countries, maternal mortality accounts for the largest or near–largest proportion of deaths among women in their prime years. It is estimated that out of half a million maternal deaths in the world each year, about 20% are in India.

Only an estimated 32% of rural births, and 74% of urban births are attended by qualified personnel (these figures show wide regional disparities, and in Jammu and Kashmir, Rajasthan and Madhya Pradesh, fall to less than 10%). Abortion is yet another problem that Indian women must face. Although legal in India, abortions are still performed in unsanitary conditions. Indian women desperate for an abortion will go to unsanitary clinics sometimes because of the ignorance of the law, and other times because a government–run clinic which offers relatively safe abortions is inaccessible. Sex selective abortion is problematic because of anti–female bias; for example, according to a 1984 report from Bombay on abortion, after prenatal sex determination, 7999 out of 8000 foetuses aborted were female.

Health services are used less often by women than by men. Parents take sick sons to the health clinics at an earlier stage in an illness than a daughter. A 1982 study in Rajasthan demonstrated that the ratio of male to females coming to government health centers for treatment was 5:1. Another study in Uttar Pradesh showed that only about 9% of cases of female illness went to a health center for treatment. While mixed evidence has been found regarding intra–family distribution of food in India, inequalities in health care utilization and general care can, on their own, yield excess female mortality rates.

Regarding female education, the percentage of girls in an average class in primary school rose from 38% in 1978 to 41% in 1986. A census from 1981 estimated that around one–third of urban girls, and two–thirds of rural girls aged 6 to 13 years do not attend school. Again there are regional variations, with the states of Bihar, Rajasthan, Madhya Pradesh and Uttar Pradesh having the lowest levels (in each case with less than 1 in 5 girls between 6–14 years of age attending school). Lower female education levels are due to a variety of reasons. The daughter is often seen as only a temporary member of the family who will enter the family of her husband upon marriage. Daughters also greatly help the mother in her work at home, and therefore keeping her at home is seen as more useful for the family than improving her education. Schools in which there are male teachers and male students, and to which the girl must travel long distance may be seen as threats to the girl. Also, the dowry for a less educated girl is usually less debilitating. Such perceptions, beliefs and practices are pervasive.

Female literacy levels improved threefold from 1961 to 1991 (from 13 to 39%), although they are still much lower than males levels which rose from 34% to 64% during the same period. The female rate however is still much lower than that of males. The regional variation with regard to female literacy is striking. In the 1981 census, the highest effective female literacy rate (i.e., 5 years and above) of 79% is registered by Kerala. Among the 14 most populous states, four states – Rajasthan (28%), Madhya Pradesh (32%), Uttar Pradesh (31%) and Bihar (30%) – ranked the lowest, and accounted for half the illiterate rural women in India. There are also marked rural–urban differences; for example, Bihar has an adult female literacy rate of 14% in rural areas, and 41% in urban areas, and in Rajasthan only 9.8% of the rural females (and 41% of urban females) are literate.

Nutrition Programmes

The two main integrated nutrition interventions in India are the national–level Integrated Child Development Services (ICDS) and the Tamil Nadu Integrated Nutrition Project (TINP). The TINP particularly has been demonstrated as being successful, and there is much scope for mutually beneficial lessons to be learned as both these programmes expand. Integrated nutrition and health programmes such as TINP and ICDS are essentially relevant and appropriate in design although (particularly in the case of ICDS) their targeting and implementation could be strengthened. At present, ICDS, like many other interventions in India, tends to exist and work best in those areas where it is, in a sense, least needed i.e. those areas with a more developed infrastructure for delivery. Area targeting to more remote, usually poorer, areas, might be supplemented with targeting to under–three year old children from the poorer households at village level. The lessons learnt from TINP (regarding targeting, implementation, training, supervision, monitoring) should be utilized fully to optimise results. The weak points in ICDS implementation, such as poor interdepartmental coordination, irregular monitoring, unsystematic evaluation without adequate arrangements for feedback and corrective action, might be eliminated through instituting an effective management information system at District/Taluk/Block/village level.

Conclusions

The trend in nutritional outcomes in India during the last fifteen years or so then has been positive but modest, manifesting itself mainly in the reduction of proportion of preschool children who are severely underweight. Although average figures on calorie consumption have remained nearly unchanged since the mid–1970s, it is likely that household food security among the poorest social groups may have improved given the reported reductions in people living below the poverty line, and the fact that food consumption per caput of landless

agricultural workers has risen. This is in line with reductions in underweight prevalences of 0.5 percentage points per year in preschool children. Famines have been completely eliminated in India in the last two decades – a major achievement of government policies on food security.

On the agricultural side, there are signs of future problems and constraints as the population growth rate re mains high, while the new technologies introduced in the 1970s may now be less effective in catalyzing growth in food production. Concern for people's livelihoods may need to be increasingly reflected in agricultural strategies which take account of the fact that an increasing proportion of households are relying more on the market for food purchases than sales.

There is increasingly serious population pressure on land resources, which highlights the urgency of adopting a more evenly spread, environmentally–sustain–able agricultural development strategy – one that considers livelihoods as a more important goal than production per se.

Before such a strategy bears fruit, the national food security safety net of the Public Distribution System (PDS) remains important, particularly if it is more appropriately targeted. During the 1980s, it was patchy in terms of both coverage and effectiveness. Household food security actions, such as the poverty alleviation programmes and the PDS, certainly contributed to the reductions in poverty and inequality during the 1980s. The PDS and probably the NREP also are thought to have a significant nutritional benefit, although explicit evidence does not exist yet.

Despite the levels of governmental expenditure (in both absolute and relative terms) on health, education and social welfare remaining low during the 1980s, there has been a steady improvement in the quality, outreach and utilization of primary health care facilities. Furthermore, India's decades of experimentation with nutrition and health interventions since the Applied Nutrition Programmes of the 1950s seems to be beginning to bear fruit, with integrated programmes such as the ICDS and TINP.

Regionally, as well as the differences discussed with regard to agriculture, there are also highly significant state–by–state variations in many other nutrition–related variables discussed here, with many factors associated with nutritional problem areas clustering particularly in the states of Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar and Orissa. Anti–female bias in food provisioning, health care utilization, and general care may be particularly severe also in these northern states, and reflected in the regional differences in juvenile sex ratio. By contrast, the one state that ranks highest with respect to many nutrition–related indices is Kerala – where a sustained political commitment to human (particularly women's) development through preferential state government support to health, education and welfare sectors, has paid rich dividends.

Bangladesh

According to the 1991 census, Bangladesh has a population of 108 million, and had a growth rate of 1.9% per annum during the period 1981–1991. The population density is over 700 persons per square kilometre; the highest population–resource ratio in the world. The majority of the population is Muslim.

Trends in Nutrition

The 1975 national survey found that 84% of under–five children were underweight according to NCHS standards. This rate appears to be extremely high relative to the rest of the world, perhaps partly because surveys were done at the end of the 1974 famine. This prevalence dropped significantly between 1975 and 1981 to 70%, but then remained at a fairly constant level between 1981 and 1985. The latest survey done in 1989/90 shows an underweight prevalence of 66%, indicating some further improvements in child nutrition. Allowing for complications in comparing surveys (e.g. the 1975 data which were largely rural, and seasonal differences in the timing of data collection), a real improvement seems to have been made, given also the consistency of these results with other indicators such as infant mortality rates.

The 1989/90 survey indicates that levels of underweight are still higher in rural areas than in urban, although there have been reductions in rural areas, narrowing the rural–urban gap significantly. Recent (October 1992) data coming from the Nutritional Surveillance Programme (see second page graphics) indicate that child stunting – below –2 s.d. height for age – was highest in the urban slums of Chittagong (82%), and lower in Khulna (68%). Stunting was also reported to be very high in the surveillance sentinel points in Matlab, Kazipur and Rajoir. There seems to be very little, if any, gender differences in underweight prevalences. Based on a number of regional studies, seasonality patterns are most significant when weight–for–height is used as an

indicator, prevalences of wasting peaking in the July–September period.

In the 1989/90 survey, a breakdown by age showed that the percentage of underweight children increased after the first year of birth, rising from 57% among infants of 6–11 months of age, to 78% in the 12–23 month age group.

The infant mortality rate was estimated at 138 per 1,000 live births in 1975, declining slightly to 130 in 1980. Continued improvements in IMR were observed through the 1980s attributed partly to increasing immunization coverage. The 1991 IMR was estimated to be 110 per 1,000 live births.

Economic Trends

The GNP per caput of Bangladesh in 1990 was estimated at US$210 – up from US$130 in 1975. Real GDP per caput grew moderately in the 1980s with an annual growth rate of 4.3%; higher than the 1.7% of the previous decade. The economy of Bangladesh is characterized by major structural problems: exports only accounted for 38% of the import bill in 1989; government revenues financed only 56% of government expenditure. This results in an exceptional dependence on foreign aid for financing development and large fiscal and external deficits. Stabilization policies throughout the 1980s reduced the latter from 12% of GDP in the early 1980s to around 6% of GDP by 1988, while the inflation rate was slightly reduced. External debt was close to US$11 billion in 1990, 10 times the figure in 1975. The debt service ratio peaked in 1985 at 33% and has been declining somewhat since then.

The country is vulnerable to both droughts and flooding. Major flooding in 1987–88 and a cyclone in late 1988 slowed down economic activity to about 2.8% growth in 1987–89. In 1989, the government once again used expansionary policies including large food subsidies and increases in wages and salaries. Growth of remittances has slowed down. The downturn in agriculture contributed to weak domestic demand for the manufacturing sector, where growth averaged less than 3% in 1987–1989.

Food Security – National Level

The agriculture sector contributes 40% to GDP and employs nearly 60% of the work force. The use of high–yielding varieties and improved irrigation through "green revolution" technologies has enabled higher growth of food production in the last 15 years. The country has not achieved self–sufficiency, yet but is expected to do so in the near future. In 1990, the increases in food production kept pace with population growth rates. Rice and wheat account for approximately 80% of the cultivated area, with the majority occupied by rice. Minor food crops include pulses, oil seeds, tubers, sugarcane, spices, fruits, and vegetables. The rate of growth of foodgrain production during the period 1973–80 was about 3.3%; for all agricultural crops, 2.9%. In the 1980s, the rate of growth fell to about 1.9% for foodgrains and to 2.1% for all crops due to a declining rate of return from the green revolution technology.

(Estimates in 1990)

Population	: 107 million	IMR	: 105
Population Density	: 740 per sq. Km.	GNP US$ (Per Capita)	: 210
Population Growth Rate	: 2.3% per annum	Urban Population	: 16%

CHILD GROWTH AND SURVIVAL

Underweight preschool children (Percent below –2 s.d. weight for age)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

Debt service ratio (Debt service/exports)

FOOD

Food production index (Per caput, 1979–81=100)

Dietary energy supply (Kcals/caput/day)

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Consumer price index (1980=100)

FPI/CPI ratio (1980=100)

HEALTH

Tetanus: Pregnant women

Measles: Children

Immunization coverage (Percent)

Population with access

Access to local health care (Percent)

Low birth weight (No. < 2.5 kgs./100 live births)

Access to potable water & sanitation (Percent)

The government is actively involved in the foodgrains sector – in imports, domestic procurement, public distribution, and open market sales. The food stocking (mainly grain storage and distribution) policy is central to such involvement, and over the last decade, this has been a constant issue faced by the government as well as the major aid donors. An optimal stocking policy is the objective – this implies cost–effective options that address the government's concern to ensure price stability and food security of the vulnerable poor. While it would be reassuring to provide as much stock to fend–off severe fluctuations during shortfalls, there is a corresponding high cost of foodgrains storage and stocking as well as disincentives to the farmers who could be faced with low farm gate prices. In 1988/89 crop year, for example, cereal imports of about 2.1 million metric tons amounted to more than $400 million, which is a heavy foreign exchange burden.

Major flooding, which occurred in 1987–88, caused serious disruptions of rice production, especially of Aman rice, which is harvested during the monsoon season. The government responded to rising food prices by obtaining additional food aid, purchasing large quantities of food–grain commercially on its own and by initiating crop rehabilitation programmes domestically to recoup crop losses. Foodgrain imports totalled 2.9 million tons in 1988 and 2.1 million tons in 1989, enabling the government to expand total foodgrain distribution to 2.5 million tons in FY 1988 and 2.9 million tons in FY 1989. Through the Public Food Distribution System (PFDS), wheat distribution doubled between 1980 and 1990. Imports and publicly held stocks were used in combination to moderate the fluctuations in the price of rice. The ratio of the food price index to the consumer price index was generally steady for most of the 1980s. Although the government was quite successful in ensuring food security by maintaining relative prices of foodgrains, insufficient attention was paid to the food producers. On many occasions in the last decade, large scale commercial imports have been made despite the bumper crops which necessitated increased domestic procurement. Such imports pre–empted the limited storage capacity and undermined domestic procurement operations – leading to a decline in farm gate prices. In FY 1988, the support prices for farmers which the government supposedly guaranteed at the start of the cropping season fell far below the actual farmgate prices that farmers received for their crops.

Food Security – Household Level

Due to increasing population pressure, landlessness and fragmentation of landholdings have been rising. The average farm size fell from 1.3 hectares in 1968 to 0.9 in 1984. This means that a vast majority of rice farmers are net consumers of basic foodgrains.

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Since the mid–1970s, average per caput income in Bangladesh expanded by about 1.0% per annum, while relative inequality has remained unchanged. The average Bangladeshi household still spends nearly 67% of its budget on food. 10% of the population allocates 75 to 80% of all household spending on food, the middle 70% of the population allocates between 60 and 70%, while the highest quintile allocates less than 50%.

Calorie availability in Bangladesh is estimated at a little over 2000 kcals/caput/day, and this has remained generally unchanged on average over the last 15 years. However, the distribution has worsened, with the estimated proportion consuming below 1,800 kcals per caput rising from 20% to 25% since the mid–1970s.

Rice has the largest share of the diet at all income levels, with the income elasticity of demand as high as 0.90 for the poorest decile. Overall, per caput consumption of foodgrains in 198 8/89 averaged 15 kgs per month, which is higher than the government guideline for minimum consumption of 13.6 kgs per month. However, consumption by the poorest decile of the population was less than 70% of the guideline. In 1985/86, foodgrains supplied an average of 80% of caloric intake, followed by fats and oils, pulses, and vegetables.

Health and Control of Infectious Diseases

The share of government expenditure on health averaged 5% during the 1980s, while annual spending on health per person averaged just under US$1, one of the lowest in the world.

Government policy in the area of health and family planning has emphasized the expansion of physical infrastructure, particularly the building of hospitals and basic health facilities. The number of Upazila Health Complexes (UHC), which offer in–patient curative treatments as well as out–patient clinical facilities, maternal and child health care, and family planning services, increased from 150 in 1973 to 351 in 1987. The number of such facilities are, however, still far below requirements for the large population of the country. Furthermore, such increase has been without a concurrent investment in personnel resources or medical supplies to make these facilities operational. As a result, there is substantial under–utilization of existing facilities.

WOMEN AND CARE

Secondary schooling

Total fertility rate (Births per woman)

Antenatal care (Percent)

Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

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Health budget (Percent of government expenditures)
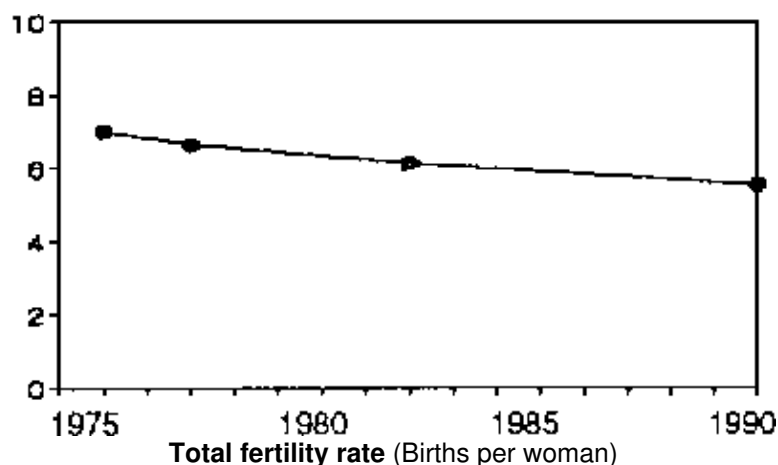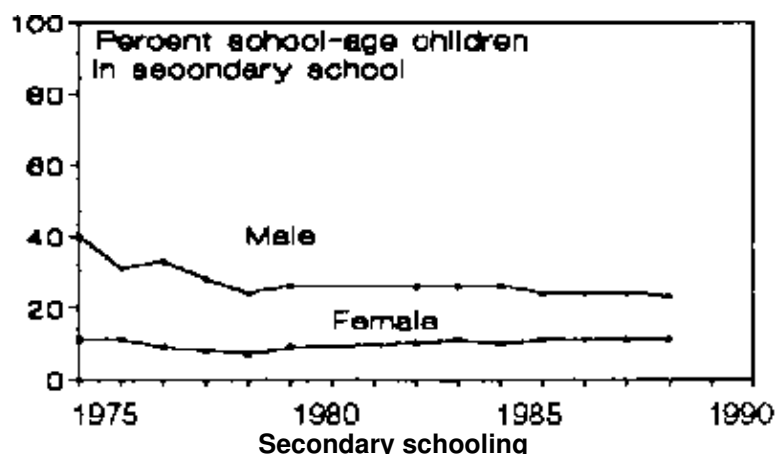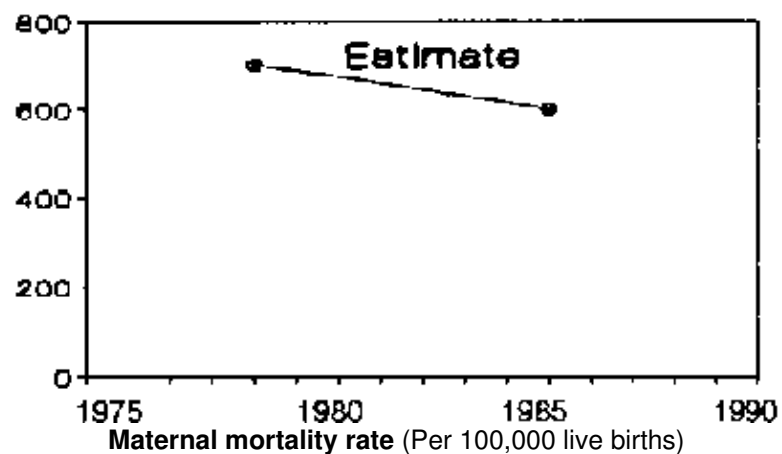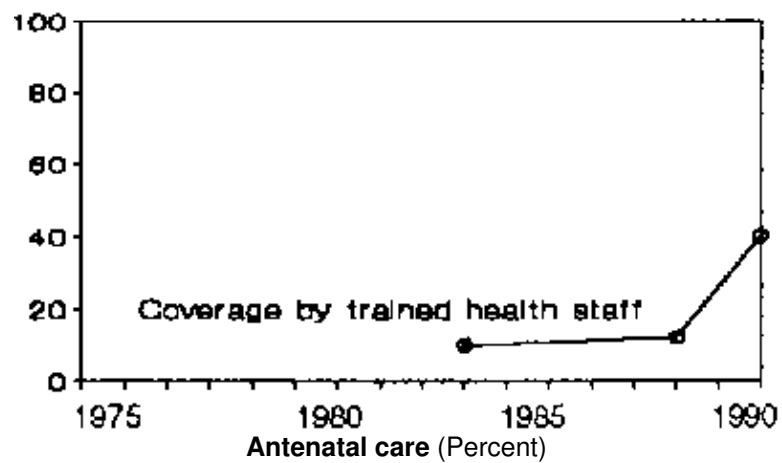
Education budget (Percent of government expenditures)
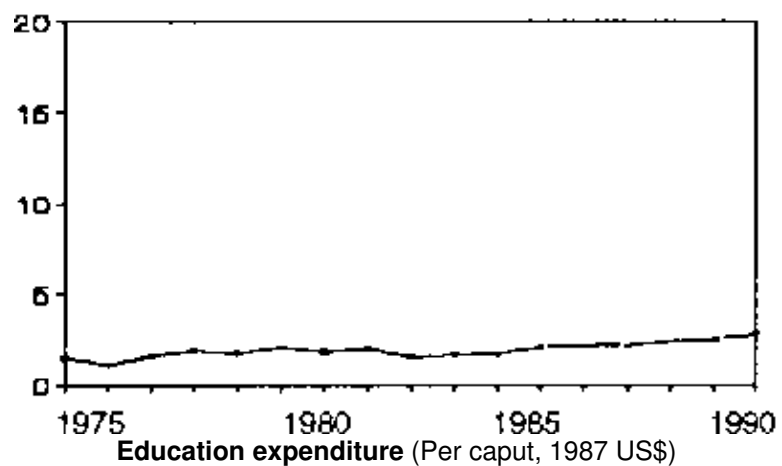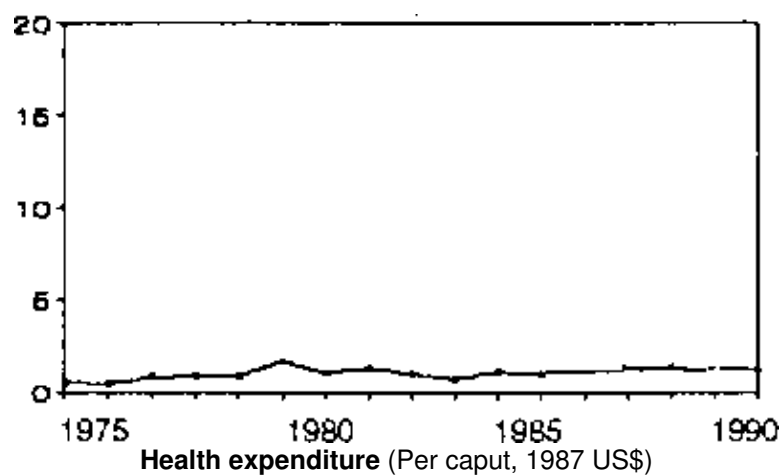
REGIONAL DATA CHILD STUNTING

Prevalence of stunting, children 6–59 months (Below –2 s.d. height for age, NCHS) Report from

In the latter half of the 1980s, Bangladesh made great strides in immunization rates, with measles inoculation increasing from 5% in 1985 to 54% in 1990. The immunization rates for pregnant women against tetanus also increased dramatically from 6% in 1988 to 74% in 1990.

Morbidity among children is particularly high. Population density is one of the highest in the world, which results in crowding and the easy transmission of infectious disease. Poor sanitation is one of the main conditions that has fostered high morbidity rates. In 1990, only 12% of the population had access to adequate toilet facilities in the home or immediate vicinity. This rate has increased only slightly from 5% in 1983. Only 40% of the population had access to safe water at home or within a 15–minute walking distance in 1983. Some improvements in water access were, however, observed towards the end of the 1980s.

Women and Care Factors

As Bangladesh is a predominantly Muslim society, the practice of "purdah" significantly affects women's ability to earn and own property. Women's labour force participation is still only a fraction of that of men. The trend data (1975–1990) on labour force participation of Bangladeshi women estimated that only 6 to 7% are considered economically active. However underestimated this result is, the figures do suggest low levels of participation of women in the economy. Women are heavily dependent on men for their economic livelihood, a situation that makes them vulnerable in cases of divorce, widowhood, or abandonment.

The school enrolment ratio of girls is low and has not improved since the 1970s. Only 12% of school–age females are in secondary school.

Indicators of health, fertility, and nutrition reveal the extent to which women are disadvantaged in Bangladesh. The under–five mortality rate for girls is 162 compared to 146 for boys, life expectancy for women is 51 versus 52 for men.

The total fertility rate dropped from an average of 7 births per woman in the early 1970s to 5.5 in the late 1980s. These high fertility rates with little provision for prenatal and perinatal care contributes to the high maternal mortality rates. The maternal mortality rate was 600 per 100,000 live births in 1985, one of the highest in the world. In 1990, it was estimated that only 26% of mothers had antenatal care by trained health staff, and only 6% had deliveries attended by trained medical personnel. The average Bangladeshi woman marries earlier than many of her other South Asian counterparts. This means that women have their first child at a young age and have spent 60% of their reproductive age either pregnant or lactating. The lack of adequate prenatal care probably contributes to the extremely high incidence of low–birth weight babies, which comprised about 34% of all live births in 1989.

Conclusion

The extent of growth failure in Bangladeshi children is extremely high, although there has been some slow improvements. Over the last 15 years, the prevalence of underweight children decreased by about half a percentage point per year. Given the very high prevalences, it will take many years at this rate before the problem is contained.

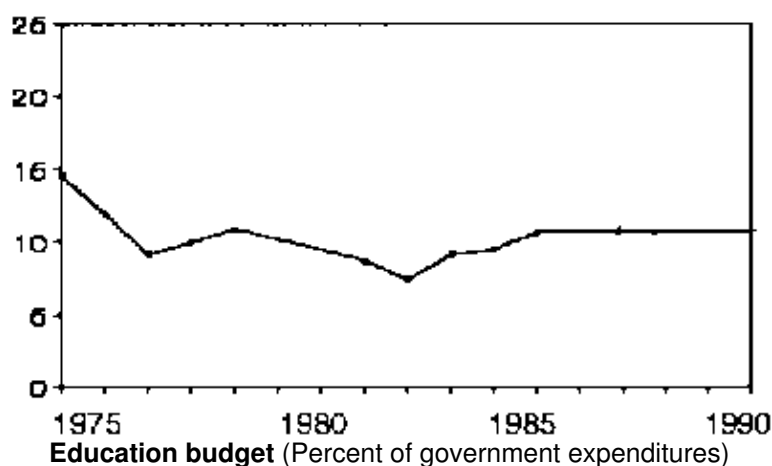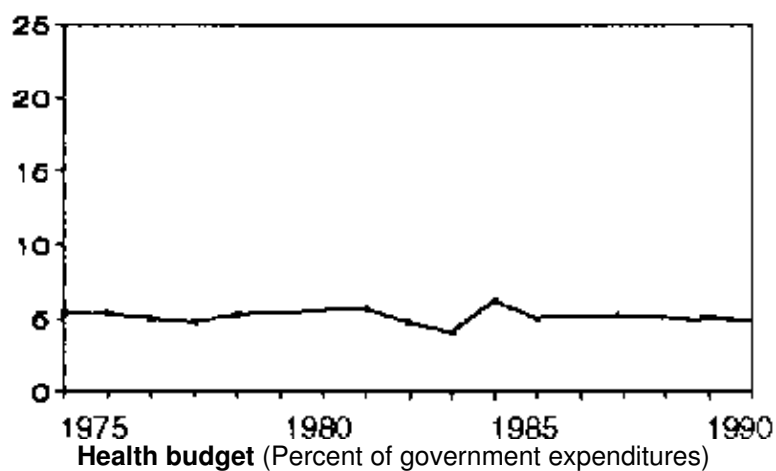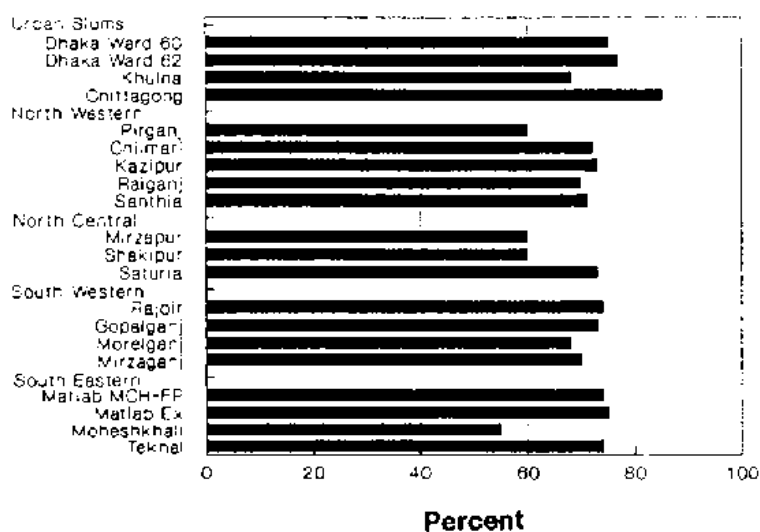The improvements in the previous decade benefitted from policies that stabilized food prices and, hence, access by the most at risk. The stability in prices of the major foodgrains, however, had been achieved at the expense of farm producers. Furthermore, the foodgrain stocking policy of the government has been a big drain on its foreign exchange, and a more optimal stocking strategy has to be sought to alleviate fiscal difficulties. Although food availability per caput has been stable, increases beyond the present levels of 2,000 kcals/caput/day would be necessary to realize sustained nutritional improvements. The increase in households classified as "hard core poor" (now one in four) warrants particular attention.

Public expenditure on human resource development (in health and education) in Bangladesh has remained at a low level at around 2.4% of GDP in the 1980s. For the majority of the Bangladeshi population, health services remain inaccessible and housing and sanitation conditions inadequate, although access to safe water improved considerably in the late 1980s.

A major nutrition–related problem cluster is that of inadequate maternal child care. There is virtually no exclusive breastfeeding and complementary feeding is inadequate for 60% of children at 9 months of age.

Women suffer social discrimination, which manifests itself in very low literacy rates, a large demand for domestic and poorly–paid productive labour, intra–household maldistribution of food and inadequate time and facilities for child care. If the rate of nutritional improvement is to be accelerated such factors will need urgent attention.

Pakistan

Pakistan is a relatively new country, having been formed by the partition of India in 1947. Pakistan was further divided in 1971 with the independence of Bangladesh. The country has four provinces: NWFP, Punjab, Sind, and Baluchistan. The majority of the population is settled in the Punjab. Sind is the next most populous province, followed by NWFP and Baluchistan.

Pakistan's population was estimated to be 113 million in 1991. The population has grown at an average rate of 3.1% a year from 1960 to 1991, but there is some expectation that this will decrease slightly to 2.9% before the turn of the century. Pakistan's fertility rate is around 6.5; a very high figure and there is no evidence of any change in the last decade. This high fertility rate gives rise to a high dependency ratio in the population; 46% of the population is below 15 years old, while 19% is below 5 years.

Trends in Nutrition

A National Nutrition Survey conducted in 1985/87 found that although child growth failure is a widespread problem throughout the country, both its magnitude and severity have improved since the last survey carried out in 1977. The 1985/87 survey indicates that among children 6–59 months, 48% were underweight, down from 54% in 1977. The recent national Demographic and Health Survey (1990/91) results have confirmed further declines in the national prevalence of underweight children, estimated at 41%, indicating more rapid improvements in the late 1980s.

Significant regional variations in malnutrition were observed in these surveys. Underweight prevalence was found to be lowest in the Punjab and Northwest Frontier Province and highest in Baluchistan. Punjab showed the most consistent improvements in the last 14 years, whereas the situation in Baluchistan has changed only slightly in that period.

The 1990/91 survey did not show any significant differences between male and female children. However, around 47% of rural children were estimated to be underweight, compared to 33% in the urban areas.

A high prevalence of malnutrition exists among pregnant and lactating mothers. In the 1985/87 National Survey, 45% of this group were found to be anaemic and a further 10% severely anaemic. About 34% of Pakistani mothers were estimated to be underweight (below 45 kg), which partly explains the high proportion of low birth weight babies; one out of every four babies has low birth weight, one of the highest rates in the world. The poor nutritional status of women contributes to the high maternal mortality rate of 500 per 100,000 live births. The 1985/87 national nutrition survey indicates that lactating mothers are an especially vulnerable group, with 46% of mothers consuming less than 70% of the recommended calorie intake. Anaemia, iodine and vitamin A deficiencies, with some geographic variation, were found to be very prevalent among this group.

In 1990, Pakistan's infant mortality rate (IMR) was estimated at 104 per thousand live births, down from 138 in 1975. The present level is relatively high compared to its neighbours and countries with similar levels of economic development. Rural–urban differences in infant mortality rates are significant, with the former showing much higher levels; the Pakistan Demographic Survey found that the urban IMR fell from 105 in 1981 to 79 in 1987, while in the rural areas the IMR showed a smaller decrease, from 135 in 1981 to 113 in 1987. The under 5 mortality rate is estimated at 162 per 1000 live births for 1991.

> *Note:* Based mainly on *Reporting on the World Nutrition Situation: Case Study on Pakistan (1976–1991)* by N. Malik and S. Malik, Quaid–e–Azam University, Islamabad.

Economic Trends

At the time of independence in 1947, Pakistan had a very small industrial base. During the 1950s, a successful policy of import– substituting industrialization was pursued. During the 1960s, the government embarked on an export promotion strategy, while maintaining high protective barriers for its domestic industry,

and private investment broadened into new areas, such as chemicals and fertilizer. In 1972, wide scale nationalization took place and public investment increased rapidly while growth in private industry stagnated. Growth in manufacturing fell to less than 4% per annum during this period. In 1977, the government sought to de–regulate the economy. The new planners relied heavily on privatization, the elimination of subsidies and promotion of large–scale manufacturing.

Overall, the economy did relatively well in the 1980s; the current GNP per caput in 1990 was US$380, slightly more than double that for 1976 of US$170. While structural transformations occurred, with an increasing role played by the manufacturing and service sectors, the economy experienced healthy growth rates in nearly all sectors.

Increasing real wages brought about by the expanding domestic economy and the strong demand for agricultural labour following the green revolution and the migration of the rural workers to the Middle East in the 1970s has managed to spread the gains from this growth. These trends in income have been translated into reduced poverty in the country as a whole. There is considerable evidence that both rural and urban poverty in Pakistan have fallen substantially in the 1980s.

Labour migration to the Middle East has been an important feature of Pakistan's contemporary history. Data from the Bureau of Emigration show an increase from 5,000 emigrants in 1971 to a peak of 173,000 in 1982, with a subsequent fall to an estimated 90,000 in 1985. Cumulative emigration during the 1970s and early 1980s resulted in some 7% of Pakistan's work force being absent in 1983. Besides relieving open unemployment, this emigration has substantially boosted the economy through remittances.

Pakistan has been a recipient of large amounts of aid. Pakistan's dependence on borrowing to finance development has increased consistently over the period 1975–76 to 1989–90. The trend growth rate during this period was 6.2%. Debt services as a percentage of foreign exchange earnings have generally been in the range of 15% to 25%. The single largest donor of foreign aid has been the World Bank. The donors responded favourably to the implementation of IMF austerity measures in the late 1980s.

Food Security

Pakistan remains a predominantly agricultural–based economy. About 70% of Pakistan's population resides in the rural areas and about two–thirds of the rural population is directly dependent on agriculture for its livelihood. Agriculture is the largest sector in the economy and accounts for 25% of the GDP. The agricultural sector experienced low growth until the mid–1960s when the "green revolution" initiated an era of rapid output expansion. The early phase of agricultural growth depended on expanding the extensive marginal lands, made possible by large scale canal irrigation projects and tubewell irrigation. By the early 1970s, the best cultivable land was brought into cultivation, and further gains in output growth had to come from improved yields. This has occurred in the last ten years with improved water management, greater use of fertilizer and availability of credit.

The early gains associated with the "green revolution" continued, with production increasing by 50% between 1978–81 and 1990. High population growth rates have placed a burden on food availability per caput however, and these figures have remained at or below the 1979–80 level throughout the 1980s. Cereal availability has been heavily based upon domestic production. This increased overall by 24% between 1980 and 1990, with a fall in the mid–1980s, and rebounded in 1989.

Compared to most developing countries, Pakistan has a low level of agricultural production instability, which is due mainly to its extensive irrigation system. The government's involvement in the agricultural sector has been successful in maintaining stable wheat prices. The wheat storage and stabilization policies were able to move wheat from surplus to deficit years and from surplus to deficit seasons, to ensure a flow of supply at most times.

Calorie availability based on food balance sheets has risen from 2,100 per caput in 1975 to 2,380 in 1990. This consistent increase reflects improving conditions affecting food supply in the country. Although the consumer price index has been rising rapidly in the last 15 years, prices of food have not been rising as fast as other consumer items. Overall, the food price index kept pace with the consumer price index for most of the 1980s.

A food distribution system using ration shops has been in place since 1947. The subsidy has sought to ensure low and stable prices for wheat, flour and sugar by distributing these items at a controlled price through ration shops. However, ration shops were never as widely available in rural areas as in urban areas. A survey in

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1986 showed a utilization rate of 19% in the urban population and 5% in the rural population. Although the ration shop system in Pakistan was originally designed to meet the full requirements of households for such necessities as wheat, sugar, tea, yam and cotton cloth, rationing of essential materials other than wheat and sugar was discontinued in 1947 after independence had been achieved. In the 1960s, the statutory ration system was abolished in favour of partial provisioning, whereby the supply of subsidized flour and sugar is typically less than the total required. Sugar was de–rationed in 1983.

Wheat flour continued to be supplied at ration shops until 1987 when a major food policy decision was made to eliminate the ration shop system. One reason was due to the inefficiency of the system, only a small portion of the subsidized flour had been going to the targeted poor. The system was replaced with a more general subsidy of wheat, mainly in the subsidy of the cost of storage and handling. The change in policy increased consumer welfare and reduced the unauthorized rents accrued under the old system. For the general population, the cost of wheat flour fell. The wheat flour subsidy, which was in effect from the mid 1970s until 1987, accounted for about a third of all direct subsidy expenditure of the government. The government estimates substantial fiscal savings arising from the new system – in the order of $100 million annually.

(Estimates in 1990)

Population	: 112 million	IMR	: 103
Population Density	: 141.2 per sq. km.	GNP US$ (Per Capita)	: 380
Population Growth Rate	: 3.1% per annum	Urban Population	: 32%

CHILD GROWTH AND SURVIVAL

Underweight preschool children (Percent below –2 s.d. weight for age)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

Debt service ratio (Debt service/exports)

FOOD

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Food production index (Per caput, 1979–81=100)

Dietary energy supply (Kcals/caput/day)

Consumer price index (1980=100)

FCI/CPI ratio (1975=100)

HEALTH

Immunization coverage (Percent)

Access to local health care (Percent)

Low birth weight (No. < 2.5 kgs./100 live births)

Access to potable water & sanitation (Percent)

Health and Control of Infectious Diseases

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Government expenditure on health care has been relatively low, averaging between 2 to 5% of the government budget over the last two decades. Facilities such as maternity and child health centres as well as rural health centres increased from 716 in 1976 to 1,027 in 1990. However, utilization has been low, partly due to a lack of adequate staff and supplies. Like many other countries, public health expenditures in Pakistan have generally been urban–biased, resulting in hospital–oriented, curative models. Whereas nearly 70% of the population is located in rural areas, almost 90% of all doctors are serving in urban areas.

Despite some increase in allocation in the government budget to education and health in recent years, these levels are still very low and have fluctuated over the years. The literacy rate, for those 10 and above, has increased from 26% in 1981 to 32% in 1988. Sind province has the highest overall literacy rate (31%) followed by Punjab and NWFP, while Baluchistan lags behind with a 10% literacy rate.

Currently about 80% of the urban and 40% of the rural population have access to clean water. Around 50% of the urban and 10% of the rural population are served by sewage facilities. The Expanded Programme on Immunization (EPI) is reported by the government to reach 91% of Pakistani children and deliver the full schedule of immunization to 71% of children in their first year and 86% in their first two years. Coverage rates vary within provinces, with 95% of infants in NWFP being fully immunized but only 23% in the remote federally administered tribal areas in the north. An immunization coverage survey of infants 12–23 months old found rates of vaccination averaging 97% for BCG, DPT, and measles. Rural Baluchistan had the lowest coverage rates (60%) for full immunization, while rural Punjab had 100% coverage.

Women and Care Factors

If life expectancy and male to female population ratios are used as indicators, Pakistani women indeed suffer by comparison to most developing countries. Female life expectancy at birth is lower than many developing countries, including China and India. Pakistani women suffer from poor health partly because of an excessive reproductive burden. During their child–bearing years, Pakistani women bear the physical stress of almost frequent pregnancy and lactation. The total fertility rate per woman is about 6.8, which means that they are either pregnant or lactating for 50% of their reproductive years. The mortality rate of Pakistani mothers due to childbirth related causes is estimated at 600 per 100,000 live births in 1983, one of the highest in the world. There have been signs of improvement in recent years. In 1990, nearly 65% of pregnant mothers had access to antenatal care by trained health personnel compared to 26% in 1983.

The relatively poor health of Pakistani mothers affect their offspring. For example, there are only three countries in the world with a higher proportion of low birth weight babies than Pakistan's 25%. Although Pakistan's IMR has fallen since 1965, the progress is below the average for low income countries.

Pakistan has a serious problem with respect to weaning practices and complementary feeding of infants. Recent studies have shown extensive supplementation beginning in the first month of life – a practice that leads to high illness rates and malnutrition for infants.

Female education is a key factor affecting the ability of mothers to provide adequate care for their families. Female primary school enrollment of 28% (in 1988) is almost half that of their male counterparts. Apart from the high reproductive burden, the poor educational level has negative consequences for labour force participation: official women's rates are only 6% overall. Although recent surveys by the World Bank and the Federal Bureau of Statistics claim that these are under–reported, these numbers are nowhere near the labour participation rates in countries like Thailand of about 44%.

Conclusions

Nearly one in two children below 5 years in Pakistan is underweight for their age. The level of growth failure has improved at a rate of about three–quarters of a percentage point per year in the last two decades. There is evidence to suggest that the high rates of 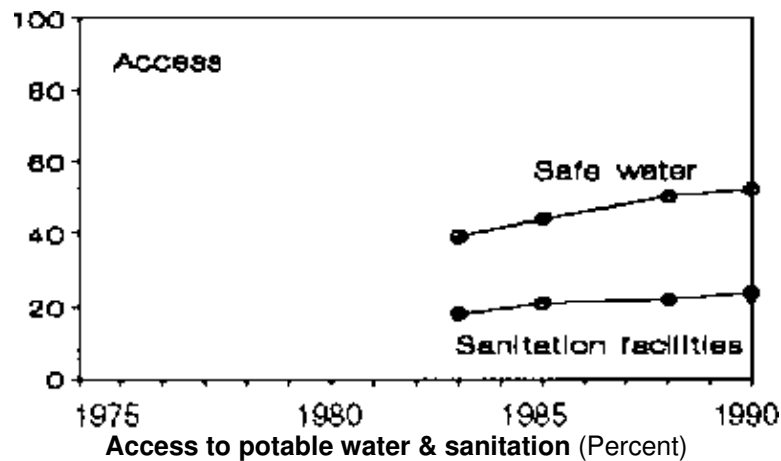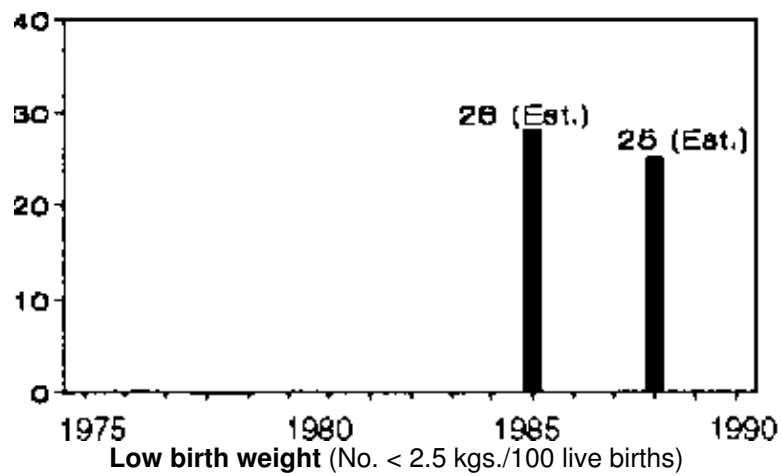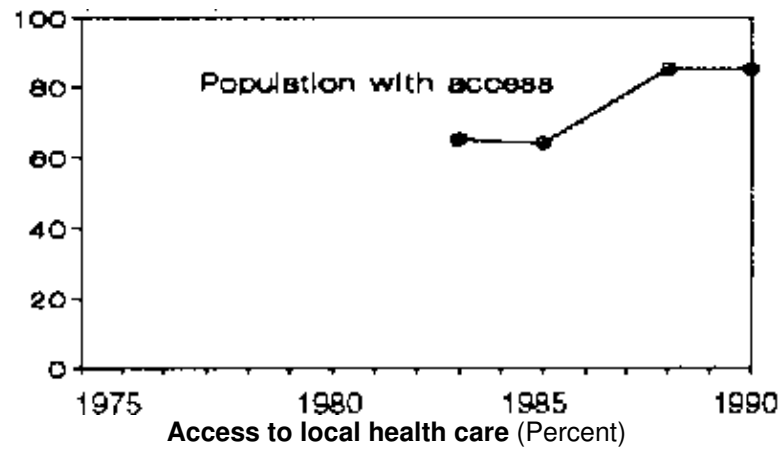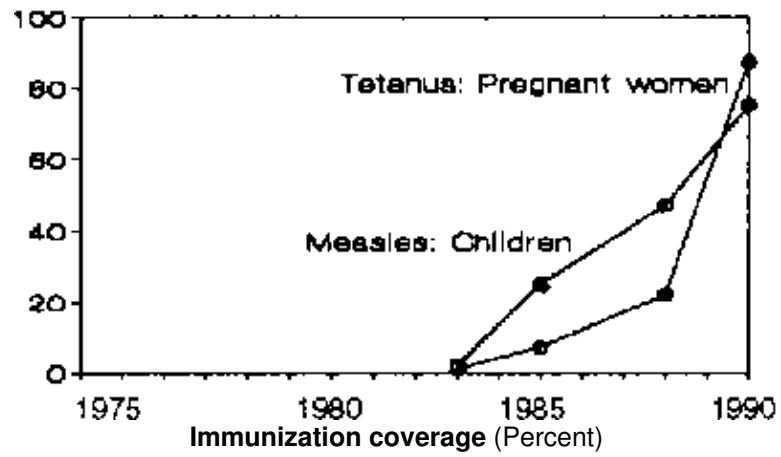growth in incomes in the last two decades, and the improvement in food availability has had an effect on nutrition in the country. Nonetheless, the prevalence rates are still high and if the trend of the last two decades continues into the future, it will take nearly 40 years before underweight problems disappear. Three main tracks need to be pursued in order to achieve a sustainable improvement in nutrition. One is to increase investment on social sector support, particularly in health and sanitation and on reduction in morbidity. The second is to deal with the poor educational levels of mothers, their poor nutritional status, high reproductive burdens, and poor social status, which have constrained further improvement. Thirdly, there is a need to improve the weaning and feeding practices which can generally be addressed alongside the education strategies. Efforts at matching the improvement in food security with investments in health and education, and reducing the population growth rates and improvement in the status

and capacities of women, would likely bring about larger reductions in the proportions of malnourished children in the country.

WOMEN AND CARE

Secondary schooling

Total fertility rate (Births per woman)

Antenatal care (Percent)

Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

Health budget (Percent of government expenditures)

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Education budget (Percent of government expenditures)
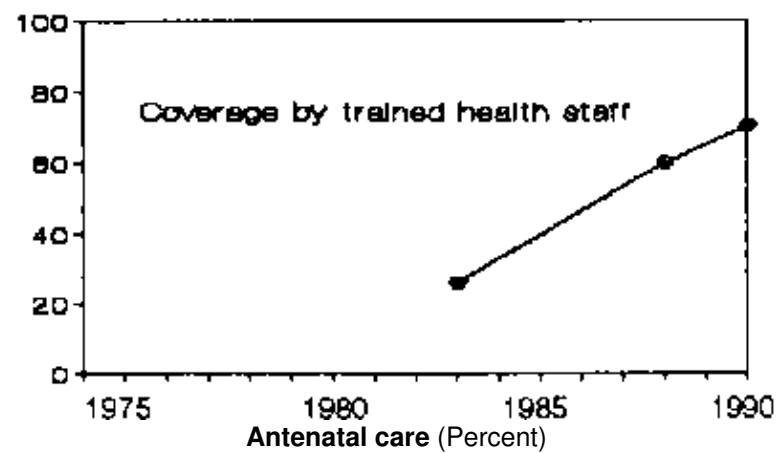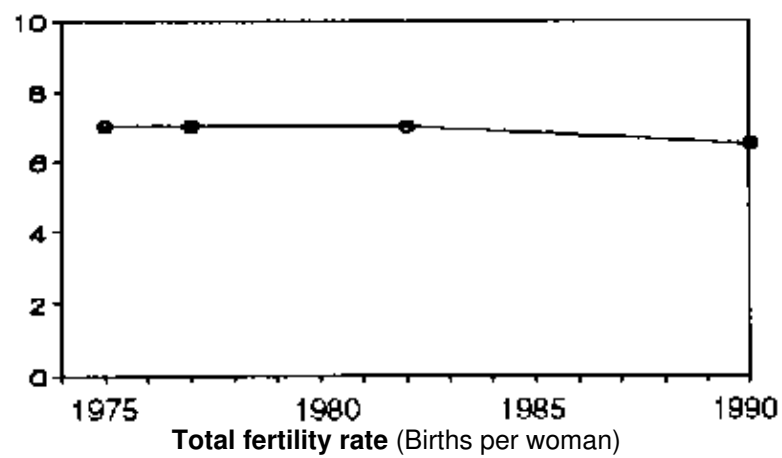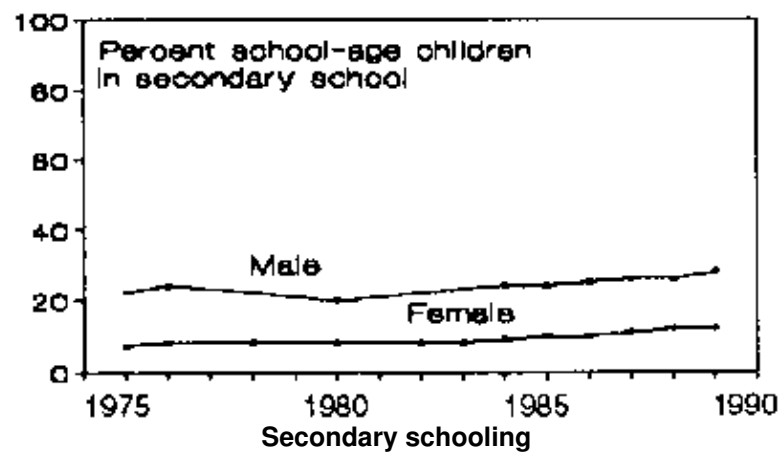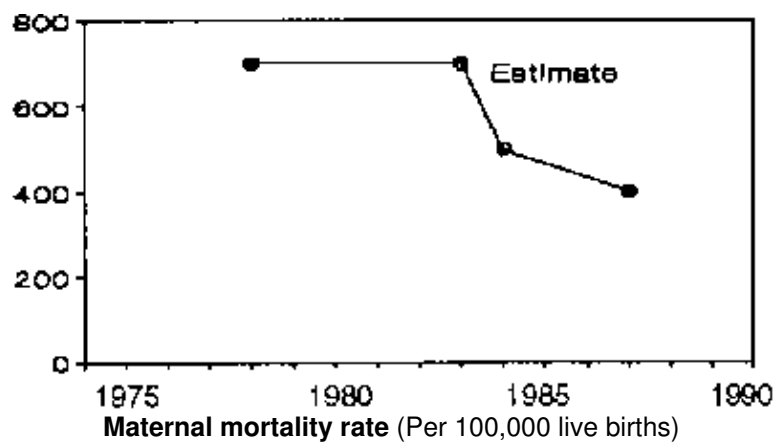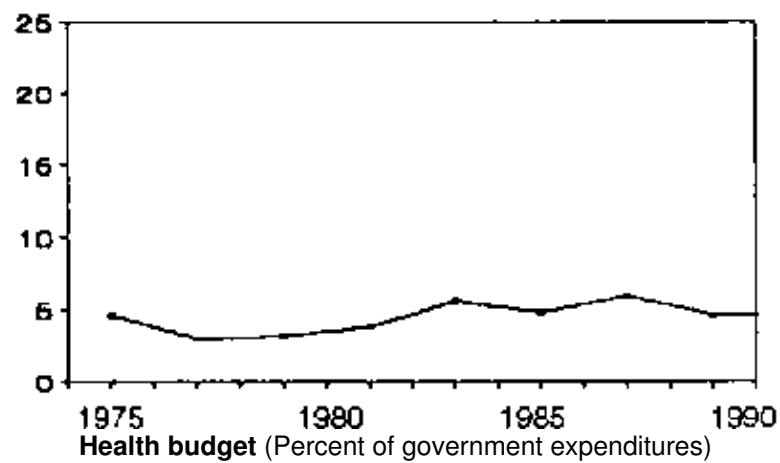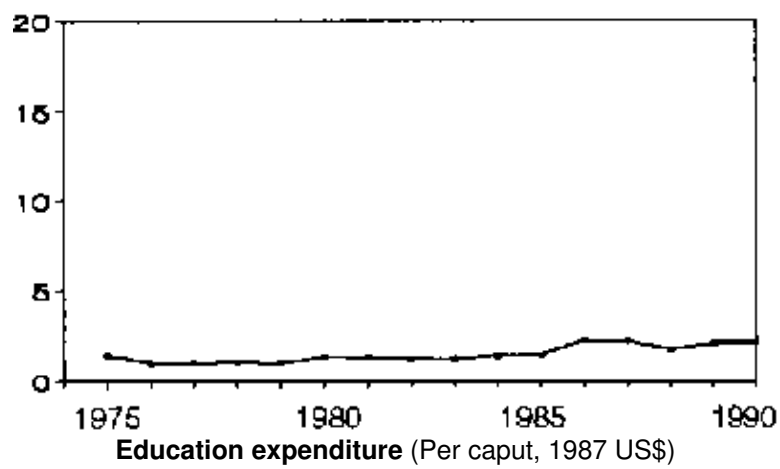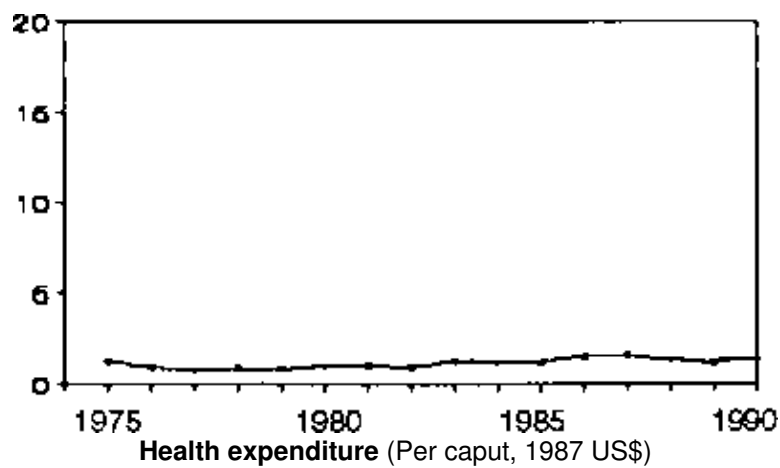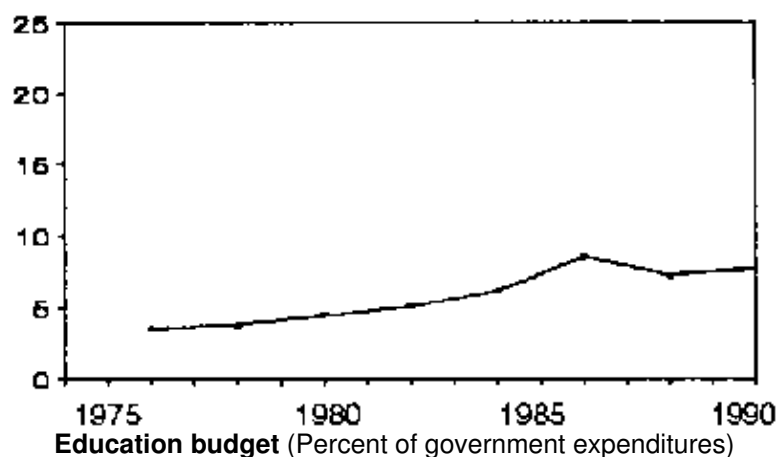
REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN
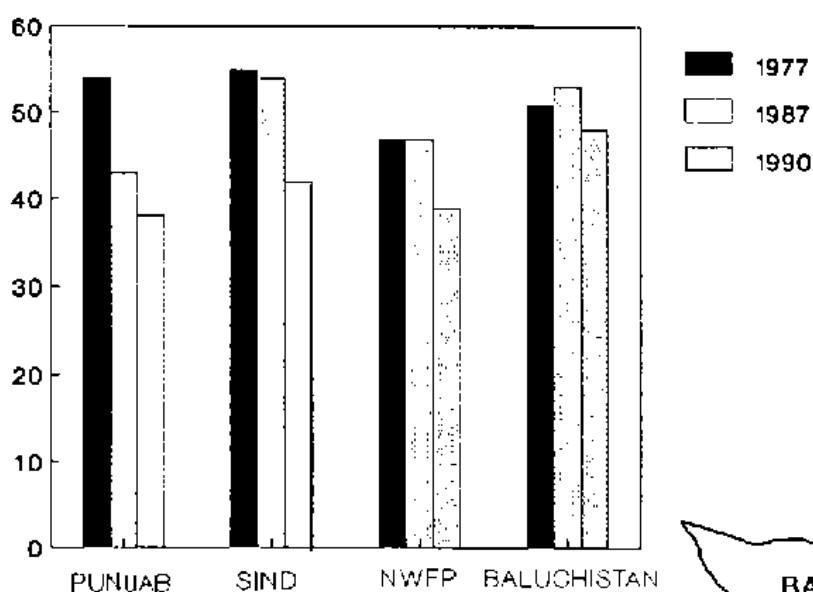
Percent children underweight (Below –2 s.d. W/A NCHS, 6–59 months)

Indonesia

Indonesia is composed of 13,600 islands, making it the largest archipelago state in the world. The country has over 178 million people, with the majority of the population located in just a few of the islands; the central island of Java constitutes 7% of the nation's land area but contains over 60% of the population.

Urbanization is at a relatively low level, with 29% of the population living in cities. Indonesia has a Muslim population. Due to its effective population policies, population growth rate has averaged 1.8% per year during the 1980s, compared to 2.4% in the 1970s.

Trends in Nutrition

Tracking trends in nutrition in Indonesia is difficult as national surveys are available only from the mid–1980s (i.e. 1986,1987 and 1989), although some prior information is available from a national survey of

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xerophthalmia carried out in 1978. Improvements are evident even over the brief interval between 1986 and 1989. In 1986, 51% of under–five children were underweight (<80% NCHS weight–for–age) compared to 46% in 1989. Improvements occurred to varying degrees in all provinces, although underweight prevalences in Eastern Indonesia (e.g. Maluku, Irian Jaya, and West and East Nusa Tenggara) in 1989 were still relatively high (e.g. 55% in Irian Jaya).

Comparisons between prevalences of moderate and severe underweight (less than 70% weight for age using Harvard standards) in under–five children can be made between 1978,1986 and 1989. The prevalence was 16% in 1978, 14% in 1986 and 12% in 1989.

An analysis of the 1987 survey using the NCHS standards indicates that about 40% of preschool children are underweight (below –2 s.d. of weight–for–age). Thus although the trends show considerable improvement over the last 15 years, present levels are still high. An urban/rural breakdown found that urban children have lower underweight prevalences than their rural counterparts (31% compared to 44%). There are also significant socio–economic differentials with child underweight prevalences (below –2 s.d. weight–for–age) in 1987 being 48% in the poorest quartile compared to 33% in the richest. Growth faltering was found, in another analysis of the 1987 data, to occur primarily from 1–12 months of age, after which the growth rate approximated that of the NCHS standard, but with no catch–up evident.

The infant mortality rate steadily fell from 104 per 1,000 live births in 1974 to 64 in 1990, with the early 1980s showing the sharpest decline. The under–five mortality rate is 97 per 1,000 live births, with the male rate higher than the female.

> *Note:* Based mainly on *Economic Growth, Equity, and Nutritional Improvements in Indonesia,* by Soekirman, I. Tarwotjo, I. Jus'at, G. Sumodiningrat, F. Jalal, Djakarta (1992).

Economic Trends

During the 1970s, Indonesia enjoyed the best economic performance in the region, growing at an annual rate of 7.0% with rising oil prices. The economy suffered a mild recession in the early 1980s due to falling oil prices, but reform policies were initiated and the economy continued to expand, albeit at a slower rate (5.5% in the 1980s). A programme of structural adjustment was initiated in 1983, comprising of a series of deregulations aimed at major reforms as well as a 31% devaluation in the rupiah, to increase export competitiveness. Since then, the economy experienced accelerated growth due mainly to an unprecedented surge in private investments, non–oil exports, and private consumption.

With sustained economic growth, both per caput incomes and social welfare improved. The first Five–Year Development Plan *(Repelita)* was started in 1969, when per caput income was only US$50 – about half that of India and Nigeria. By 1990, per capita incomes reached US$570 – nearer those in Thailand or the Philippines, although Indonesia had started from a much lower base. Equitable economic development successfully reduced poverty – in less than one generation, poverty figures fell from 40% (in 1976) to 15% in 1990. The number of people estimated to be below the poverty line declined from 54 million to 17 million over that period. The annual rate of reduction in the incidence of poverty in Indonesia was the highest among all countries in the 1980s.

Food Security – National Level

Food production increased dramatically in the last decade, averaging a growth rate of 4% per year between 1980 and 1990. In Repelita I (1969–74), the achievement of self– sufficiency in foodstuffs, particularly rice, was seen as a priority, with 83% of total projected spending on agriculture being allocated to rice production and the rehabilitation of the irrigation network. In 1969, the BIMAS programme was introduced. Under this scheme, the government established a support price for rice to be defended by its food marketing agency, BULOG.

The government sought to further encourage production increases by providing input subsidies and promoting the use of "Green Revolution" technology. Incentive–oriented agricultural policies were continued in Repelita II (1974–1979), and rice production increased to significant levels. By 1984, Indonesia had made the transition from being a food–deficit country to self–sufficiency. Food production increased dramatically throughout the 1980s. Rice imports fell from 2 million tons in 1980 to only a few thousand tons since 1985. Calorie availability increased from 2,150 kcals/caput/day in 1975 to 2,630 in 1990.

Success in increasing food production has meant slower increases in food prices relative to overall inflation in the early 1980s. This changed when a drought in 1987 and 1988 caused production to fall below consumption trends (although food imports were not greatly increased). The result was price instability for rice in these two years. The drought occurred at the same time that the government, faced with the need to cut expenditures, reduced input subsidies and lowered the support price at which farmers could sell output to BULOG.

Rice is the major staple in the diet, representing 72% of total staple consumption in 1980, compared with 68% during the 1970–75 period. Other food crops include cassava, sweet potato, and maize, but production increases in these have been only moderate. With the virtual exhaustion of gains from high–yielding rice varieties, the government emphasizes diversification into these other crops as a way of sustaining agricultural growth momentum.

Food Security – Household Level

The average household expenditure devoted to food was 68% in 1980 and declined to 60% in 1990, as incomes rose.

The government heavily subsidized rice prices for consumers. Rice prices were held constant in real terms for about 12 years from 1974 to 1986. As a result, with rising incomes, rice consumption per person increased by about 30%, from 100 kilograms per person per year in the late 1960s to around 145 kilograms per person per year in the late 1980s.

Although Indonesia has achieved food security at the national level, households which rely on seasonal wage labour still experience vulnerabilities during the slack period, and poor households are especially susceptible to hunger during periods of drought or other related factors resulting in low agricultural output. Households in some regions in the country failed to meet their dietary energy requirements. Based on the SUSENAS 1989 survey, some 10 to 15% of households in the provinces of the East Region were food–insecure.

Health and Control of Infectious Diseases

Central government expenditure on health as a share of total expenditures has averaged about 2.5% during the 1980s, while actual per caput spending on health in real terms increased from slightly over US$1 in the mid–1970s to about US$2 during the 1980s. These figures are low compared to its neighbors in Southeast Asia.

In Repelita III (1979–84), priority was given to the provision of health care services to low–income groups in both rural and urban areas, and the effective distribution of medicines, both modern and traditional, with special emphasis on safety and efficacy. Most health care services are administered by the Ministry of Health; however, private medicine is commonly practised in urban areas. Outside major towns, where hospitals are scarce, medical functions are shared by polyclinics which act as satellites to hospitals.

The health strategy of Repelita IV was four pronged: (a) to step up and consolidate health services, (b) to increase the number of health personnel, (c) to improve nutrition and community hygiene, and (d) to improve and consolidate the management system, regulations, and laws in the field of public health. Of the total government expenditure on health, about 83% was allocated to three main programmes: hospital services (38%), public health centre services (28%), and communicable diseases and environmental sanitation (17%).

Indonesia has seen significant improvements in the percentage of the population with access to health care, from 40% in 1983 to 64% in 1988. Immunization rates for children against measles and for pregnant women against tetanus have also dramatically increased, from 8% to 86% between 1985–90 for measles and 11% to 54% between 1983–1990 for pregnant women.

(Estimates in 1990)

Population	: 178 million	IMR	: 61
Population Density	: 94 per sq. km.	GNP US$ (Per Capita)	: 570
Population Growth Rate	: 2.1% per annum	Urban Population	: 31%

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CHILD GROWTH AND SURVIVAL

Underweight preschool children (Percent)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

Debt service ratio (Debt service/exports)

FOOD

Food production index (Per caput, 1979–81=100)

Dietary energy supply (Kcals/caput/day)

Consumer price index (1980=100)

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FPI/CPI ratio (1980=100)

HEALTH

Measles: Children

Tetanus: Pregnant women

Immunization coverage (Percent)

Population with access

Access to local health care (Percent)

14 (Est.)

8 (Est.)

Low birth weight (No. < 2.5 kgs./100 live births)

Access to potable water & sanitation (Percent)

In addition, water and sanitation services have also improved, from 32% to 42% and from 30% to 48% between 1983 to 1990, respectively, although the improvement has been less rapid in rural areas where coverage is still low.

Women and Care Factors

Indonesian women find fewer barriers to their participation in the labour force, education, and public life than some other Asian counterparts. The Indonesian constitution, written in 1945, recognizes no differences between men and women as regards labour, health, politics, and law. Labour laws state that women should receive the same wages for the same work as men. They also outlaw discrimination based on sex in the work place. A fully paid maternity leave is allowed, as well as leave after a miscarriage and time off to nurse infants. In reality, some discrimination does exist though.

The net primary school enrollment ratio of women from 1986 to 1990 was 97% for females, 99% for males. The percentage of school–age females in secondary school has been rising – the level was about 43% in 1987 compared to about 18% in 1975.

According to the World Fertility Survey data, in 1980, the median duration of breast–feeding for women with no education was 25 months, while those with secondary education breast–fed for about a median duration of 13 months. A Department of Health Survey in 1987 found that the median duration for breast–feeding remained the same for women with no education while it had increased significantly to 18 months for women with some education. Fertility rates fell from 5 to 4 births per woman between 1974 and 1990. This implies a gradual reduction in the reproductive burden among Indonesian women. The maternal mortality rate was estimated at around 360 per 100,000 live births in 1980.

Nutrition Programmes

One important feature of Indonesia's approach towards solving nutrition and health problems is the extensive grass–roots community involvement, a natural outgrowth from a tradition known as *gotong royong.* This inherited cultural pattern of mutual help in the community has been adopted as one of the 15 principal guidelines for the country's national development plan.

Community involvement in nutrition began in the 1970s with the applied nutrition program (ANP), which trained village nutrition cadres to disseminate nutritional messages in the villages. With a slightly changed concept, ANP has continued as the National Family Nutrition.

Improvement Programme (UPGK). Between 1979 and 1983, UPGK grew from only a few hundred to 45,000 villages out of 65,000 villages in Indonesia – a growth made possible through active participation of a village women's organization known as PKK. The members of PKK were responsible for establishing village nutrition centres called *Taman Gizi.* Once a month, approximately 20 to 30 mothers and their children gather in the centre for nutrition education, recording the weights of the children and setting up supplementary feeding when necessary. Most of the activities in the centre are carried out by the village nutrition cadres trained under the auspices of government nutrition programmes. Activities are funded by the mothers with local products such as rice, eggs, and vegetables, or with cash. Since 1984, the village nutrition centres have been gradually integrated with other primary health care services, such as immunization, family planning, and maternal health care. These integrated service posts are known *as posyandus.*

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The total number of *posyandu* increased rapidly from 90,000 in 40,000 villages in 1984 to 238,000 in 55,000 villages by 1992. The number is expected to reach the optimal target of 1 *posyandu* per 100 children under five years of age by 1994, or about two per village. This rapid development is primarily due to the active involvement of PKK and other women's organizations at the villages.

Conclusions

Over the last 15 years, there has been a steady improvement in nutrition in Indonesia, although there are still some important regional differences. Nutrition has benefitted from an overall development approach of growth with equity, with the proceeds of oil resources being channelled towards development, particularly into agriculture. The Green Revolution programmes in rice production made the country self–sufficient in food, raised agricultural incomes and labour demand in rural areas, and successfully reduced poverty on a large scale. This economic performance flourished against a backdrop of political and social stability in the country.

Indonesia is among the few countries that espouse clear nutritional goals in their national and sectoral plans and programmes in agriculture, health, family planning, and women's affairs. Direct nutrition programmes have increased in both scope and scale over the last decade. The *posyandu* programme, which integrates village level services to include nutrition, health, and family planning, now covers 55,000 out of the 66,000 villages in the country. The future goal is to address the lagging provinces, particularly in the eastern regions.

WOMEN AND CARE
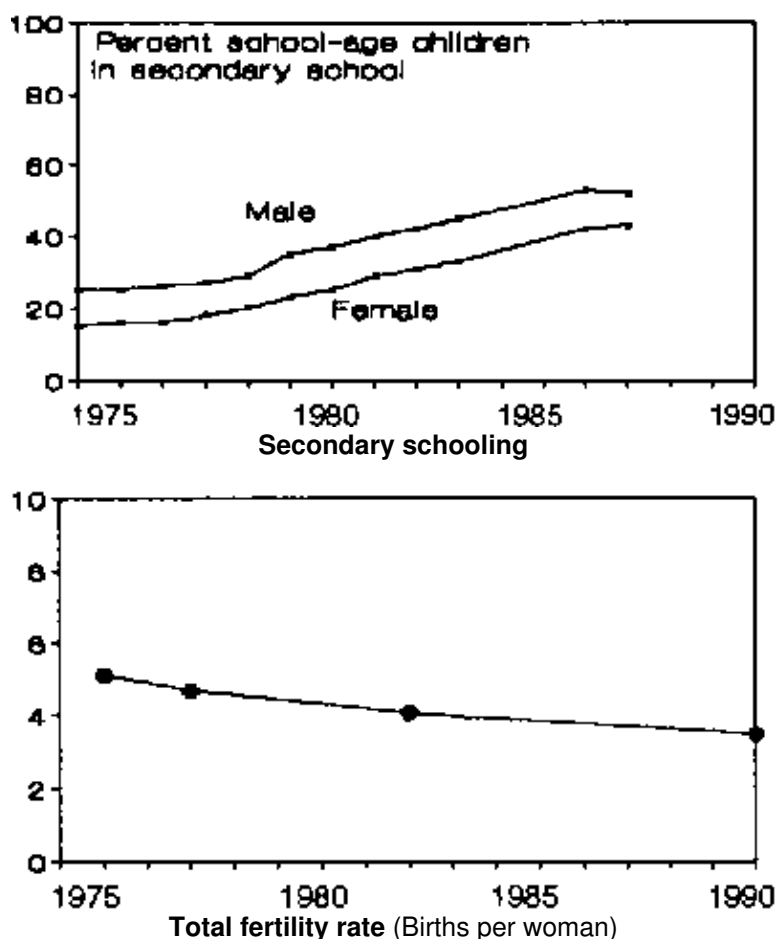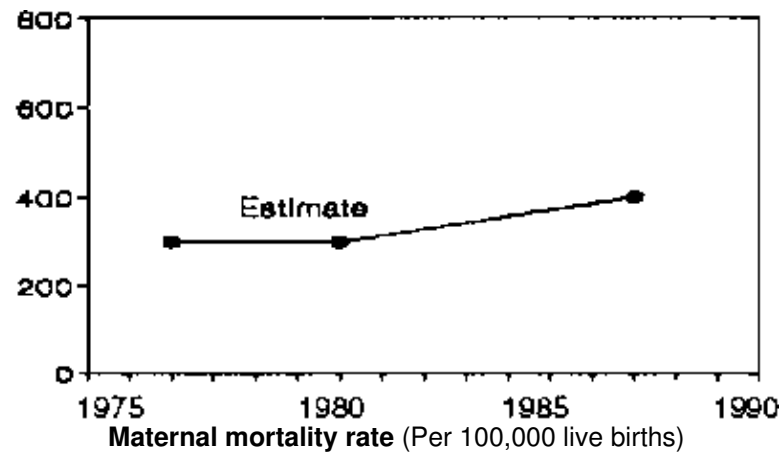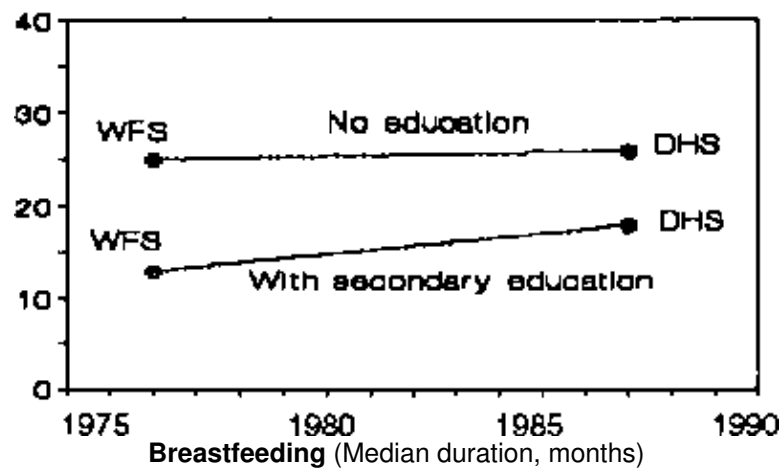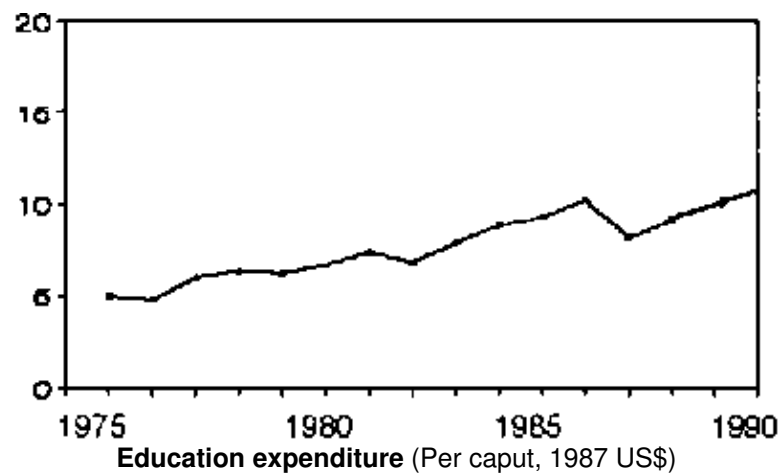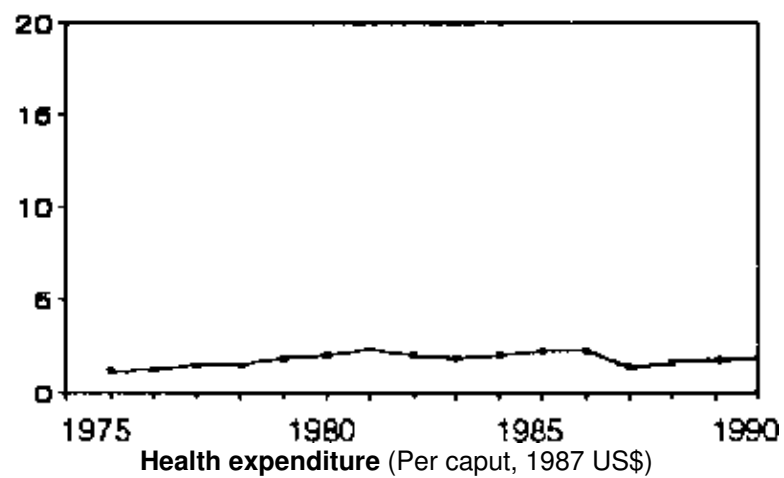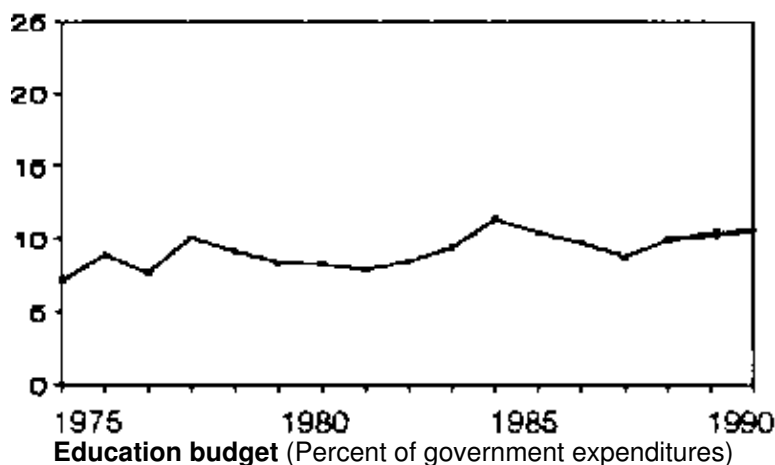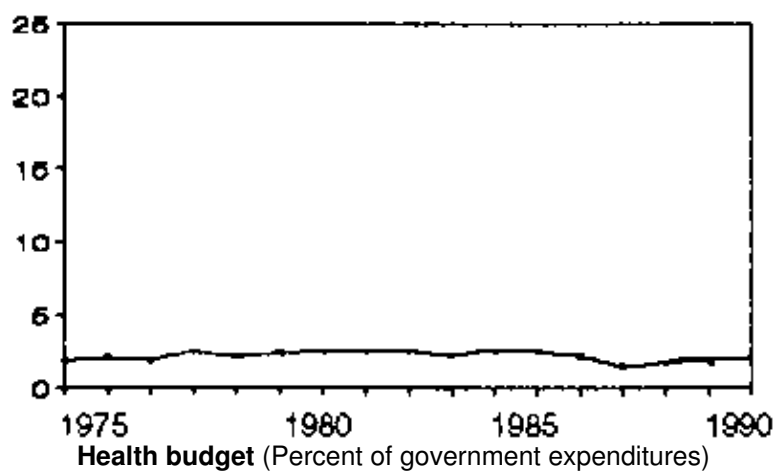
Secondary schooling

Total fertility rate (Births per woman)

Breastfeeding (Median duration, months)

Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

53

Health budget (Percent of government expenditures)

Education budget (Percent of government expenditures)

REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN
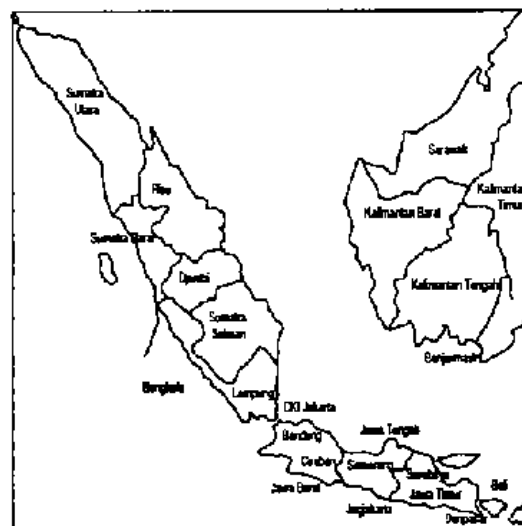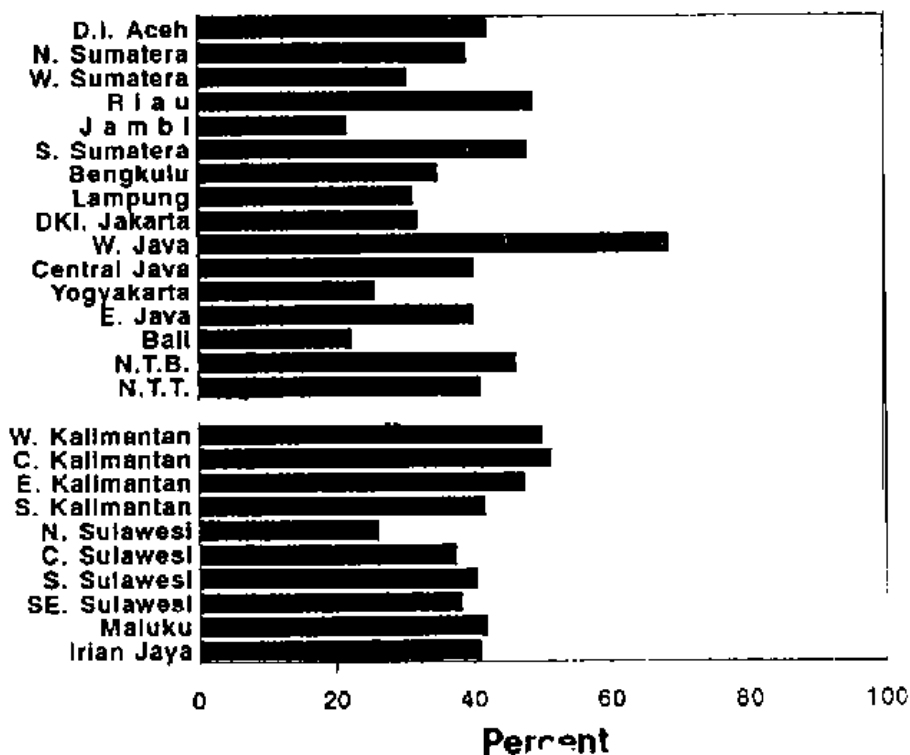
Prevalence of underweight children, 0–59 months (Percent < –2 s.d. weight for age, NCHS) 1987

Philippines

The Philippines is an archipelago of 7,107 islands located off the southeastern coast of the Asian mainland. Its proximity to the equator gives it a tropical climate with wet and dry seasons. The islands are divided into three main groups: Luzon, in the north; Visayas, a scattered collection of small islands in the centre of the archipelago; and Mindanao, which is in the southern part of the country.

The country's population in 1990 was estimated at 61 million. The population is growing by approximately 2.4% per year and is heavily youth dominated, with 36% of the people below the age of 15. The population density is extremely high in urban areas; about 32% of the urban population is concentrated in the Metro Manila area.

Trends in Nutrition

The proportion of underweight children (below −2 s.d. NCHS) reported by the Food and Nutrition Research Institute (FNRI) from representative surveys fell from 39% in the mid−1970s, but has remained at around 33% throughout the 1980s. The prevalence of low weight−forage varies among regions (see second graphics page); the 1989 Operation Timbang (weighing programme for preschool children conducted annually throughout the country) showed that the prevalence of malnutrition is highest in eastern Visayas and Bicol and lowest in Central Visayas. Western Visayas, which had the highest prevalence rate of malnutrition in 1987, has consistently experienced improvement in 1989. Other regions which exhibited similar improvements include Ilocos, northern Mindanao, and central Mindanao. It should be noted that FNRI and Operation Timbang data are not directly comparable because of differences in methods.

The extent and nature of malnutrition differs by urban−rural location. Low weight−for−height or wasting, characterizes urban malnutrition, while low height−for−age or stunting, is more common among young children from the rural areas.

The infant mortality rate (IMR) fell from 60 to 41 per 1,000 live births from 1975 to 1990. Life expectancy at birth rose from 58 to 62 years during the 1970s with further improvements in more recent years.

The leading causes of death for all ages are pneumonia (also a leading cause of infant mortality), heart disease, and tuberculosis. Although preventable, diarrhoea and measles still accounted for a sizable proportion of all reported deaths, and the number of premature deaths from degenerative diseases is thought to be increasing. Respiratory infections such as bronchitis, influenza, and pneumonia were the most prevalent ailments. Approximately 60% of those affected by pneumonia, bronchitis, diarrhoea, and measles were infants and children under 5 years of age.

Economic Trends

Despite the first oil crisis, the Philippines economy performed fairly well in the 1970s due to a relatively buoyant world economy, favourable terms of trade, easy access to foreign loans, and some policy reform. Between 1975 and 1979, real GDP per caput grew by an average of 3.8% per year.

However, the economy was heavily dependent on imports and foreign capital, and did not adjust well to the economic shocks of the post−1979 period – high oil prices, high interest rates, and declining export prices. Real GDP per caput dropped by 15% from 1983 to 1985. Inflation averaged 3.4% a year between 1974−83, but grew by an average of 42% per year between 1983−85.

The country was forced to undergo a structural adjustment programme in 1984, which led to important reforms in the economy: the current account deficit was reduced from 8% of the GNP in 1982 to a small surplus in 1985. The consolidated public deficit was reduced from 5.8% of the GNP in 1982 to 1.5% in 1985.

The correction of these imbalances was done primarily through expenditure reduction, imposing a heavy cost on the poorer segments of society. Real wages fell by 40 to 50%, and employment fell in every sector except services. The open unemployment rate rose from 5.4% in 1985 to 7.1% in 1988. Government expenditures fell from 15.6% of the GDP in 1981 to 12.4% in 1984. The poverty incidence rose from 49% in 1971 to 59% in 1985. In metropolitan Manila, the increase was from 33% to 44% over the same period.

After experiencing years of negative growth, the economy achieved real growth in GDP of 5.5% per year between 1987 and 1990, and 3.1% in 1990. Inflation, which had been reduced to 4.3% a year between 1986−88, again rose sharply in 1989.

(Estimates in 1990)

Population	: 62 million	IMR	: 41
Population Density	: 205 per sq. km.	GNP US$ (Per Capita)	: 730
Population Growth Rate	: 2.39% per annum	Urban Population	: 43%

CHILD GROWTH AND SURVIVAL

Infant mortality rate (Per 1,000 live births)

Underweight preschool children (Percent below –2 s.d. weight for age)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

Debt service ratio (Debt service/exports)

FOOD

Food production index (Per caput, 1979–81=100)

Dietary energy supply (Kcals/caput/day)

57

Consumer price index (1980=100)

FPI/CPI ratio (1980=100)

HEALTH

Measles: Children

Tetanus: Pregnant women

Immunization coverage (Percent)

BCG

DPT

Immunization coverage: BCG & DPT (Percent)

Low birth weight (No. < 2.5 kgs./100 live births)

Access to potable water & sanitation (Percent)

It is estimated that the incidence of poverty at the national level dropped from 59% in 1985 to 49% in 1988. The comparable figures for Indonesia, Malaysia, and Thailand are about 39, 27, and 30%, respectively. Government revenue per head has risen since 1986, the combined effect of a rising ratio of taxation to the GDP and a rise in the GDP per caput. Government expenditure as a percentage of the GDP grew from 13.0% in 1985 to 16.4% in 1988.

The Philippines emerged from the 1983–85 crisis only to be subjected to another series of shocks. The country was significantly affected by the Persian Gulf Crisis, with its resulting increase in oil prices and reduced remittances from the Persian gulf. Overseas remittances are the country's single biggest source of foreign exchange, and the Philippines benefits significantly from remittances sent by overseas workers in the Middle East, Germany and France, and the U.S.

Food Security – National Level

Agriculture's share of the GDP was 24% in 1989, relatively unchanged since the 1960 level of 26%. About 40% or approximately 11.8 million hectares of total land area is devoted to agriculture. Landholdings are markedly inequitable, with 10% of the population owning 90% of the land. Most Filipinos who depend on farming for their livelihood do not own the land they cultivate; one–third of these are tenant farmers who are forced to pay high cash rents or relinquish as much as two–thirds of their crops to absentee landlords. The government proposed land reform measures in 1988 but the process of actual redistribution is slow and thus far has had little impact.

Food production remained virtually stagnant during the 1980s; the per caput food production index fell by 17% between 1980 and 1988, although this has slightly recovered since then. Rice and corn are the two main staple foods in the Philippines, accounting for roughly 75% of the total calories consumed by those in the lowest–quartile income bracket and 50% of their food budget shares. Rice is the preferred staple, although corn is consumed in relatively greater quantity by poorer households, especially in the southern islands. Rice yields have doubled since the adoption of high–yielding seeds in the 1970s. Most rice land has already been switched to high–yielding variety seeds, and further increases in yields are not expected without the development of a new generation of modern varieties. However, a high percentage of corn area is still planted with traditional varieties, and there is a larger chance of substantially increased yields of this crop.

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The Philippines had been self−sufficient in rice since 1974, but had to rely on imports for years when natural calamities like tropical typhoons induced lower production.

Food Security – Household Level

Calorie availability increased from 1,990 per caput in 1974 to 2,421 in 1980. This fell in the mid−1980s, mainly due to the economic crisis, to a level of 2,260, but has recovered since then. The 1990 calorie availability per caput of 2,450 is slightly higher than the levels at the start of the 1980s.

The average Filipino family spends 50% of its income on food, with rural families spending slightly more than their urban counterparts, 56% and 45%, respectively. Poor families in both sectors spend 60% of their income on food. Yet low incomes make even such high percentages of expenditure inadequate to ensure a minimum diet.

The FNRI (1990) estimates show that the average per caput food expenditure required for rural areas in 1987 was P10.14, while that of the urban areas was P13.47. Using these figures as reference, the FNRI survey revealed that an estimated 70% of households in both urban and rural areas were below the food threshold.

Preschool children and pregnant and lactating women were found deficient in all micronutrients. Intakes of iron and vitamin A among preschool children are below the recommended levels by 13% and 11%, respectively. Iron and vitamin A intake among pregnant and lactating women is even lower; pregnant women are deficient by 38% and 34%, while lactating women are short by 45% and 59%, respectively.

The majority of the food insecure are located in the rural areas; the sugar workers of Negros were especially hit by the crisis in the mid−1980s. Higher cost of production, coupled with depressed prices of sugar, left them with little or no income.

Health and Control of Infectious Diseases

The economic crisis of the 1980s manifested itself in lower social services. Between 1983−1985, the government reduced the budget share of social services to 19% and that of economic services to 29%, while substantially raising the allocation for debt servicing. Nearly one−third of all government resources went toward defence and debt servicing.

The share of health services as a percentage of total government expenditures averaged 5% between 1976 and 1990. However, real per caput expenditure averaged US$4.00 per year between 1979−82 and then dropped about 10% to US$3.60 between 1983−85 (1987 US$), but recovered to about US$4.10 between 1986−89. A study by Intercare (1987) indicates that the government financed, largely from tax revenues, only 26% of the total health care expenditure in the country in 1985, down from 33% in 1981. The study also shows that, between 1981 and 1985, government spending on preventive care averaged 33% of the total government health budget, while spending on curative care was 57%; the rest was used to cover administrative costs.

WOMEN AND CARE
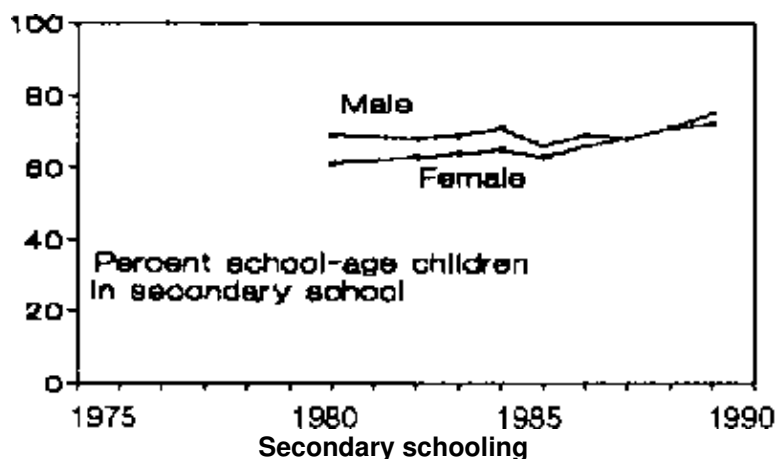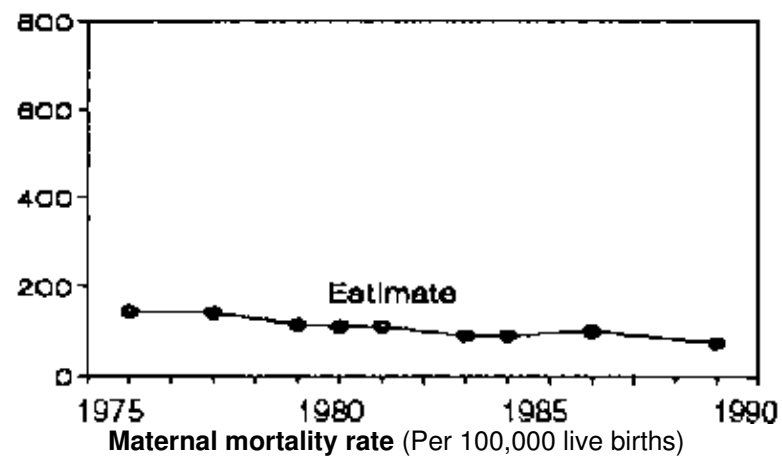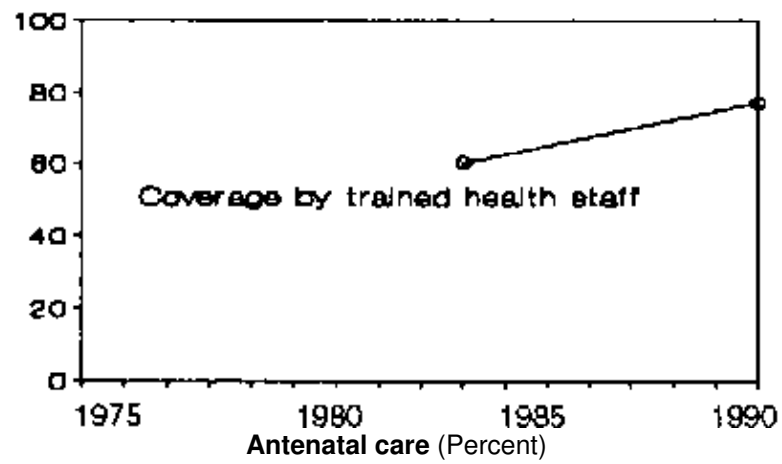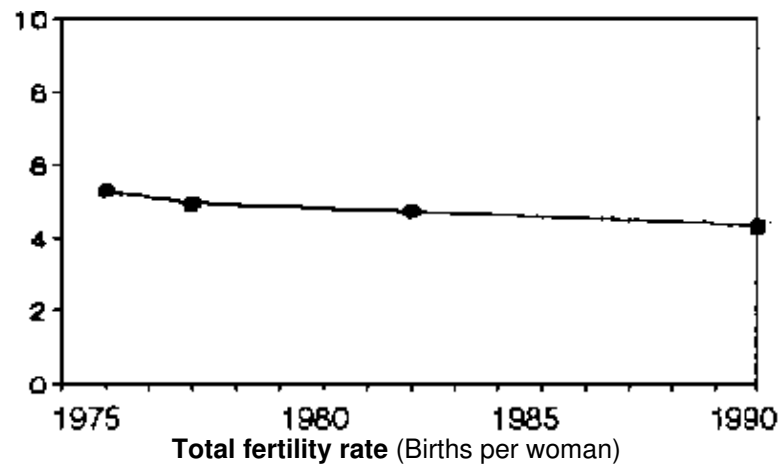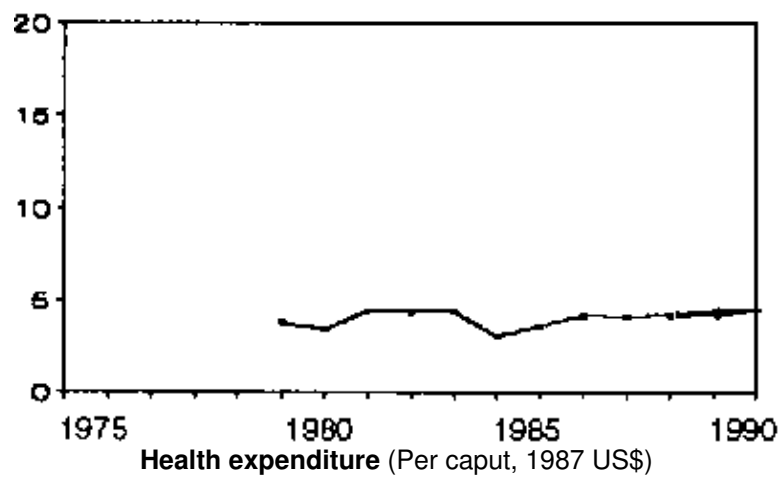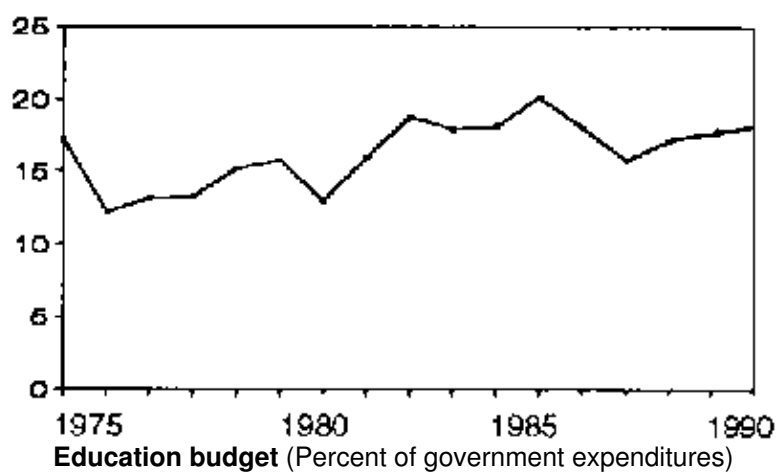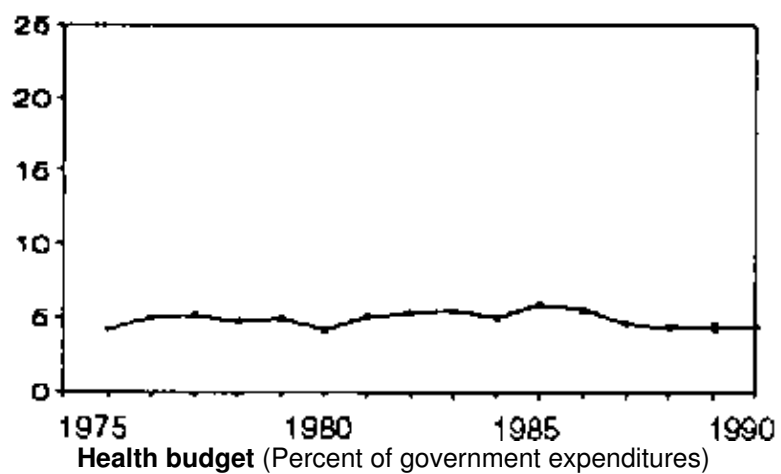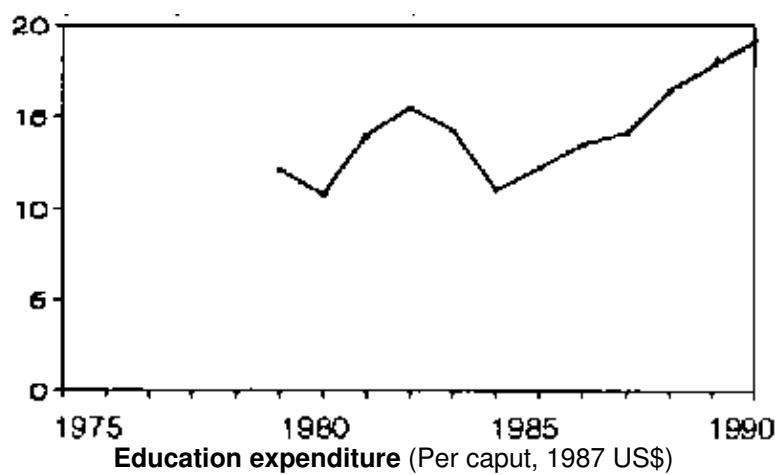
Secondary schooling

Total fertility rate (Births per woman)

Coverage by trained health staff

Antenatal care (Percent)

Estimate

Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

Health budget (Percent of government expenditures)

Education budget (Percent of government expenditures)

TRENDS REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN
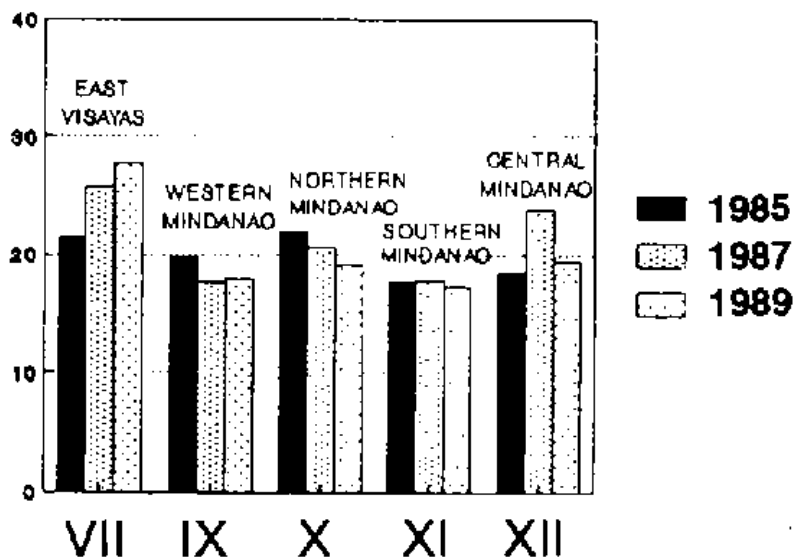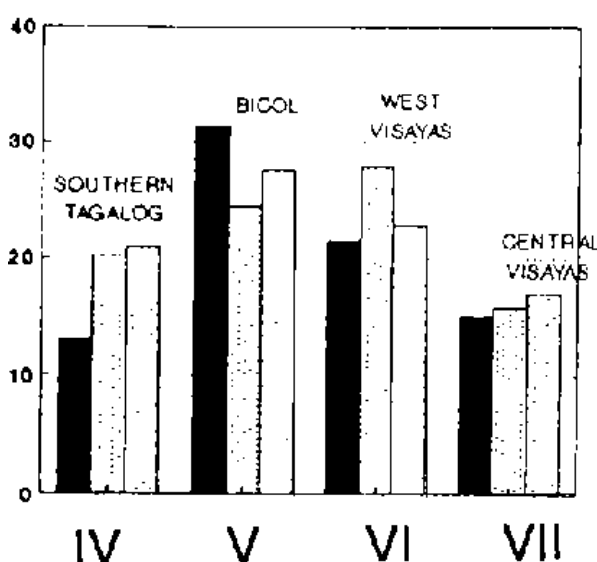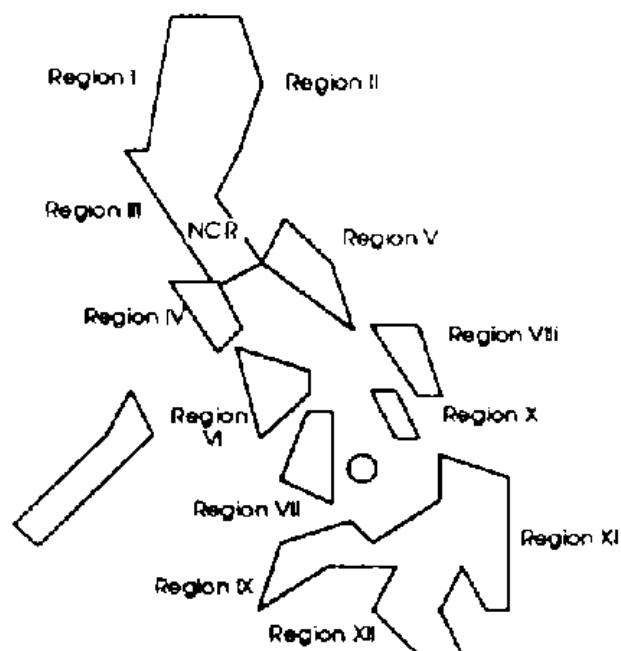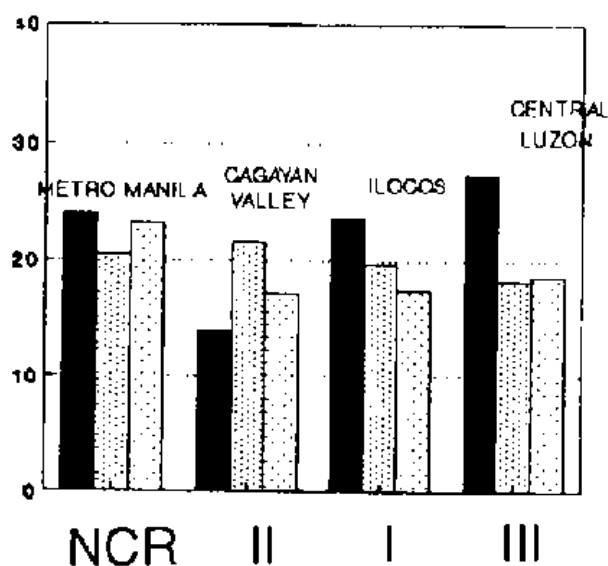
Prevalence of underweight children, 0–71 months (Percent < 75% weight for age, Philippine standards) OPT–National child weighing programme

The allocation of available resources has however become more rational and equitable. It is now based on poverty and population data at the provincial and regional levels. About 65% of total resources go towards public health care and 35% towards hospitals. Hospital utilization rates are the criteria for budgetary support for individual hospitals.

A more preventive orientation has been adopted in the maternal and child care programme through the interrelated activities of immunization, family planning, and the control of diarrhoeal and respiratory infections. The coverage of the immunization programme rose from 25% of all targeted infants in 1985 to 80% in 1989. The immunization rate for children by their first year for DPT and measles has shown a consistent improvement; from 45% in 1986 to 88% in 1990 for DPT, and from 55% in 1985 to 85% in 1990 for measles.

Trends in the immunization rates of pregnant women against tetanus show an increase from 22% in 1985 to 43% in 1990. Diarrhoeal diseases, which are exacerbated by problems in environmental sanitation and lack of access to clean water, are now better controlled through the wider use of oral rehydration therapy. The number of children under 5 years of age who were reported as treated with ORS increased from 652,000 in 1988 to 942,300 in 1989.

Nearly two–thirds of the Philippine population is served by water supply systems. In metropolitan Manila, up to 92% of the population is reported to be supplied by water systems, but, in other urban areas, only 73%, and, in rural areas, only 53% of the area is reached by such systems. The rest have to resort to such other sources as open wells, and rivers and streams. Low–income households are particularly vulnerable to shortages in water supply.

Women and Care Factors

Women of child–bearing age comprise 44% of the total female population, and a Filipino woman gives birth, on average, to four children during her lifetime, indicating a relatively high degree of reproductive stress. Fertility in the Philippines has declined in the last decade. Several studies have found gender and birth order to be important determinants of health and nutritional status within the household. Higher birth–order children may also suffer from inadequate calorie allocation because of the increased burden on family resources and less parental care and attention than their older siblings received at a certain age.

Female literacy in the Philippines is one of the highest in the developing world. More than three out of four females of school age are in secondary school and there is virtually no gender difference in access to education. Thus participation of females in the labour force is moderately high.

Pregnant women do not receive adequate health care, and almost half of this group (estimated to be one million annually) are considered to be affected by anaemia and/or undernutrition. The proportion of pregnant women who had access to antenatal care by trained health personnel, however, increased from 60% in 1983 to about 80% in 1990. This partly explains the declining trends in maternal mortality rates, which was estimated at 74 per 100,000 live births in 1989, compared to 143 in 1975. Low birth weight was estimated to be 15% in 1985, higher than Indonesia (14%), Thailand (12%), and Malaysia (9%).

The prevalence of goitre among females increased considerably in 1987. The prevalence rate for pregnant and lactating women is particularly significant; it ranged from 12.4 to 17.6% for pregnant women, and 5.6 to 10.7% for lactating mothers. The FNRI survey indicated that vitamin A deficiency, as manifested by night blindness and Bitot's spots, dropped substantially in 1987, especially among children 6 months to 6 years old.

The proportion of the population afflicted with anaemia has risen from 27% in 1982 to 37% in 1987. The worst affected are children age 6 to 11 months old and lactating women, with a prevalence rate of 71% and 51%, respectively.

Conclusions

The Philippines experienced a serious economic decline starting in the early 1980s. The country which, in many respects, was ahead of its neighbours in the early postwar period (it had twice the GNP per caput of Thailand and Indonesia in the 1950s) has now seen its position deteriorate relative to its neighbours. Poverty levels have worsened; resources for health and other social services, and in agriculture have been strained due to budgetary problems and a high population growth rate.

The nutritional improvements in the mid to late 1970s, and early 1980s were thus negated because of the economic crisis of the 1980s. However, there are signs of improvement towards the end of the 1980s decade, such as those exhibited in Mindanao, in West Visayas and Ilocos and Cagayan Valley. The deterioration in nutrition in the urban areas is however, cause for concern. Future nutritional improvements hinge on the ability of the government to address the poverty issue. Future urban development programs would likely be key. In 1990, close to half (43%) of the country's population are located in the urban areas.

The country has had strong experience in nutrition programs with tested delivery systems at the grass–roots level. In order to achieve substantial reduction in malnutrition, these programs need to be sustained side by side with the poverty alleviation schemes.

Thailand

Thailand, a country of 513,000 square kilometres, is situated on the Indochina peninsula of Southeast Asia. The population was estimated at 56 million in 1990 when it was growing at an annual rate of 1.8% (as compared to 3.2% in 1970). Population density is 109 persons per square kilometre. Life expectancy has risen from 60 to 63.2 for males and 66 to 67.3 for females during the period of 1980–1990. The nation's total

fertility rate has also dropped to only 3.0 births per woman in 1990 from 5.2 in 1975, while the crude death rate fell from 13.5 per 1,000 in 1960 to 7.0 per 1,000 in 1990. Along with the significant declines in child mortality rates, these demographic transitions have created a changed picture in terms of Thailand's population age distribution from that of a broad based shape in 1970 to columnar based form at present.

Trends in Nutrition

Thailand has made great strides in improving the nutrition and health status of its population during the 1980s. Nutritional surveillance reports from the Nutrition Division of the Ministry of Public Health (MOPH) indicate that Thailand has achieved dramatic reductions in the proportion of underweight children. According to the 1987 DHS survey (which uses NCHS standards), the percentage of underweight children (under 5) was estimated at 22% in 1987. This was significantly lower than an estimated 36% in 1982. The estimated prevalence of underweight in 1990 was about 13%, amongst the lowest in Asia. The estimates for 1982 and 1990 prevalences are given based on NCHS standards recalculated from the national nutrition surveillance data of the Ministry of Public Health.

The level of underweight prevalence in children, however, varies substantially between regions, with the Northeast region having more than twice the rate of the Central or Eastern regions. The urbanized Central region has consistently had the lowest rates of underweight children, although the problems in the urban slums are considerable.

Significant gains have been made in other health outcome indicators. Infant mortality rates have been reduced from 51 per 1,000 in 1980 to 27 in 1990. Boys have a slightly higher mortality rate than girls both in infancy and early childhood.

Studies in Thailand from 1980–1988 indicate prevalence rates of iron deficiency anaemia to be as high as 30–43%. A survey in 1986 found iron–deficiency anaemia among pregnant women to be highest in the Eastern region (35%) and lowest in the north (20%). An estimated 30% of the under–fives were anaemic in the 1988 national nutrition survey. The prevalence of anaemia in school–age children and pregnant women from the hospital–based data has been reduced from 27% for both groups in 1988 to about 18% in 1990. People in the south seem to have the highest prevalence of anaemia; this may be related to the climatic, occupational, and life style conditions conducive to higher hookworm infestation.

The Northern region and some provinces in the Northeast are categorized as goitre–endemic. A Nutrition Division Report in 1991 indicated that the prevalence of goitre in school–age children might be as high as 38% in the 10 upper Northeast provinces and 26% in 11 Central provinces. A national iodine deficiency disorders (IDD) control programme has been underway since 1989. Current control measures include distribution of iodized salt, iodate–concentrated stock solution drops in community wells and drinking water tanks at school and at home in villages where goitre rates exceed 5%.

The percentage of the population suffering from vitamin A deficiency seems to have been significantly reduced during the 1980s. A 1977 survey in Ubon Ratchathani Province in the northeast demonstrated that 17% of preschool children showed deficient serum retinol levels (less than 10 mcg/dl) and as many as 70% of the children studied had marginal serum vitamin A (10–20 mcg/dl). Results in school–aged children were 22% for deficient and 51% for marginal levels. In 1987, the prevalence of deficiency level and marginal level in school children in the same areas was reduced to 1.3% and 16%, respectively. In a 1990 survey in the North and Northeast, marginal serum retinol levels between 10–20 mcg/dl were found in 14% and 7% of the preschool children in the dry and rainy seasons, respectively, the variation being due largely to an increase in the intake of vitamin A–rich foods during the latter period.

> *Note:* Based mainly on *Nutrition and Health in Thailand: Trends and Actions (1992)* by Y. Kachondham, P. Winichagoon and K. Tontisirin, Institute of Nutrition, Mahidol University, Thailand.

(Estimates in 1990)

Population	: 56 million	IMR	: 27
Population Density	: 109 per sq. km.	GNP US$ (Per Capita)	: 1,420
Population Growth Rate	: 1.8% per annum	Urban Population	: 23%

CHILD GROWTH AND SURVIVAL

Underweight preschool children (Percent below –2 s.d. weight for age)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

Debt service ratio (Debt service/exports)

FOOD

Dietary energy supply (Kcals/caput/day)

Food production index (Per caput, 1979–81=100)

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Consumer price index (1980=100)

FPI/CPI ratio (1980=100)

HEALTH

Tetanus: Pregnant women

Measles: Children

Immunization coverage (Percent)

Population with access

Access to local health care (Percent)

Low birth weight (No. < 2.5 kgs./100 live births)

Access to potable water & sanitation (Percent)

Although the nutritional trend is improving fast, nonetheless due to uneven prosperity in the society, inadequate consumer protection and environmental dangers, new problems may now emerge; nutrition–related health threats may coexist with diseases of affluence. Heart diseases, the number one killer in mortality statistics since 1960, and hypertension are likely to be associated with diet especially among the well–to–do class. Certain kinds of cancer maybe related to over–consumption of fat, and contamination of toxic substances in the food chain, as a result of uncontrolled environmental hazards and rapid industrial development. An epidemiological transition is occurring, moving from problems of infectious and parasitic disease and nutritional deficiency to chronic and degenerative diseases of adult life such as heart disease, cancer and stroke.

Economic Trends

The late 1980s witnessed Thailand's emergence as one of the fastest growing economies in the world, with GNP growing by 11% and 10.5% in 1988 and 1989, respectively. In less than 30 years, Thailand has been transformed from a subsistence agrarian society into a rapidly industrializing free–market economy. Guided by six Economic and Social Development Plans in the past 30 years, the economy and living standards of the population have risen greatly. Between 1961 and 1990, per caput incomes rose by nearly 10% per year.

The road to rapid growth was marked by severe problems especially in the mid–1980s as a result of worsening budget and trade deficits, low international reserves and high debt service ratios. The Thai Government reacted to this economic decline by initiating major structural reforms in the economy. Emphasis was given to switching the economy from dependence on agricultural exports to one with a strong export–oriented manufacturing base. Market liberalization policies were followed to deregulate the economy and offer attractive investment incentives to foreign companies which were facing rising costs domestically, especially from Japan, Taiwan, Hong Kong, and Singapore. This strategy was successful, and by 1988 the agricultural products share of exports had dropped to 25%, from a level of 48% in 1980, while manufacturing's share climbed from 33% to 68% during the same period. The debt service ratio has been continuously reduced from 21.9% in 1985 to 9.9% in 1989, and, the economy has gone from 3.9% of GDP treasury deficit to 3.7% treasury surplus.

However, Thailands's income distribution and poverty profiles are of major concern. Although over the past two decades household income has steadily increased in real terms, the Gini coefficient increased from 0.43

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in 1976 to 0.50 in 1986. People engaged in the non−agricultural sector earned about 9 times more than those in the agricultural sector in 1990 (rising from 5 times more in the early 1970s). Over half of the country's poor live in the Northeast region which contains just one third of the total population. Incidence of poverty is highest in the Northeast and lowest in Bangkok and the Center region. The expeditious introduction of predominantly capital−intensive, large−scale technology has failed to benefit the majority of semi−subsistence farmers and those urban poor who moved from the rural areas. The future economic gains will also more likely benefit the already better−off households, reliant more on non−agricultural occupations, as a result of foreign capital inflows which largely finance development in non−agricultural activities.

Food Security − National Level

The present interplay between the country's natural resources, application of technology, government policies, and agricultural workforce has propelled Thailand's food production to a level that consistently exceeds annual domestic consumption. Consistently in its history, Thailand's exports of agricultural commodities and food products have far exceeded food imports in value. In 1988, Thailand had a positive agricultural balance of US $5−billion, exporting produce worth $8−billion and importing $3−billion worth.

Thailand is not only self−reliant in rice, but also one of the world's largest exporters (35% of the world export market in terms of quantity, ranking first in 1986). Rice is the main staple food of the Thai people and also the major subsistence and cash crop for the majority of farmers. In the 1988/89 cropping season, rice output was 21.1 million tons. Rice production, domestic consumption, and exports increased in the 1980s, the proportion remaining approximately two−thirds for domestic consumption and one−third for export. Production increases were maintained through expansion of low yield marginal land, which has been brought into agricultural use. Thailand still has tremendous potential to produce more, either for domestic consumption or export, provided that farmers get the right incentives with special emphasis on alleviating marketing and pricing constraints.

Thailand is also the world's largest exporter of cassava, with 89% of the world export market in 1986. Other major food crops whose estimated value exceeded 10 billion baht (US$ 400 million) during 1984−1990 included maize, sugarcane, and combined oil seeds such as soybean, coconut, groundnut, etc. Most of these agricultural products were for export and indirect consumption in terms of animal feed.

One of the significant changes in food crop production in the 1980s was soybean. Soybean consumption demand in terms of oil and cake for animal feed increased sharply during the past decade. Soybean production tripled as a result of an import substitution policy, from 113,000 tons in 1982/83 to 517,000 tons in 1988/89, but it is still inadequate to meet the domestic demand. Changing food habits in urban areas has also accelerated the demand for wheat products. Thailand is trying to produce her own wheat, but production is minimal compared to imports that tripled in the 1980s.

WOMEN AND CARE
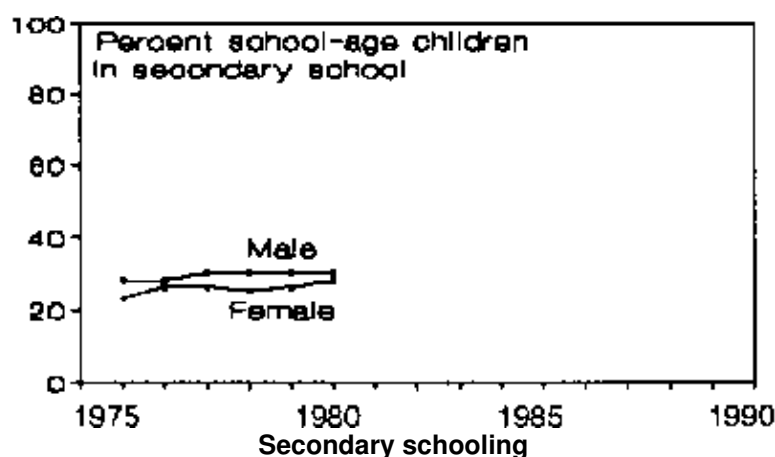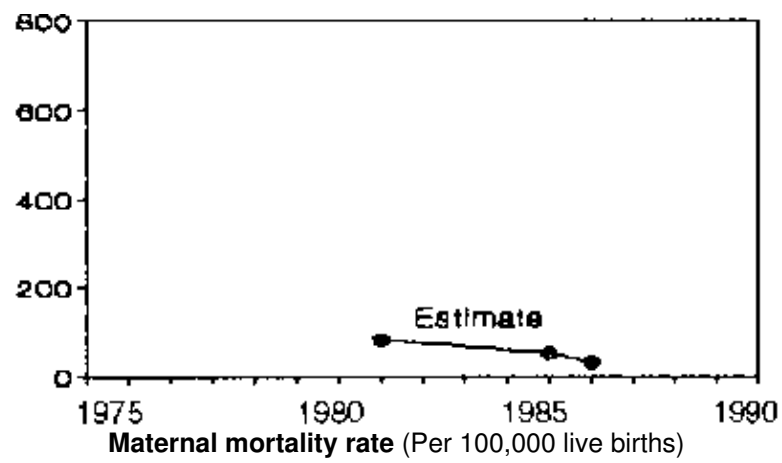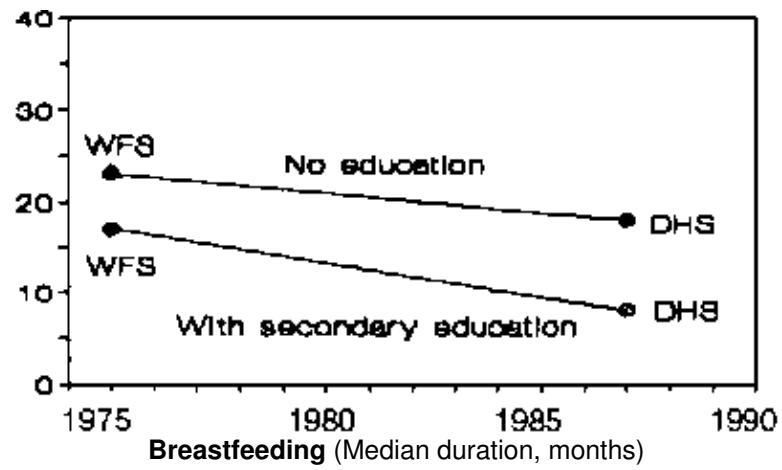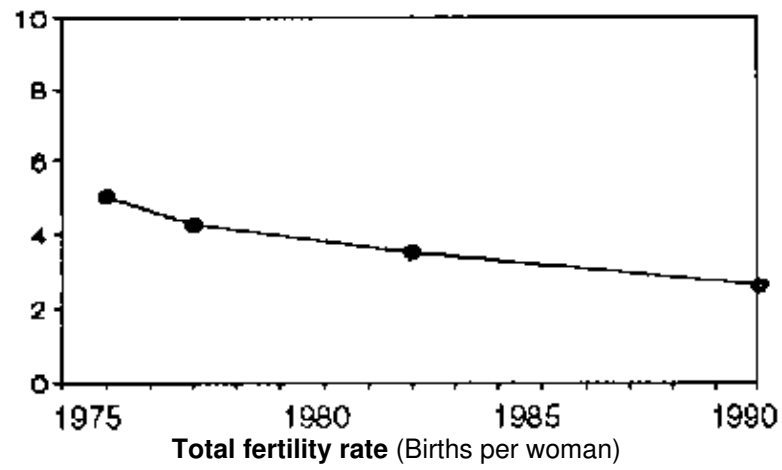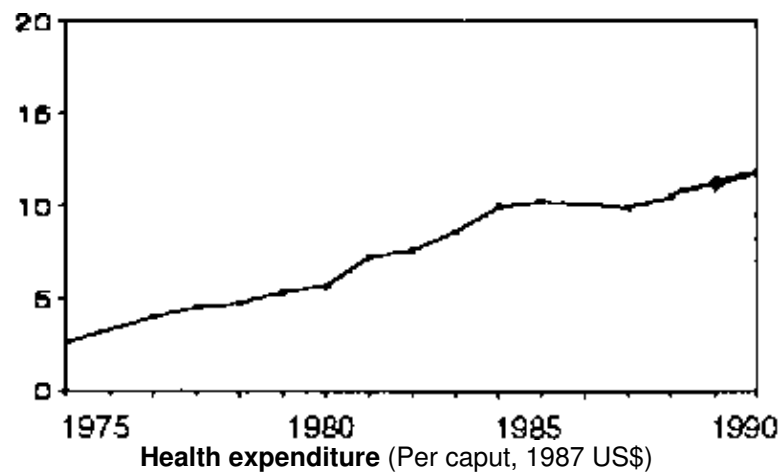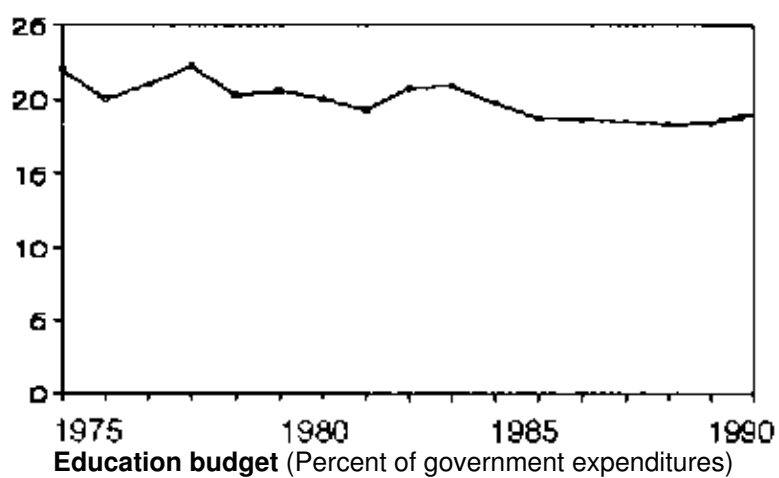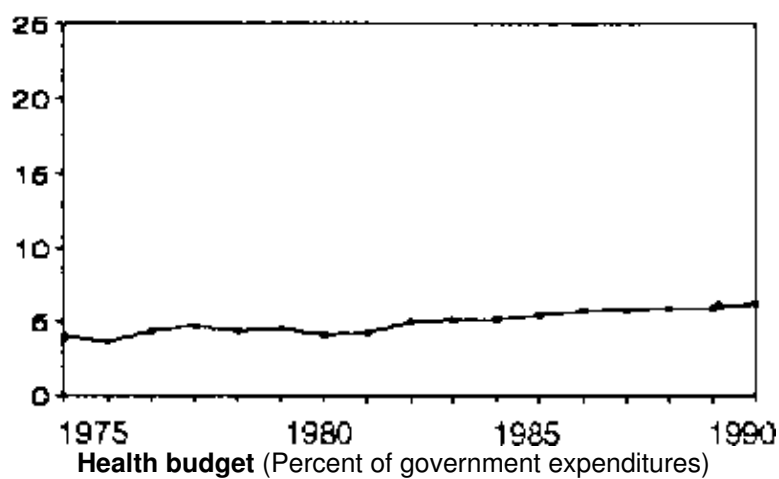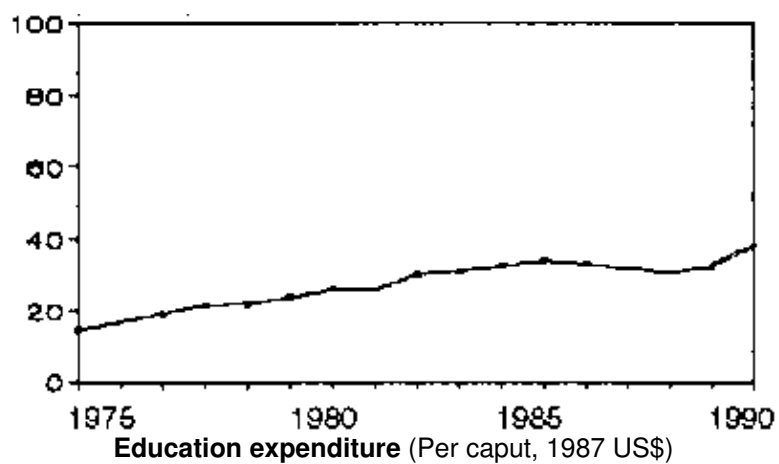
Secondary schooling

Total fertility rate (Births per woman)

Breastfeeding (Median duration, months)

Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

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Education expenditure (Per caput, 1987 US$)

Health budget (Percent of government expenditures)

Education budget (Percent of government expenditures)

TRENDS REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN
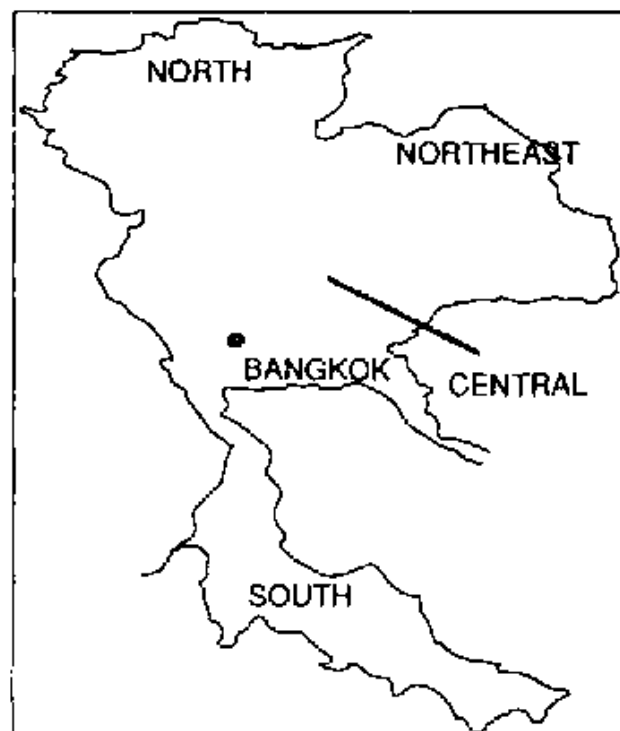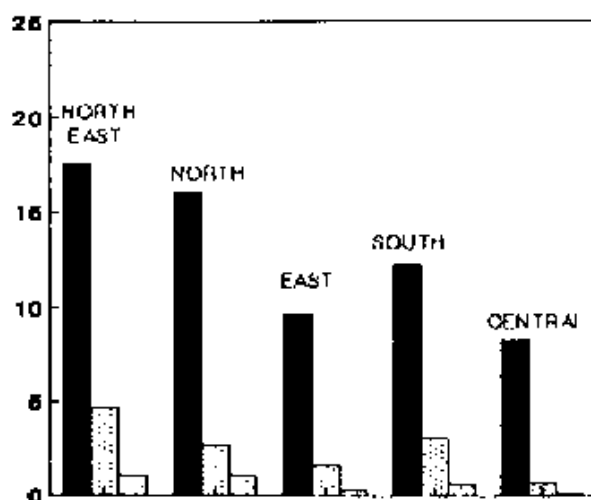
Prevalence of underweight children, 0–59 months (Percent < 75% weight for age, Thai standards)

The latest estimates from food balance sheets put caloric supply for Thailand at 2,290 kcals/caput/day and protein at 49 g per caput. Trends over the last two decades show that calorie availability has been stable at 2,200–2,300 kcals/caput/day. Overall, consumer prices rose by an annual average of 5% between 1980–90. The late 1980s saw steeper rises in the inflation rate, partly as a result of the high rise in food prices.

Food Security – Household Level

One of the issues faced by Thai planners has been how to translate the success in food production into higher food consumption. Actual food consumption (in contrast to food balance sheets data), derived from the 1986 National Nutrition Survey (MOPH), put calorie intakes at 1,770 per caput, 92% of Thai RDA, and protein intake at 50g (125% of RDA). Average intakes of micronutrients are generally adequate: 126% of RDA for iron, 231% for vitamin A, 3,135% for vitamin C, but inadequate for calcium at 61%. Meat consumption increased by more than 50% in the last 25 years, implying trends towards diversity in the diet.

Around 30% of household income is, on average, spent on food, one of the lowest in Asia, indicating widespread food security. Rice policy in the 1980s has been an overriding governmental concern as rice production is a major employer of a large part of the country's total labor force. Rice also remains the primary source of calories, ranging from 40 to 90% of calorie intake. The government has attempted to keep domestic rice prices low in order to benefit consumers, although this, in general, has hurt producers, particularly the large commercial farmers. Many small farmers subsist on paddy they produce, while others are net purchasers of rice.

Health and Control of Infectious Diseases

Health and nutrition became high priorities in the Sixth Five–Year Plan (1986–91). Government spending on social service programmes such as health, education, housing, and social security accounted for 30% of total expenditures in 1990. Of these four categories, education received the biggest share of spending (63%), with health at 20%. Although relatively low, health expenditures have increased from 4.2% of total government expenditures in 1981 to 6.3% in 1989, reflecting greater prioritization by the government. Social expenditures (on education and health) have not been evenly targeted to all four regions in Thailand, consistently lagging behind in the North and Northeast. The present economic plan is also attempting to remedy past imbalances in social expenditures among various regions. A recent initiative called the "Green Northeast" has been launched to tackle poverty problems in the Northeast, the poorest region in the country.

The health care system in Thailand is not designed so that the government pays all health costs, although poor families use the health care system free of charge. In the cities, the private services play a very important

role. In rural areas, however, the majority of the population use government–run health care services extensively. The health care system has expanded considerably in the last twenty years, making extensive coverage possible. Approximately 80% of the rural population in Thailand has access to health services.

Under–utilization of the health care system in rural areas led to the reformation of the health care system along the lines of primary health care in 1977–1981. Aimed at expanding the coverage of rural poor, the National Primary Health Care Program trains community–level workers to disseminate health information and become acquainted with the treatment of common diseases. These projects have had varying degrees of success.

The unevenness in distribution of services between rural and urban areas is reflected in relative expenditures. For the period 1982–86, an emphasis on rural development led to the PHC section of the Ministry of Public Health (MOPH) budget share increasing from 49% in 1981 to 55% in 1988, compared to the allocation for secondary and tertiary health care which decreased from 52% to 46% in the same period. The MOPH budget only accounts for 18% of total health expenditure; the largest proportion comes from private financing, which in most cases is spent on secondary and tertiary levels of medical services.

The country saw a significant improvement in the coverage of safe water and sanitation facilities in the early– to mid–1980s. Access to safe water increased from 66% to 72% between 1983 to 1988, while access to sanitation facilities increased from 45 to 62% in the same period. There has been less improvement in the late 1980s, with coverage remaining virtually constant between 1988 and 1990. Immunization has also improved significantly. Due to a widespread immunization campaign, 60% of infants under 12 months have had measles vaccination while 80% have had DPT vaccinations.

Women and Care Factors

Women have traditionally had a very strong role in Thai society, although they may still represent a disadvantaged group of society. Education statistics reflect some anti–female discrimination, although the figures are more reassuring than in many other developing countries. Thailand has only recently raised the number of years of compulsory school education from 4 to 6 years. As a result, many Thais, especially women, have had an education up to the fourth grade, but not beyond. In 1980, 59% of adults had only a fourth grade education. Of women from the ages of 20 to 44, only 17% had gone beyond the fourth grade, while 70% had had a fourth–grade education.

The Ministry of Public Health has as one of its aims to provide good health services to mothers and children. Approximately 80% of the births since 1982 have had some prenatal care, almost all administered by trained medical personnel. However, Thai mothers living in rural areas avail themselves of prenatal services much less frequently than their urban counterparts. Approximately 74% of the rural mothers received at least one prenatal test, as opposed to 94% of the urban mothers. Moreover, there exist wide regional disparities in the use of prenatal care facilities by women. In Bangkok, 96% of the mothers had some prenatal care, while the lowest use of prenatal care could be found in the South, 66%. The North, Northeast, and Central regions had figures of 72%, 76%, and 85% respectively.

Throughout the country, trained personnel attend about two thirds of all births. Traditional mid–wives deliver about one fourth. About 7% of births occur with either some other form of help, or none at all. In contrast, in a national survey in 1969, 57% of the women who replied said that their latest birth had been attended by a traditional mid–wife, and only 28% indicated that trained health personnel had delivered their last baby. These figures show that the situation in which births occur has improved greatly.

Thailand has relatively low maternal mortality rates, with a reduction during the 1980s from 81 per 100,000 in 1981 to 30 in 1986. There has been a slight improvement in the incidence of low birth weight – from 9.5% in 1989 compared to 9.0% in 1991. In 1991, the regional incidence in the Southern, Central, Northeastern, and Northern regions were 9.5%, 9.2%, 9.4%, and 10.2%, respectively. A comparison of infant feeding practices using data from the World Fertility Survey (1975) and the Demographic and Health Survey (1987) shows that women with secondary schooling breastfed for a median duration of 17 months in 1970s, dropping to 8 months in the 1980s, while women without any schooling de creased the length of time they breastfed from 21 months in 1980 to 15 months in 1987.

Nutrition Policies and Programmes

During the Fifth Five Year Plan (1982–86), the government instituted a nutrition intervention programme – the Food and Nutrition Plan – as part of its Poverty Alleviation Plan. Components included: (i) nutrition

surveillance programmes, (ii) nutrition information, education and communication, (iii) production of nutritious foods in the community through kitchen gardening, growing fruit trees, cultivation of legumes and sesame, (iv) supplementary food production and supplementary feeding programme at village–level through village volunteers and womens groups, (v) school lunch programmes covering 5,000 schools in the poverty areas and food fortification and distribution through health infrastructure and private channels, and (vi) training of village–level health workers.

The Poverty Alleviation Plan included a rural investment programme targeted at high poverty concentration areas, including the Northeast and the South. There were four key components: (i) rural job creation, (ii) village development projects or activities, (iii) provision of health facilities, health and nutrition services, clean water supplies, and legal services, and (iv) agriculture production programme which covered nutritious food production, upland rice and soil improvement projects.

Conclusions

The rates of nutritional improvement in Thailand of about 2 percentage points a year reduction in underweight children over the last decade is remarkable. It was achieved by a combination of a large reduction in poverty, a 10% a year increase in incomes, and a strong national commitment towards nutrition from the highest levels of government to the village level. Every year since 1982, growth monitoring of 1–2.6 million preschool children was recorded. In addition, from the early 1980s, the poverty alleviation program, targeted towards the lagging regions and the lowest income groups, was successful, although there were some regional disparities in improvements (the underweight prevalence in the Northeast region is still more than twice that of the rest of the country).

Although economic growth has been a key factor in the rapid improvements in nutrition, the targeted nutrition and health actions delivered mainly with wide–scale community participation were largely responsible for the sustained attack on chronic undenutrition. The conscious and explicit effort of including nutrition objectives from the highest level of policy planning down to communities were among the key ingredients of success. Put in an historical perspective, the explicit strategies for combatting malnutrition in Thailand required approximately 10–15 years, of which 6 were required to create awareness and muster political support from central planners and policy makers. This was followed by 5 to 9 years of developing effective managerial structures and functions to integrate national and community strategies, and formulating detailed operational plans and objectives based on experiences. Thailand's scientific and academic community which exhibited a strong and sustained interest in nutrition contributed substantially by guiding in the planning process. If the trends continue, it is likely that Thailand will eliminate undenutrition as a public health problem (now estimated to affect 13% of preschool children) before the year 2000.

Egypt

Egypt has the largest population and the second largest economy (after Saudi Arabia) in the Middle East. Egypt's population in 1991 was estimated at 58 million, 15% of whom are children below the age of four. The population growth rate fell from 2.8% in 1985 to 2.5% in 1991.

The country's arable land is quite limited at less than 3% of the total area, and thus nearly 45% of the population lives in the urban areas. A majority of the urban population is concentrated in two biggest cities of Cairo and Alexandria.

Trends in Nutrition

Comparing data from national surveys in 1978 and 1988 indicates that the prevalence of underweight children (6–36 months age group) fell from around 21% to 14% over this period. These figures were based on nationally representative surveys from the CDC/Egypt Nutrition Institute and DHS. For comparability, data from the two surveys were recalculated to a common age group of 6–36 months old. A more recent survey done by CAPMAS and PAPCHILD in 1990 also indicated that 10% of children (0–59 months) were underweight, a prevalence level that is generally similar to the 1988 DHS survey.

Moderate improvements were observed in many parts of the country, although the rates of change varied considerably across regions (see second page of graphics). Upper rural Egypt, the region which was most affected by malnutrition in 1978 improved the least by 1988. On the other hand, the urban governorates cut the prevalence of underweight children by nearly half over the 10–year period.

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The country's infant mortality rate (IMR) declined significantly from 138 per 1,000 in 1970 to 66 per 1,000 in 1990. A disaggregation shows that around 13% of this fall was accounted for by neonatal mortality while a larger percentage (31%) was due to post neonatal mortality, which have shown a declining trend in the last 12 years, especially after 1984.

Regional variations in infant mortality rates reflect patterns similar to the prevalence of underweight children. The risk of death is five times higher in rural areas than in urban and 4.7 times greater in Upper Egypt than in the rest of the country. Infant and child mortality rates are significantly higher for girls than for boys. This may indicate greater care for boys than for girls in the infancy and childhood period. Life expectancy at birth is around 60 years in 1990.

The leading cause of death in infancy according to vital statistics was diarrhoea and other intestinal diseases, which are responsible for more than half of all deaths over the last two decades. Acute respiratory infection ranks next to diarrhoea as a leading health problem in the under five children.

There are no nationally representative data on the percentage of low birth weight babies. However, regional and small studies over the last two decades show that around 12% of babies were born below 2.5 kilograms; this rate was found to be particularly high among adolescent mothers.

Anaemia has been a crucial health problem in the 1970s and 1980s. It is most prevalent among the urban, low–income classes in Cairo and Alexandria. Moreover, an anaemia problem of major proportions exists among lactating mothers in Egypt and was found to be relatively high in rural areas for all mothers. The prevalence rate of iodine deficiency disorders (IDD) measured by external signs of goitre was 6.7% in 1991.

The results of the different surveys indicate a growing prevalence of overweight and obesity in preschoolers in the 1980s compared with the 1970s. This tended to level off by 1987.

> *Note:* Based mainly on *Review of Trends, Policies and Programs Affecting Nutrition and Health in Egypt* by H. Nassar, W. Moussa, A. Kaml, and A. Elminiawy. Cairo University–Institute of Nutrition–Aishams University (1992).

Economic Trends

Egypt had a per caput GNP of US$610 in 1990, having followed a pattern of development which concentrated growth in a few sectors and geographical regions, such as those in Cairo and Alexandria. These economic policies involved the protection of the urbanized sector of the economy at the expense of the rural poor. The agricultural and rural sectors were relatively neglected, accounting for the increasing urban–rural gap in per capita incomes. In the mid–1980s, rural incomes, on average, were only a third of urban incomes, and this differential has been increasing. The biases in investments explain to a large degree the wide regional differences between Upper and Lower Egypt, as well as between the urban governorates and the rest of the country.

After experiencing rapid economic growth – averaging 9% in the late 1970s – Egypt's economic position started to deteriorate in 1981, when the oil–related sources of foreign exchange started to fall. From 1985 onwards, the country faced significant difficulties in covering its debt service obligations. External debt increased to around US$46 billion in 1991, placing Egypt among the five countries with the highest debt to GDP ratio.

Egypt experienced an economic downturn in the late 1980s, with real GDP growth rates averaging less than 3%. The curtailment of foreign aid, remittances from overseas workers, and revenue from oil earnings put increasing pressure on the government's ability to sustain its social polices and programmes. Since 1986, the Egyptian Government has been gradually implementing structural reforms to reduce its deficit imbalances. While some of this may be accomplished by reducing inefficiencies in the current social programmes, other cuts in expenditure will place the poorer segments of the population at increasing risk.

Food Security – National Level

In assessing the country's food security situation, one needs to distinguish between total food availability and the domestic supply of food in the country. The government's exchange rate and trade policies encouraged imports of food, particularly wheat, and led to a relative decline in agricultural exports. The end result was a serious deterioration in the country's ability to feed itself. Production was less than a quarter of the consumption of wheat in 1988, less than a third for vegetable oil and lentils, and less than two–thirds for

maize and chicken.

The result was a high dependence on food imports (food aid mainly from the U.S.), which became the instrument for securing domestic food supply. Food aid's share in total wheat imports increased from 0% in 1970 to 49% in 1978, falling to about 21% in 1988. In spite of the decline in food self–sufficiency in Egypt, food supply increased in 1990 compared with 1970. This was achieved at a high cost, however, because of the drain in foreign exchange from food imports.

The agricultural sector accounts for 19% of GDP and employs almost a third of the labour force. Except for 1984–85, food production increased at a moderate pace between 1980–87. In the early 1970s, Egypt was a net food exporter. However, the government's commitment to low food prices for consumers led to the imposition of tight regulations placed upon agricultural producers. Farmers were forced to grow certain crops and sell their produce to "cooperatives" at fixed prices. Faced with low procurement prices, farmers reduced their output to the market. This, combined with a high population growth rate, led Egypt to substantially increase its food imports. Consumer preference for imported foods has exacerbated this problem. Cotton is the main export crop while major food crops include maize, sorghum, rice, wheat, beans, and vegetables.

There have been some recent changes in agricultural policies. A liberalization programme was launched in 1986–87 in connection with an IMF Stand–by Arrangement. Since 1986, the government has reduced its intervention in crop planting decisions, opened up marketing channels, and raised producer prices for some commodities. This has raised output in the agricultural sector, and food production for some crops increased significantly in the latter half of the 1980s. Liberalization measures have also meant increased incomes for some segments of the rural population, namely large–scale farmers who are able to take advantage of these new reforms. Smaller farmers, however, were disadvantaged by the rising prices.

Food Security – Household Level

Until very recently, Egypt had one of the largest food subsidy schemes in the world, successfully increasing food availability per capita to levels comparable to developed countries (3,390 kcals/caput/day). Levels of food consumption are higher than those of neighbouring countries such as Morocco, Tunisia, and Turkey. A 1981 survey of actual food intake of the population showed levels of consumption in excess of requirements; on average, caloric intake per caput was 2,840 and protein intake was 96 grams per caput. This represents 103% and 117% of average energy and protein requirements.

In 1989, approximately 93% of the population received some form of ration card, with 47 million receiving full ration and 1.4 million receiving partial ration. Wheat, flour, and bread were sold at a fixed subsidized price, uniform throughout the country, in unlimited quantities. Sugar, tea, cooking oil, rice, beans, and lentils were sold at subsidized prices and were rationed in fixed monthly quotas, which vary according to governorates and to the rural/urban location of households. Additional quantities were available at higher prices in co–operatives and government stores. Meat, poultry, and frozen fish were also subsidized, but in limited quantities.

(Estimates in 1990)

Population	: 52 million	IMR	: 66
Population Density	: 52 per sq. km.	GNP US$ (Per Capita)	: 610
Population Growth Rate	: 2.4% per annum	Urban Population	: 47%

CHILD GROWTH AND SURVIVAL

Underweight preschool children (Percent below −2 s.d. weight for age)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

Debt service ratio (Debt service/exports)

FOOD

Food production index (Per caput, 1979–81 =100)

Dietary energy supply (Kcals/caput/day)

Consumer price index (1980=100)

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FPI/CPI ratio (1980=100)

HEALTH

Immunization coverage (Percent)

Access to local health care (Percent)

Low birth weight (No. < 2.5 kgs./100 live births)

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Access to potable water & sanitation (Percent)

As part of the structural adjustment programme, there is recognition that this massive food subsidy places a tremendous financial burden on the government and has had substantial leakages to the non–nutritionally needy. Attempts are being made to identify targeted interventions which will more efficiently benefit low–income consumers who are otherwise significantly hurt by the increased prices. It is estimated that a "minimum cost diet" increased by 425% in the urban areas and 391% in rural areas between 1981 and 1990.

Health and Control of Infectious Diseases

The improvement in the nutritional situation among preschoolers in Egypt in the 1980s is partially traced to the success of two targeted health interventions – the national diarrhoeal disease control programme, which was launched in 1983, and, secondly, the expanded immunization programme. Control of diarrhoeal disease benefitted greatly from the establishment of the diarrhoeal disease control programme, which was piloted in Alexandria in 1983 and began nationally in 1984. The programme continued until October 1991, when the Ministry of Health institutionalized the project into one department. Several evaluations showed the tremendous success of the programme in reducing child mortality and morbidity. Between 1984 and 1990, a reduction in infant and 1–to–4–year–old mortality due to diarrhoea reached 65% for infants and 73% for children. Around 90% of mothers were reached by programmes that taught the use of oral rehydration therapy and the correct use of oral rehydration solution. By 1990, around 79% of all mothers had the ability to use ORS, up from 17% in 1980. Furthermore, attitudes towards breast–feeding during diarrhoeal episodes of infants were changed – in 1980,58% of mothers stopped breast–feeding during diarrhoeal episode, and this decreased to only 5% in 1989. This had a major impact on the improvement in the nutritional status of children less than two years of age.

The other major health intervention that contributed to the improvements in child nutrition was the universal child immunization project. Accelerated immunization programmes started in September 1986 by a measles campaign covering 3.57 million children to protect them against tuberculosis, diphtheria, pertussis, and polio.

By 1990, vaccination coverage surveys indicated that 76% of children had been fully immunized, and 21% partially immunized. These were aimed to protect children against tuberculosis, diphtheria, pertussis and polio. The government increased the share allotted to the social sectors in the overall budget from 11% in 1980 to almost 18% in 1989. These shares, however, have been disproportionately spent on salaries to the detriment of other expenditures. The Ministry of Education spent 94% of its budget on salaries while, for the Ministry of Health, the wage bill amounted to 78% of the total budget.

Although Egypt was one of the first countries in the region to develop rural health services throughout the country, health facilities still tend to be urban, and curative based. In the fifth Five–Year Plan (1987–92), the Ministry of Health Investment Budget budgeted 65% of its resources for curative services, 29% for primary health care, and 6% for preventive services.

At present there are 2,673 rural primary health care units, each one designed to service 11,000 people. These facilities are easily accessible – 99% of the population lives within a four–kilometer radius of a health centre. However, the quality of service is seriously inadequate. Villagers complain of long waiting times and shortage of drugs. This leads to low utilization of services.

Women and Care Factors

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The educational level of females in Egypt is low as compared to males. The proportion of girls in primary education increased from 38% in 1972 to about 44% in 1986. Illiteracy rates of women are still very high at 61%, and tend to be highly concentrated in the poor rural areas in Upper Egypt, with about 86% illiterate. By comparison, Cairo's and Alexandria's rates are only 26 and 31%, respectively. These rates partly explain the low level of participation of Egyptian women in the labour force, which is estimated at 10% in 1990 – a slight improvement from 8% in 1980.

Total fertility rates fell from 5.7 births per woman in 1975 to around 4.8 in 1990. Breast–feeding duration among women with no education declined between 1979 and 1987, but increased among those with at least secondary education – from 10 to 16 months, on average (see second page of graphics). Data on breastfeeding are based on two national surveys – the World Fertility Survey for the earlier period and the DHS survey for the later period.

Results from the 1988 DHS survey showed a strong positive influence of maternal education on the nutritional status and infant mortality rates. Maternal education has been linked with greater use of health services, lower fertility, and more child–centred care. For example, the proportion of fully immunized children was 54% among children whose mothers have a secondary education, compared to around 25% among those whose mothers have never attended school.

WOMEN AND CARE
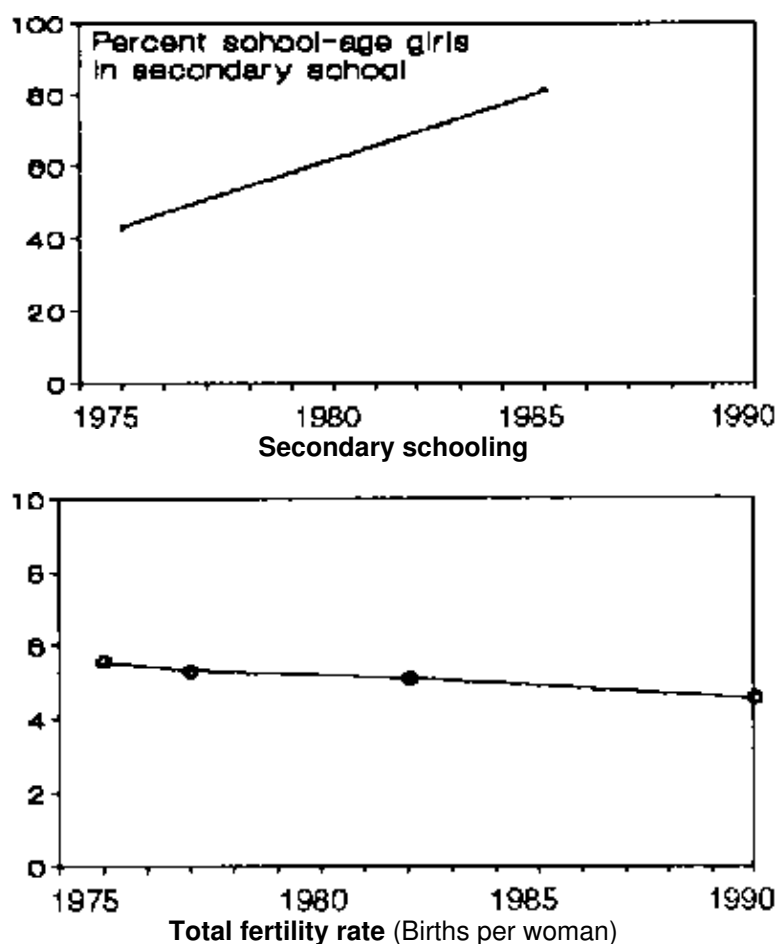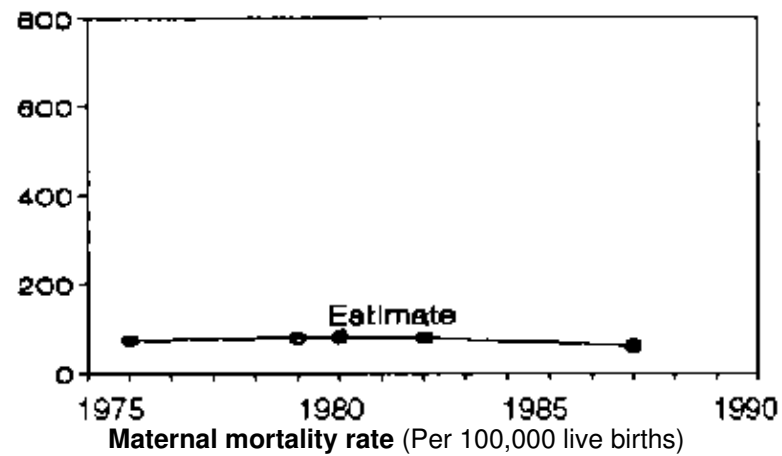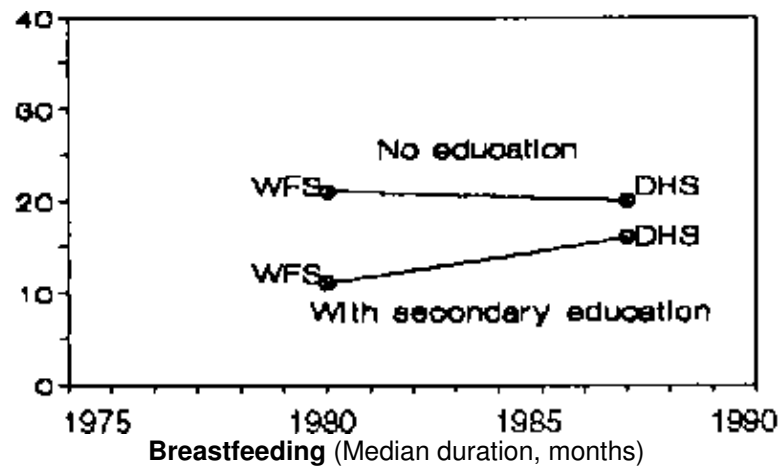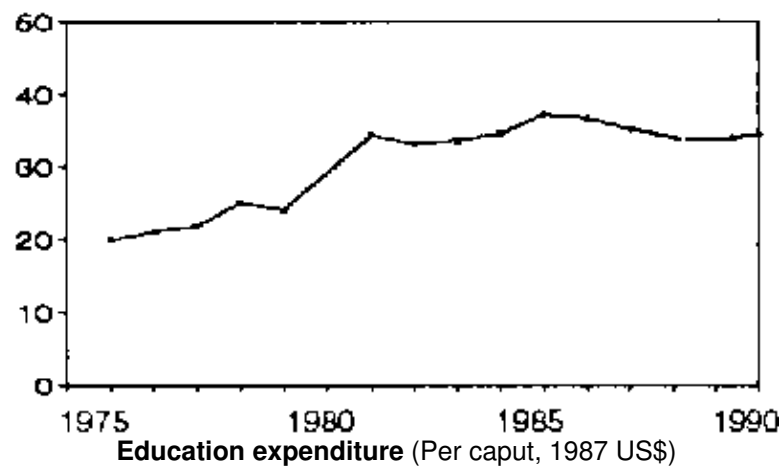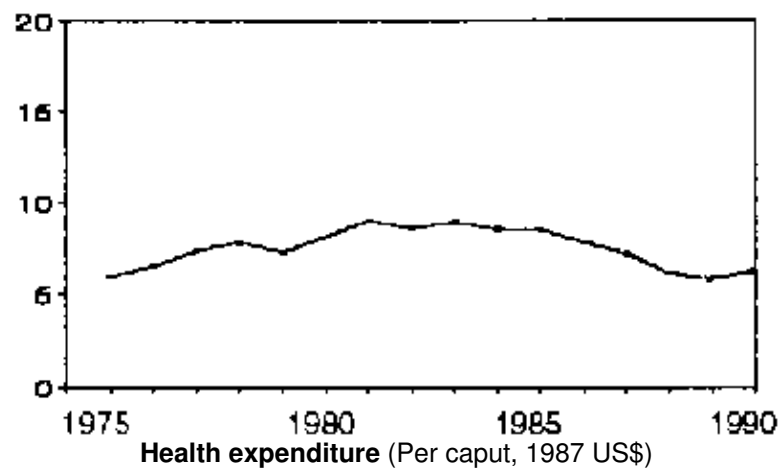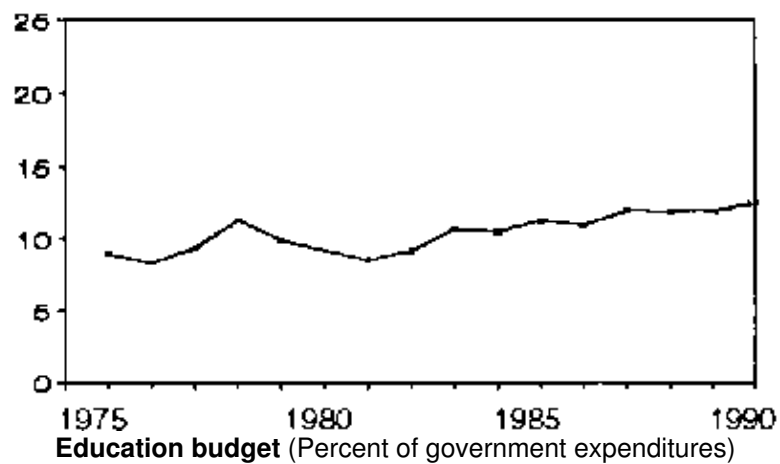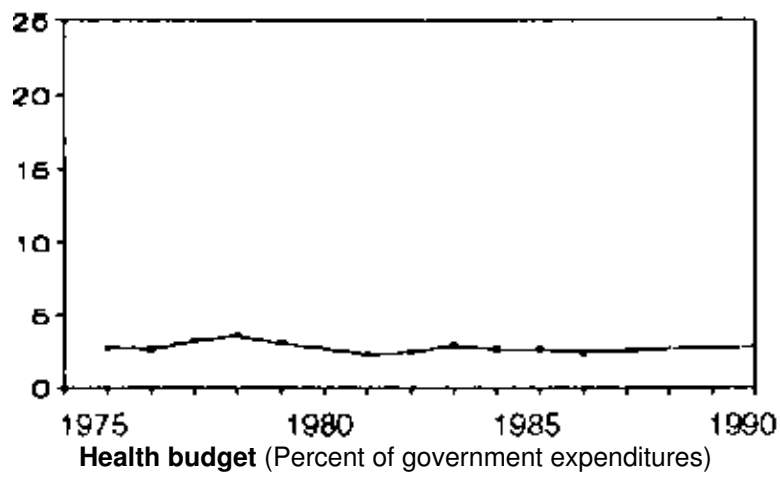
Secondary schooling

Total fertility rate (Births per woman)

Breastfeeding (Median duration, months)

Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

83

Health budget (Percent of government expenditures)

Education budget (Percent of government expenditures)

TRENDS REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN

1978 ☐ **1988**
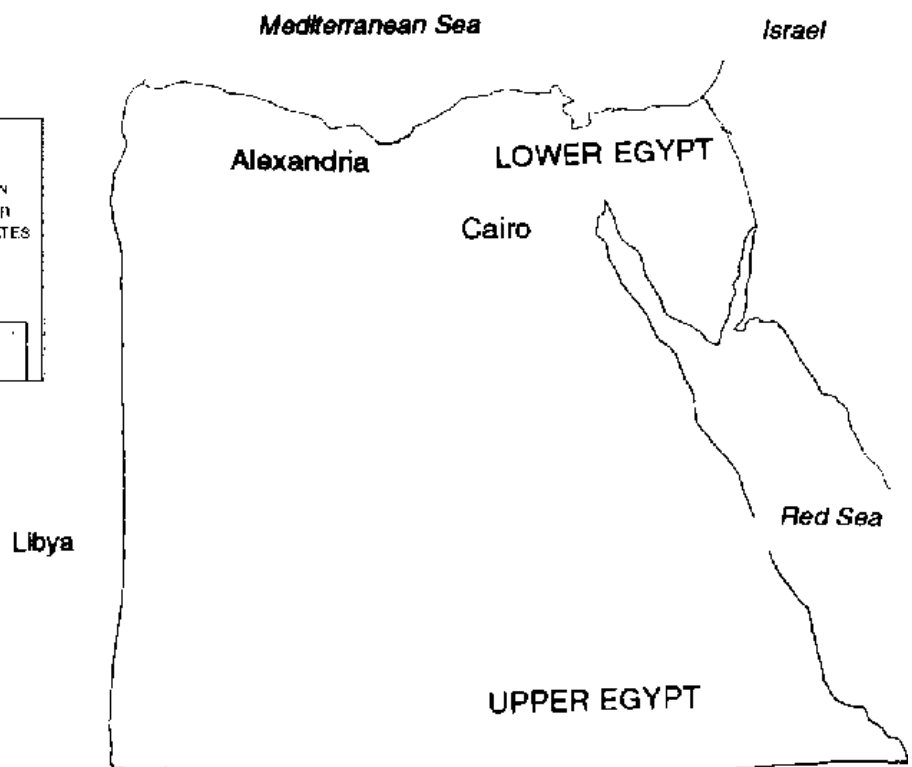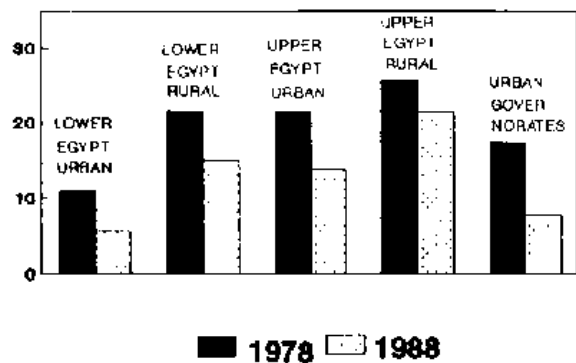
Prevalence of underweight children, 6–36 months (Percent < –2 s.d. weight for age, NCHS)

Conclusion

84

The Egyptian population has benefitted from almost 30 years of a comprehensive social welfare system. The state has initiated widespread land reform, nationalized major industries, subsidized food distribution, and provided free education and health care as well as the provision of a wide range of other public services at low cost.

Despite the economic difficulties in the mid– to late–1980s, the nutritional status of Egyptian children improved over the levels in the 1970s. This was helped by the success of targeted programmes in the health sector – notably the diarrhoeal disease control and the expanded immunization campaigns – which were successful in reducing morbidity as well as child and infant mortality rates. Food security in the country is better than most developing countries because of explicit policies anchored on a large food subsidy system which has near universal coverage, and which enabled calorie consumption above 3,300 per caput – a level seen in developed countries. There are, however, significant regional differences in health and nutritional problems. Food security in recent years has been threatened by budget tightening, particularly on food subsidies as a result of structural adjustment.

It is likely that, given the already high levels of food intakes, the future net improvements in nutrition would be achieved by easing problems in morbidity from infectious diseases. The high IMR of Egypt, relative to countries with the same level of incomes, is a symptom of high infection levels, which could be due to crowding, and problems of sanitation.

Kenya

Kenya has an estimated population of 24 million in 1990, growing at a rate of 3.9% per year, one of the highest in the world. About 90% of the population live on 20% of the total land area, contributing to a high population density of about 185 people per square kilometre of arable land.

Trends in Nutrition

Four national (rural) surveys of child nutrition have been carried out, in 1977, 1979, 1982, and 1987 – a longer time series than in any other African country. Results are generally comparable over all four surveys for indicators of stunting (for twelve to 48 month olds). Underweight trends are less easy to compare (because of seasonally, a change of standards, etc.) but can be assessed from 1982 to 1987 (for children of zero through 60 months). Trends in stunting can also be estimated by province (see second graphics page); and the later surveys allow estimates down to district level.

Trends in stunting prevalences are here the most informative, shown on the first graphics page. Stunting prevalences were approximately steady in 1977 to 1982, then improving from 27% in 1982 to 23% in 1987. Estimated changes in underweight prevalences from 1982 to 1987 were similar, down from around 23% in 1982 to 18% in 1987, a rate of reduction of about one percentage point a year. Severe drought in 1983/4 might have been expected to have affected stunting prevalences, hence the underlying mid–80s improvement rate could have been higher.

Within Kenya there are substantial differences in trends of nutritional indicators by province. In general, export crop producing areas have been recently favoured above food crop areas (mainly maize). While most areas showed improvement in the 1980s, Coast Province and the west probably did less well (certainly in Nyanza, with Western Province showing some unexplained fluctuations).

The infant mortality rate decreased from 112 per 1,000 live births in 1965 to 66 per 1,000 live births in 1990. The under–five mortality rate was estimated at 108 per 1,000 live births in 1990. The worst–off districts are in western Kenya and on the coast (South Nyanza and Kilifi), which have estimated IMRs of 200 per 1,000, while the better–off districts are in the central provinces (e.g. Nyeri and Nyandarua), with rates as low as 60 per 1,000.

Economic Trends

Kenya's GNP per caput was estimated at $370 in 1990 – this figure was nearly constant in the preceding two years. The GNP per capita increased steadily from 1975 until a severe drought in 1984, which lowered the GNP growth rates significantly. However, good weather conditions in the latter half of the 1980s, especially in 1988, boosted GNP growth rates somewhat, but only to be subjected once again to severe drought in 1990–92.

85

The country has increased its debt burden to a level of US$5.4 billion (nearly US$260 per person). The debt service ratio showed a long−term upward trend, increasing from about 18% in 1975 to 40% in 1983. It has declined from its peak to a ratio of 34% in 1990. A structural adjustment programme is being implemented generally to reduce the government's share in the total economy. Total central government expenditure as a percentage of the GNP has risen substantially over the last two decades – 31% in 1990 compared to 21% in 1972. In 1990, about 28% of Kenya's GDP came from agriculture – down from 35% in 1965, while both industry and manufacturing increased their share in the GDP in the same period from 29% to 33%.

Food Security − National Level

Food production in Kenya in the last two decades has been affected by three serious droughts (1979−80, 1983−4 and 1990−92). This is reflected in the large swings in the per capita food production index. In the normal years, the country is typically self sufficient with respect to its main staple, maize, although it remains as a net importer of rice and wheat.

Agriculture contributes about 30% to the GDP, two−thirds of all exports, and provides livelihoods to over 80% of the population. Only a small amount of the country's land is cultivable due to lack of rainfall, causing increasing landlessness and a shift to less productive lands with population pressure. Kenya is primarily a nation of smallholder farmers, three−fourths of whom have less than two hectares of land, and who retain significant amounts of their production for home consumption.

Maize is the dominant food staple and is grown in varying degrees throughout the country, depending on agricultural zones. Almost 60% of total maize production comes from the western region, while farmers in the central region tend to grow a mix of cash crops, as well as maize. The eastern provinces have a deficit in maize production.

Production of sorghum and millet has diminished in the last 10 years, being replaced by maize. This has been of some concern because maize is much more dependent on regular rainfall than millet or sorghum. Wheat imports have increased more than threefold for the 1980s compared with the 1970s, allowing for a larger role in the diet. Potatoes are important in eastern Kenya, and millet and sorghum are important in the west.

Food production levels are linked to the system of maize pricing and distribution, controlled by the government. The National Cereals and Produce Board is the government agency responsible for procuring and distributing maize.

The drought in 1983−84 caused serious declines in production. The country was forced to import over half of its maize and wheat requirements. The strain that commercial imports placed on the country's foreign exchange reserves was cushioned by the 1984 beverages boom. The price of Kenyan tea on the world market virtually doubled and coffee prices increased.

Since 1986, food production has managed to keep abreast of population growth. The generous rains in 1985 returned Kenya to self−sufficiency in at least its staple food, maize. However, the country continues to be a considerable wheat importer and sugar imports began in 1985. Extensive efforts at liberalization of the marketing of sugar are still underway.

The 1990−91 production experienced a shortfall due to delays in the rains while low producer prices for wheat reduced incentives. Stocks were being drawn down and the government imposed a ban on cereal exports. The country is, however, providing emergency relief for operations in Somalia and Sudan was provided in exchange for wheat from international donors.

Food Security − Household Level

Calorie availability per caput has been steady at around 2,200 per day for most of the 1970s and 1980s. In the drought year of 1984, calorie availability declined but recovered in the following years. The 1990 level of 2,160 is below the 1975 figures, indicating that food constraints are continuing.

On average, Kenyan households spend 40% of their budget on food; nearly half the food consumed is from own−production. Subsistence has, to some degree, buffered the consumption of food from the market price movements. This is, however, not the case for people living in maize−deficit areas who experience high prices for the staple. In general, the index of food prices has risen slightly more slowly than the general consumer price index since 1982 contributing to stable food consumption patterns for most of the 1980s, excepting the drought years. The most affected groups in the periods of food deficits are the landless rural households.

Health and Control of Infectious Diseases

Health expenditures as a share of the central government budget have declined from about 8% in the late 1970s to 5% in the second half of the 1980s. Immunization rates for children are estimated to have actually dropped from 65% in 1988 to 59% in 1990, while the rates of immunization for pregnant women against tetanus have dropped from 40% in 1985 to 37% in 1990. Under the structural adjustment programmes, user fees for health care were introduced as part of the mechanism to strengthen the delivery system.

For children between 1–4 years old, measles is the leading cause of death. However, immunization against measles in Kenya at about 40% coverage is lower than in many Sub–Saharan Africa.

At the national level, only 34% of households had access to clean drinking water in the wet season, while 32% had access to water in the dry season. At the district level, the coastal district of Kilifi had the highest access, while Baringo District in the Rift Valley, Kisii in Nyanza, and Kitui in the eastern region had the lowest level of access to safe water. Around 45% of all households had sanitary facilities in the home or immediate vicinity. This proportion has not changed since 1985.

There is only one doctor for every 11,000 inhabitants, and are mostly urban based. About 67% of doctors are located in urban areas, where 24% of the population live.

Women and Care Factors

The total fertility rate in Kenya was registered at around 8 births per woman in 1975. This went down to 7.7 in 1984 and to 6.7 in 1989, indicating some improvements which may have resulted from family planning programmes and improved education among women. However, population growth at nearly 4% per annum is one of the fastest in the world. This fertility rate implies that, on average, a Kenyan woman spends above 60% of her reproductive years (15–45 years old) either pregnant or lactating. The stress on women in Kenya is high, since they are also involved in agriculture production – mainly in food plots. Female labour force participation among Kenyan women is estimated to be about 40% and has been at that rate for the last 15 years.

(Estimates in 1990)

Population	: 24 million	IMR	: 67
Population Density	: 42 per sq. km.	GNP US$ (Per Capita)	: 370
Population Growth Rate	: 3.8% per annum	Urban Population	: 24%

CHILD GROWTH AND SURVIVAL

Underweight and stunting in preschool children (Percent)

<80% Height for Age

<80% Weight for Age

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

Debt service ratio (Debt service/exports)

FOOD

Food production index (Per caput, 1979–81=100)

Dietary energy supply (Kcals/caput/day)

Consumer price index (1980=100)

FPI/CPI ratio (1980=100)

HEALTH

89

Immunization coverage (Percent)

Tetanus: Pregnant women

Measles: Children

Access to local health care (Percent)

18 (Est.)

Low birth weight (No. < 2.5 kgs./100 live births)

Access

Sanitation facilities

Safe water

Access to potable water & sanitation (Percent)

Breast–feeding duration in Kenya has been rising between the 1970s and 1980s. Based on data from the World Fertility Survey of 1977 and DHS in 1989, the median duration of breast–feeding among mothers with secondary education increased from 15 to 19 months, and from 20 to 22 months for those with no education.

These data imply (1) that the massive campaigns to promote breast–feeding are having some effect, and (2) that the effect is larger in educated women.

Government policy in Kenya puts a high priority on education; around 22% of the national budget is spent on education. The per capita expenditures on education of about US$20 in 1988, up from around $12 in 1975 is one of the highest in Africa. There is only a slight gap in the education of females compared to males. The proportion of school–age females at secondary school is around 55% (compared to 62% of males). This is about twice the average for all Sub–Saharan African countries.

Conclusions

Child nutrition in Kenya appears to have improved during the period 1982 to 1987, despite a severe drought in 1983/84. In part, this maybe explained by relatively favourable prices for export crops and good harvests in the mid–1980s. Much of the improvement occurred in the more central areas of the country, and the coast and west seem not to have shared this progress. Trends in nutrition since 1987 have not been directly assessed.

Two features in Kenyan development that are likely to have influenced nutrition are: (1) a strong political commitment towards the education of both men and women, which partly contributes to better nutrition, and (2) stability of food prices relative to other consumer goods. The liberalization of food marketing in the country has been successful in ensuring the transport of cereals into areas that had regular deficits.

WOMEN AND CARE

Secondary schooling

Total fertility rate (Births per woman)

Breastfeeding (Median duration, months)

Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput. 1987 US$)

Health budget (Percent of government expenditures)

Education budget (Percent of government expenditures)
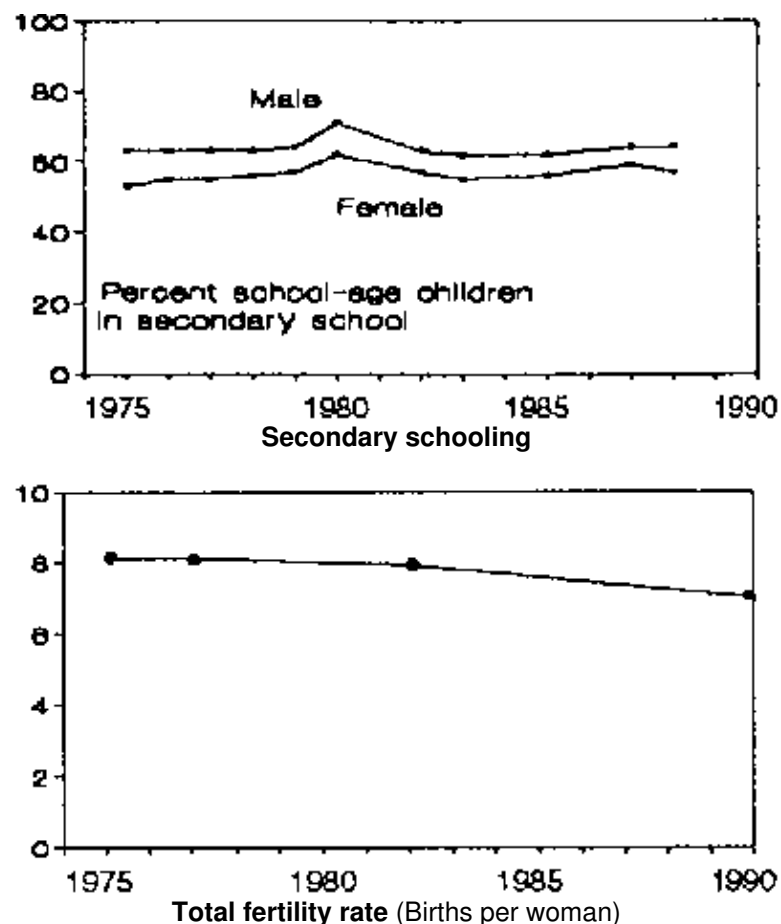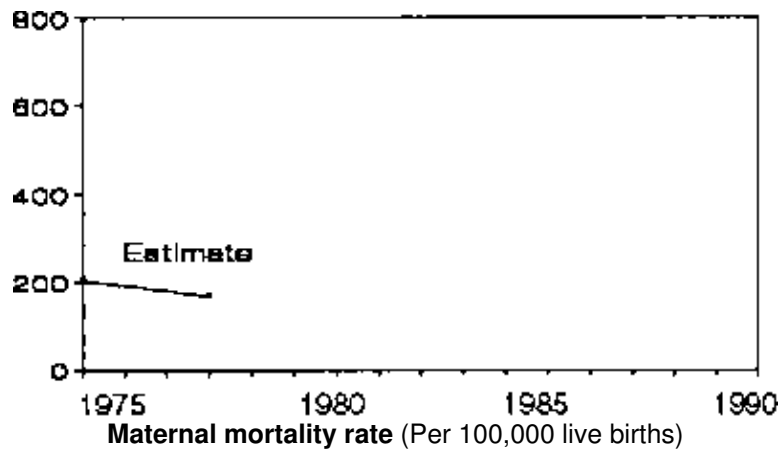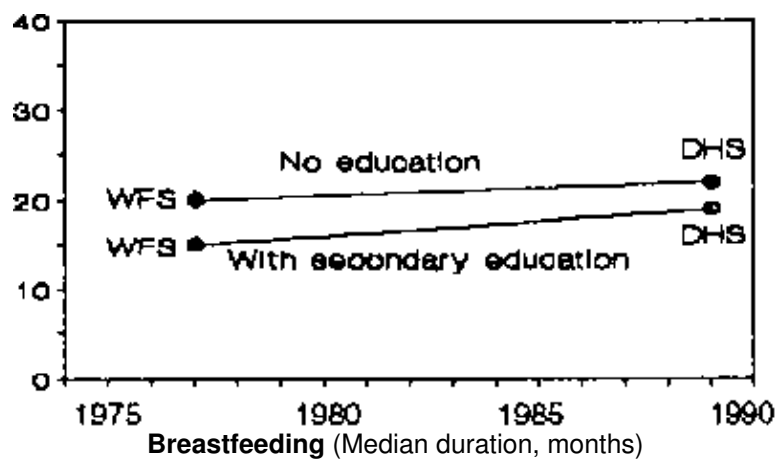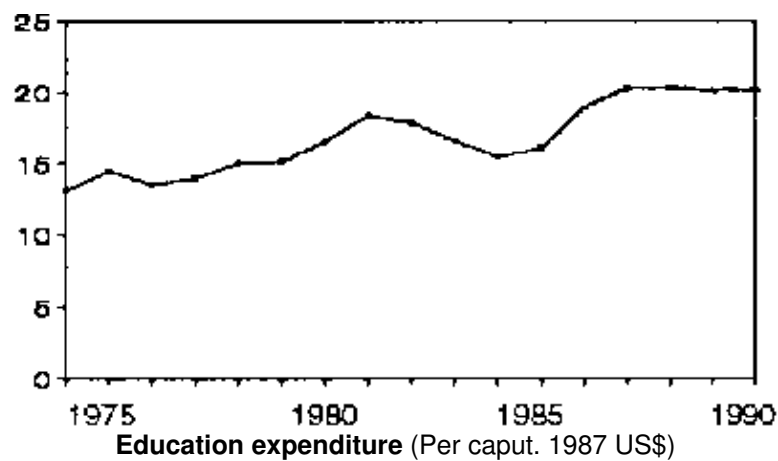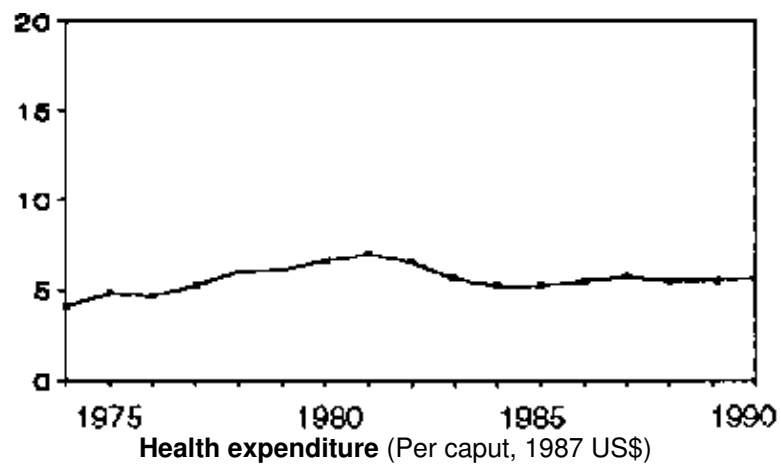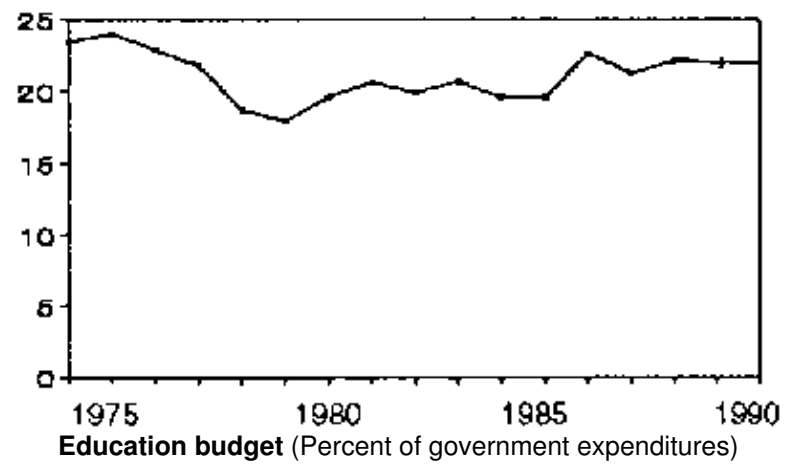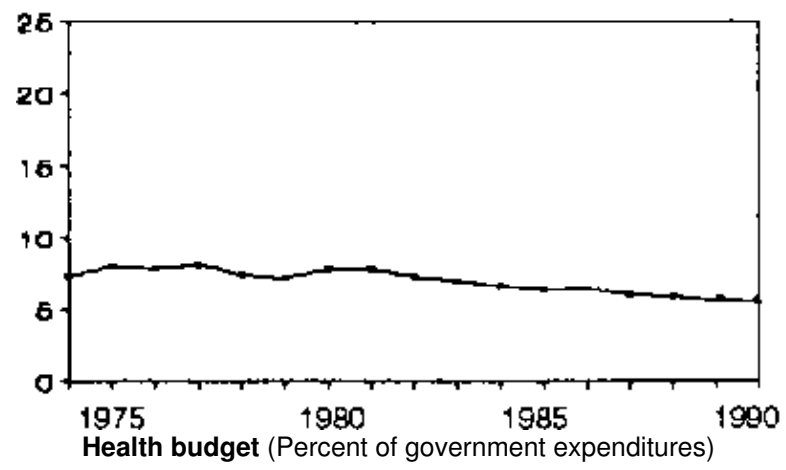
REGIONAL PREVALENCE OF CHILD STUNTING

93
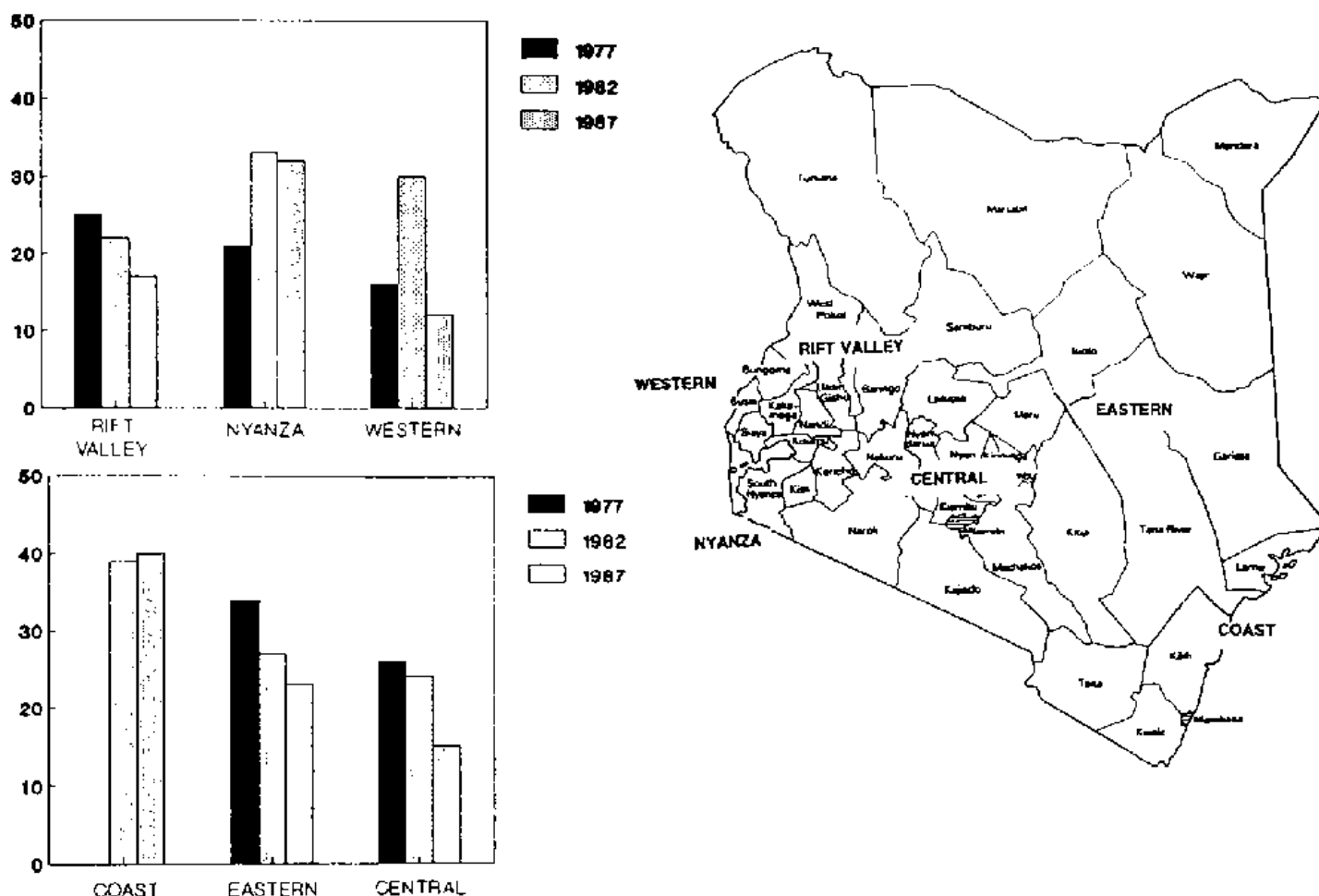
Prevalence of stunting in children, 12–59 months (Percent < 90% height for age, NCHS)

Nigeria

Nigeria has the second largest economy in Sub–Saharan Africa and a widely diverse population. Nigerians comprise as many as 125 different ethnic groups, the majority coming from three: the Muslim Hausas in the north, the Christian Ibos in the east, and the Christian/Moslem Yorubas in the west.

The country's population has recently been estimated as 88 million – a figure that is nearly 20% lower than previously reported. Between this census and the previous one in the early 1960s, population figures were extremely unreliable. The country's estimated population growth rate of 3.5% is one of the highest in Africa. The composition of the population is heavily child–dominated, with 45% being below the age of 15 and 21% under five years. Women in their reproductive years make up 24% of the population. One–third of all Nigerians live in urban areas and the urban growth rate is 6% per year. The largest number of densely populated urban centres is found in Southern Nigeria, where, apart from Lagos itself, the largest towns are Ibadan, Onitsha, Aba, Enugu, Port–Harcourt, Warn, Ogbomosho, Oshogbo, Ilorin, and Abeokuta. Northern Nigeria has, in contrast, widely scattered population centres, the largest being the city of Kano, assumed to contain over one million people.

Trends in Nutrition

Despite the paucity of comparable nutritional trend data at the national level, it seems likely that the prevalence of children underweight rose during the 1980s and is now an increasingly serious problem in Nigeria. The most recent national survey done in collaboration with the DHS (1990) placed the proportion of underweight under–five year old children (below –2 s.d. weight–for–age) at 35.7%, including 12% severely underweight (below –3 s.d.). A modelling of past trends as described in Chapter 2 estimated the national prevalence of underweight children to be about 30% in 1980; hence an increase in the prevalence is probable in the last decade.

The 1990 survey also showed that the prevalence of stunting (below –2 s.d. height–for–age) to be 43%, including 22% severe stunting (below –3 s.d.), while respective levels of wasting were 9.1 and 1.8%. Underweight prevalences were found to be higher among rural children than urban, among children with uneducated mothers, and within the 1–3 year age group. There were also marked regional differences, with the highest levels of wasting (over 10%) and stunting (over 50% – a very high level) being reported in the northeast and northwest. There were no significant gender differences in prevalences.

Several other regional surveys depict the state of nutrition in Nigeria. In February 1990, an anthropometric survey of pre–school (2 to 5–year–old) children in seven states found underweight prevalences ranging from 15% in Akure in Ondo State to 52% in Kaduna in Kaduna State, while stunting prevalences ranged from 14% in Iyero–Ekiti in Ondo State to 46% in Kaduna in Kaduna State (see map).

A 1987 rapid survey conducted by the Federal Ministry of Health and UNICEF in five local government areas in five states showed prevalences of underweight under–fives at 25% (Kwara), 28% (Cross River), 30% (Ondo), 39% (Bauchi) and 40% in Oyo State. The 1986 DHS survey of children aged 6–36 months in Ondo State found prevalences of 28.1% (underweight), 32.4% (stunting) and 6.8% (wasting). During the drought of 1983–84, the National Health and Nutrition Status (HANS) Survey (weight and height data but not age) gave a prevalence of wasting among under–fives of around 20% (20.9% urban, and 19.7% rural) – considerably higher than the 1990 DHS figure of 10.9%

The incidence of low birth weight in Nigeria was around 17% in 1990. Both protein–energy malnutrition and low birth weight are considered leading causes of infant mortality. The infant mortality rate in 1990 was 98 per 1,000 births, about average for Sub–Saharan Africa. The fertility rate is quite high at 6.3, and the maternal mortality rate is 800 per 100,000 live births – one of the highest in the world – attributed primarily to maternal malnutrition, anaemia, and poor obstetric care. Life expectancy in 1989 was low at 49 for males and 54 for females.

> Note: Based mainly on Trends in Nutrition in Nigeria: Reporting on the World Nutrition Situation by T. Agary. Ministry of Science and Technology. Nigeria. (1992).

Nutritional anaemia is a common problem in Nigeria among children and women, with estimated prevalences of 20–40% in adult females, 20–25% in children, and 10% in adult males. In 1988,39% of school children examined suffered mild anaemia. Nigeria has been identified as having a high prevalence of iodine deficiency, with an estimated 24 to 36% of the surveyed population currently suffering from goitre.

(Estimates in 1990)

Population	: 88 million	IMR	: 98
Population Density	: 125 per sq. km.	GNP US$ (Per Capita)	: 290
Population Growth Rate	: 3.2% per annum	Urban Population	: 35%

CHILD GROWTH AND SURVIVAL
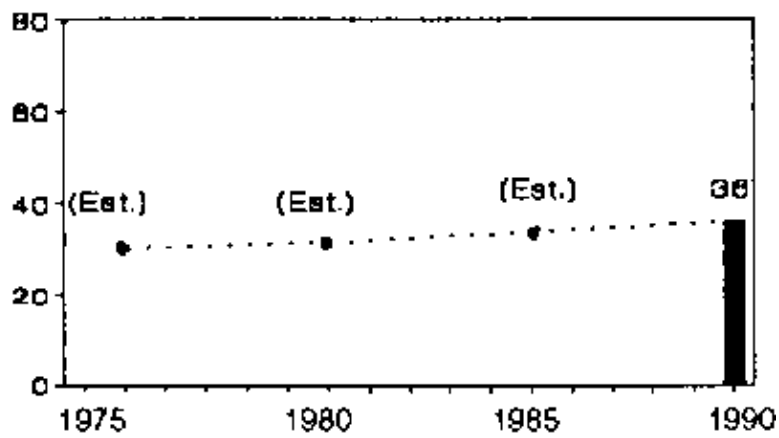
Underweight preschool children (Percent below −2 s.d. weight for age)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodoloqv)

Debt service ratio (Debt service/exports)

FOOD

Food production index (Per caput, 1979–81=100)

Dietary energy supply (Kcals/caput/day)

Consumer price index (1980=100)

FPI/CPI ratio (1980=100)

HEALTH

97

Immunization coverage (Percent)

Access to local health care (Percent)

Low birth weight (No. < 2.5 kgs./100 live births)

Access to potable water & sanitation (Percent)

Economic Trends
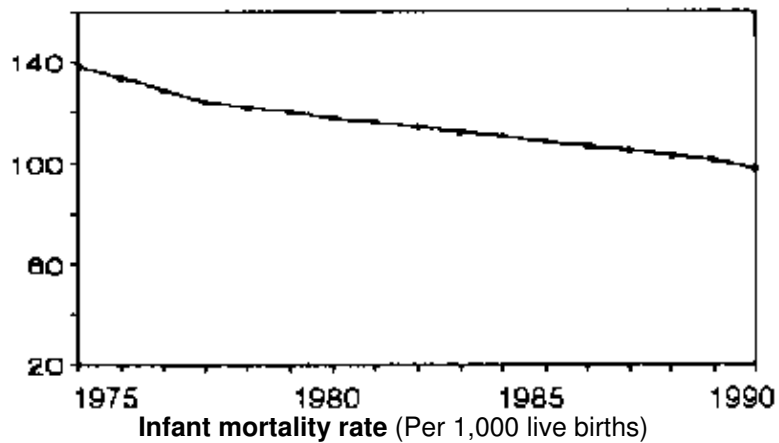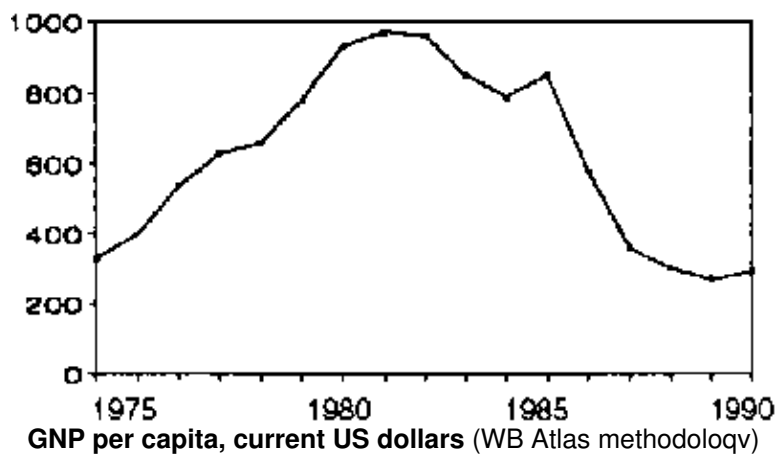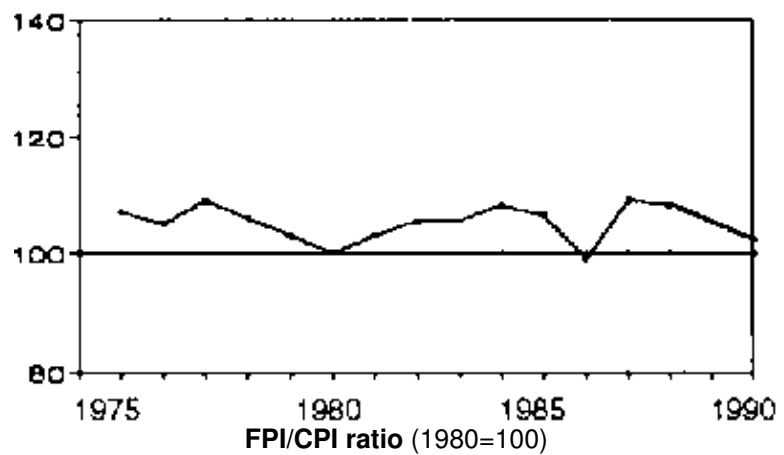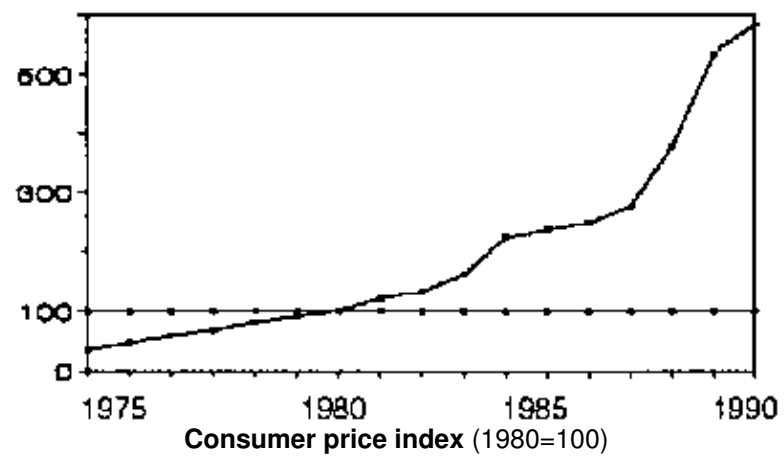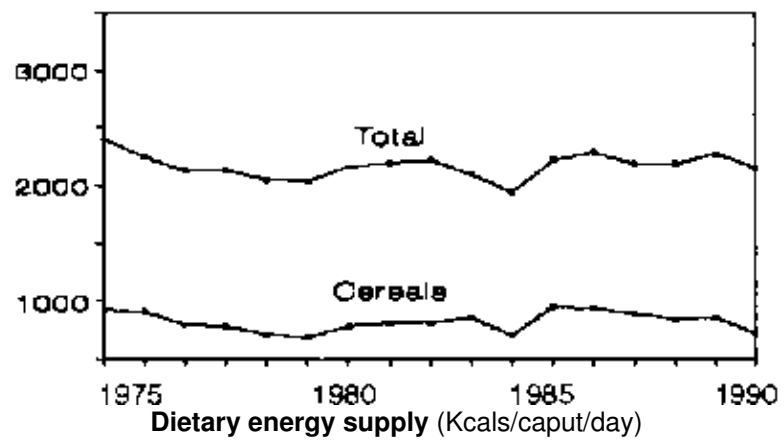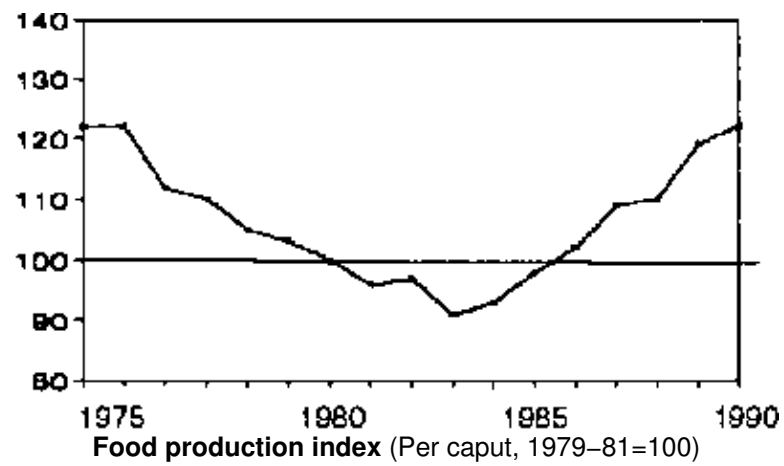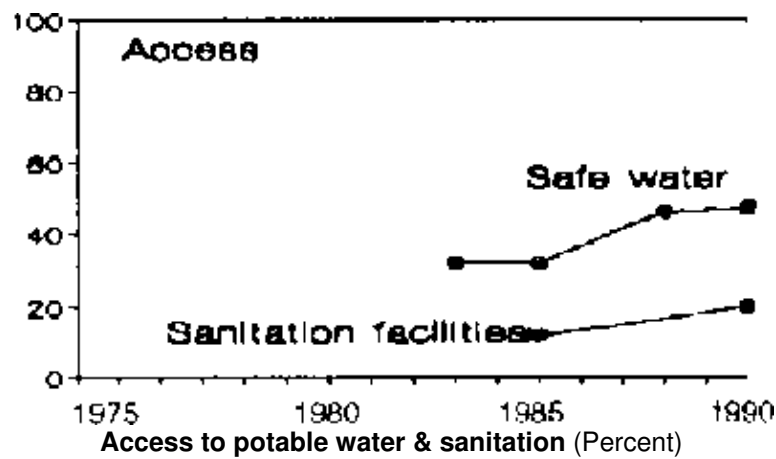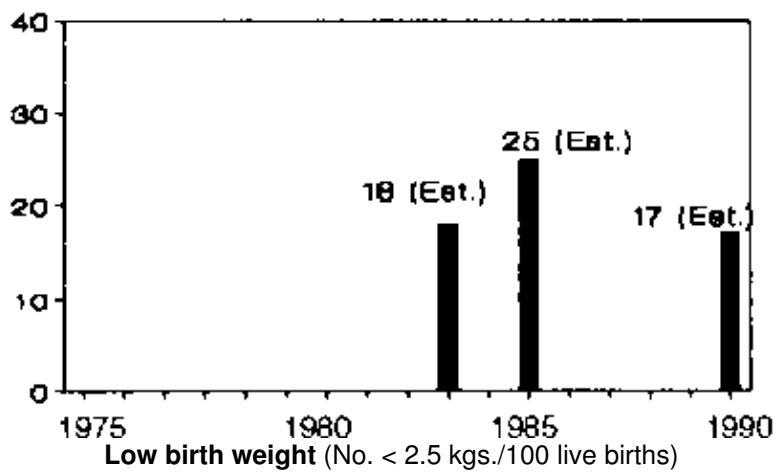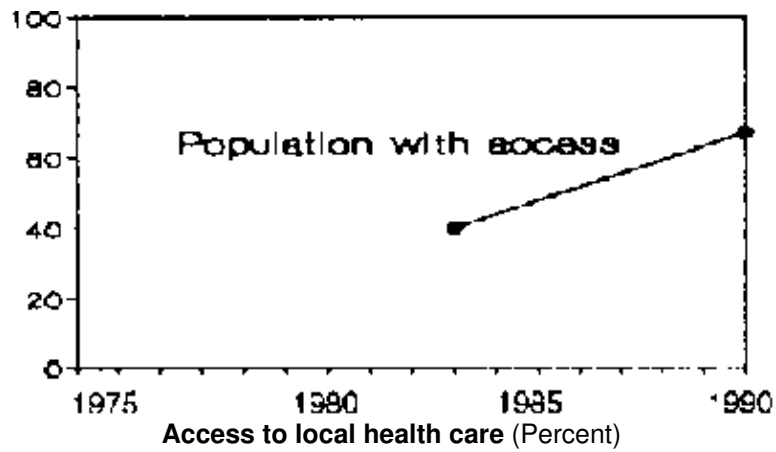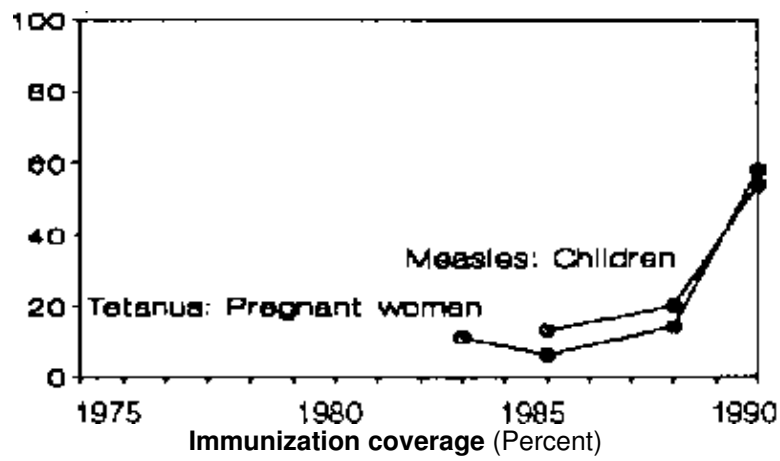
As one of the major oil–suppliers in the world, Nigeria experienced huge windfall profits from the high oil prices of the late 1970s. Exports were boosted from US$4 billion in 1975 to US$26 billion in 1980. The GNP per capita rose from US$400 in 1975 to over US$930 in 1980. The oil boom, however, did not significantly contribute to manufacturing or agriculture, but rather saw the rise of the urban service sector. This contributed in turn to an increased rate of rural to urban migration, and a significant rise in imports.

The end of the oil–boom started in 1981, when Nigeria was forced to reduce extraction to boost oil prices. The external current account deficit reached 6% of the GDP in 1983 while the fiscal deficit was 9%. The government dealt with declining government revenues by public sector borrowing, running down international reserves, and accumulating large payments arrears on external trade deficits. Real wages fell by more than 50% between 1982 and 1986; a statutory wage freeze in both the public and private sectors, introduced in 1982, was compounded by salary cuts in 1985 ranging from to 20% for public sector employees. When the oil price collapsed in 1986, the Nigerian economy went into a slump. The GNP per capita fell to US$360 in 1987 and US$290 in 1990. By 1986, export receipts were down to US$6 billion and external debt had risen to US$25 billion. The new government in 1986 was prompted by the IMF to undergo a structural adjustment programme. Wide sweeping structural changes followed: numerous government–owned companies were sold to encourage foreign investors by lessening red tape and offering fiscal incentives, interest rates and foreign exchange markets were liberalized (contributing to a fourfold depreciation of the naira); import substitution was sought; market forces were permitted to determine the value of the naira and stringent debt management was introduced.

Many Nigerians thus faced a decline in their standard of living during the 1980s. Expansionary policies in late 1987/early 1988 resulted in a 40% increase in the rate of inflation, averaging 38% in 1988 and 47% in 1989. Despite this, the government did not adjust the minimum wage, which has stood at N125 per month for most of the 1980s. Although civil service wages were increased in early 1988 and further to N250 by 1991, sharply rising prices more than eroded that gain. In mid–1988, fiscal stabilization and a good harvest slowed the increase in food prices until the first part of 1989. But prices overall began to rise quickly, in part reflecting the exchange rate depreciation and the reduced government funding of the foreign exchange market.

While Nigeria has somewhat reduced its dependence on oil, this still accounts for 95% of foreign exchange earnings and 80% of government revenue. Non–oil exports fell to US$307 million from US$720 million in 1988. Nigeria was one of the few countries to benefit from the Gulf crisis. The price of oil rose above US$25 a barrel at the beginning of 1990, providing the country with revenues totalling US$5 billion in the first six months of 1990.

Food Security – National Level

Between 1960 and 1966, the country was self–sufficient in food, except for wheat and dairy products, which were imported. Since 1972, however, food shortages have become a national problem due to neglect of the agriculture sector, and food imports rose dramatically throughout the 1970s.

Agriculture provides employment for over half of the country's people, yet contributes only about 25% to the GDP and a negligible amount to foreign exchange earnings. The total cultivable land area is 9.1 million hectares, 34% of which is actually cultivated. Most food crops are region–specific, based on climate and soil conditions. The dry savannah in the north with a short rainy season of three months (June–August) is suitable for growing sorghum, millet, and maize. The main food crops of the Middle Belt and the south of the country, which has a rainy season of up to five months, are cassava, yams, plantain, and maize. Only rice and maize are grown throughout the country. Nigeria suffered a serious drought in 1983/84, when food production was significantly lower than previous yearly levels; production of cereals fell by more than 25% and that of beans, cassava and yams by 10%.

The structural adjustment programme has had a significant impact upon the agricultural sector. Official producer prices have been raised, input subsidies have been removed, and shifts in relative prices as a result of a large depreciation of the naira have induced farmers in some areas to shift from food crops to cash crops such as cotton and palm oil. In 1985, the government banned imports of food items such as maize, rice, and wheat in order to stimulate local production. The period from 1988 onwards, however, saw a recovery in agriculture – the per capita food production index rose to 119 in 1990 (base 1980=100) and 122 in 1991.

WOMEN AND CARE
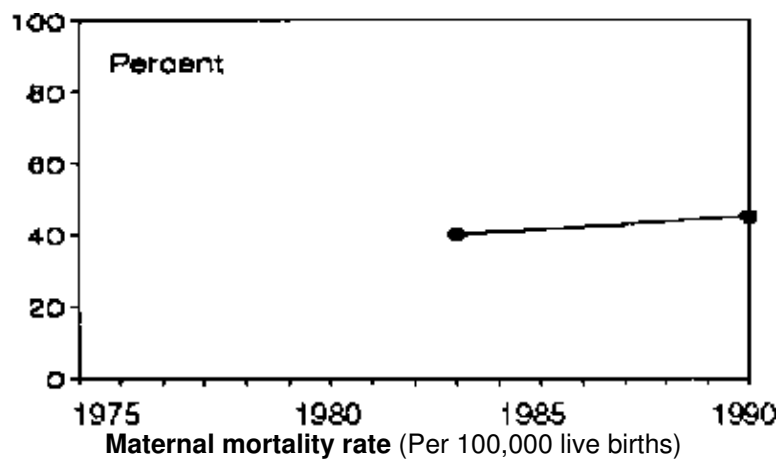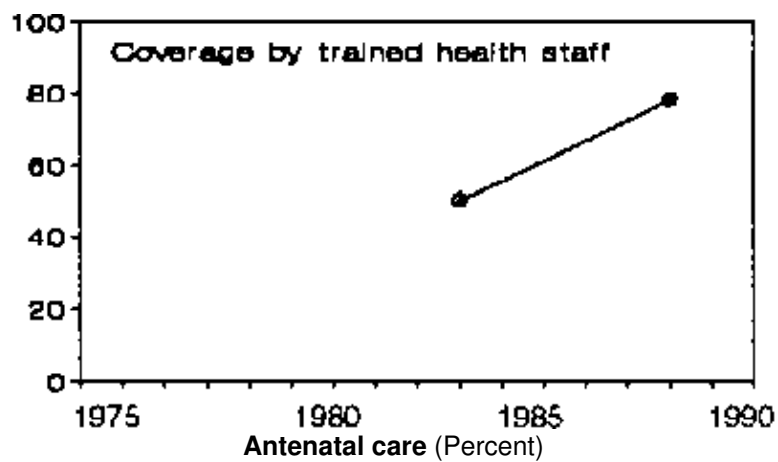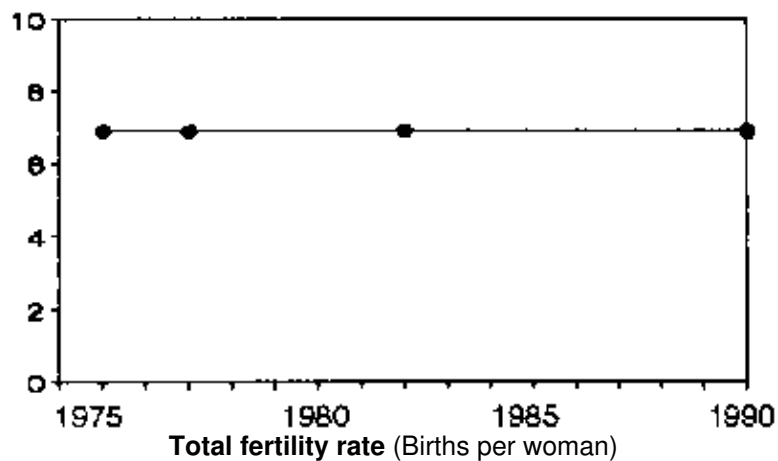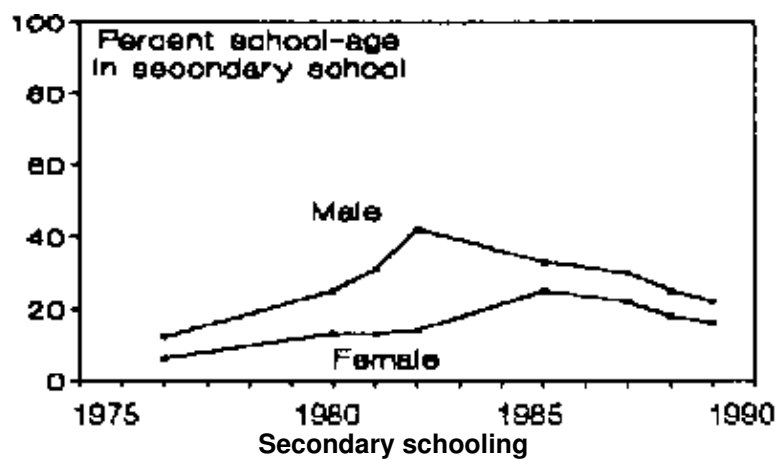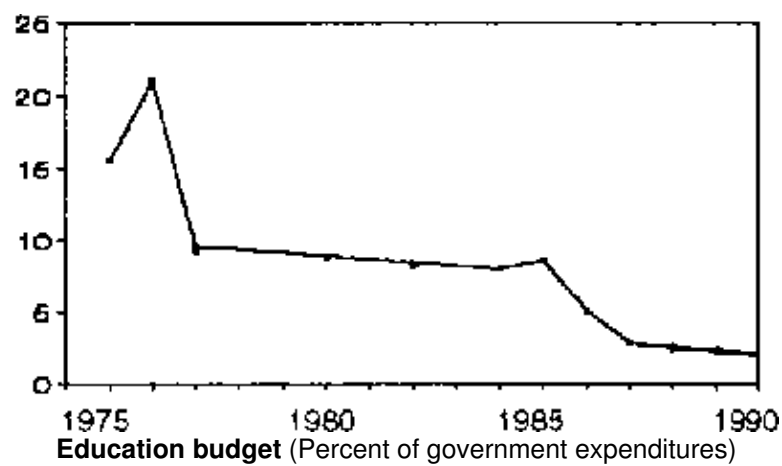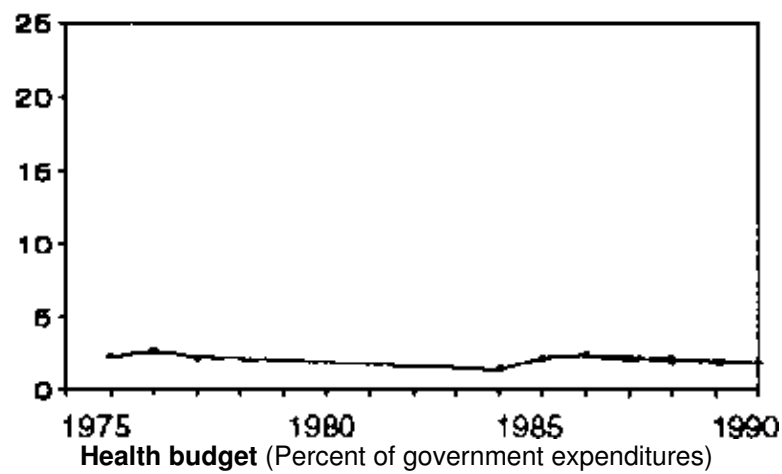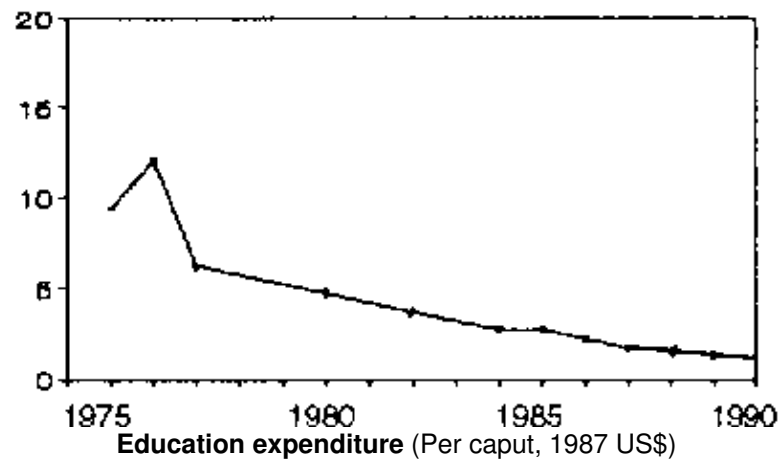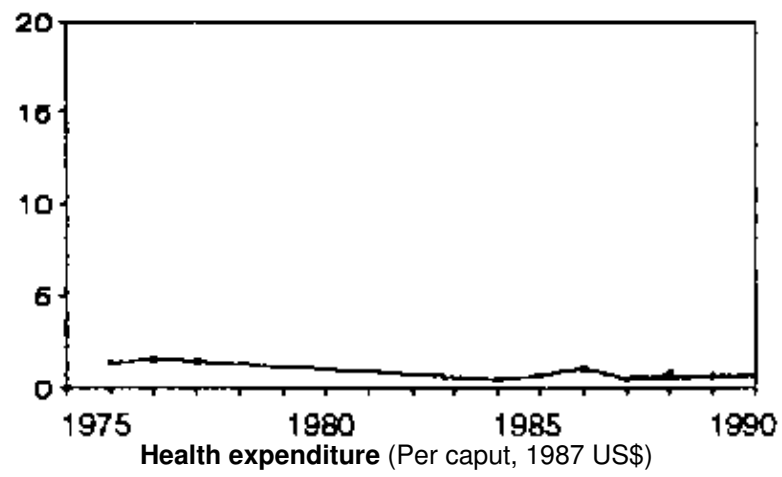
Secondary schooling

Total fertility rate (Births per woman)

Antenatal care (Percent)

Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

100

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

Health budget (Percent of government expenditures)

Education budget (Percent of government expenditures)

REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN

101
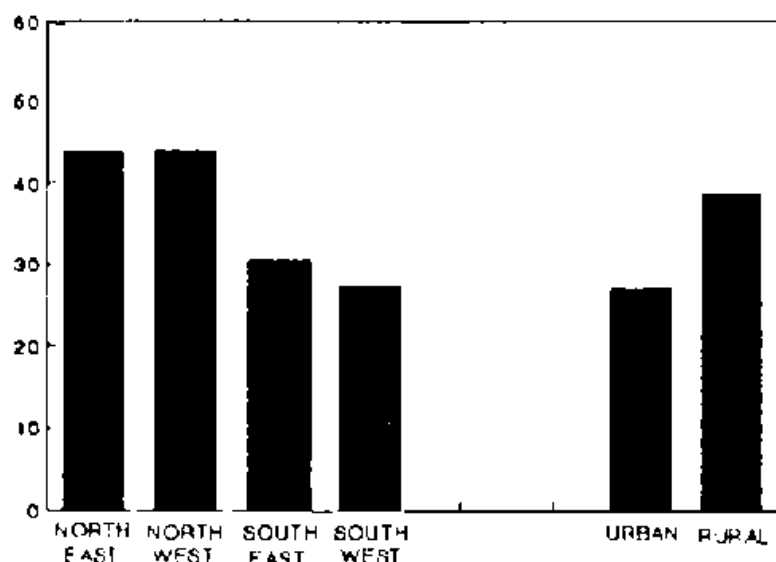
Prevalence of underweight children, 0–59 months (Percent < –2 s.d. weight for age, NCHS) 1990

Food Security – Household Level

Trends on calorie availability per caput show a deterioration over the last 20 years. The calorie supply reached 2,410 per caput in 1974, declining to around 2,150 in 1990 – another reflection of the overall deterioration in the economy in the 1980s.

Households earning less than N450 (urban) and N300 (rural) a month are defined as living below the poverty line. The 1985–86 data showed that 22% of urban households and 17% of rural households had expenditures of less than N250 per month. It is widely accepted that the urban areas of the country are more food–insecure than the rural areas, due to rising food prices. Retail prices of all food crops increased at a tremendous rate, by 250 to 700% between 1986 and 1989, similarly to the prices of other consumer goods (see FPI/CPI graph). While this benefited producers of cash crops such as cocoa and cotton, and, to a smaller extent, cassava and rice, it caused serious hardship for net consumers as incomes were not rising correspondingly.

Regionally, the Southern part of the country is the most vulnerable to household food insecurity; it has higher rates of urbanization than the North and Middle Belt areas as well as higher urban and rural unemployment rates. Over 40% of the Southeastern population has less than 0.2 hectares of land, considered the minimum necessary to sustain a household in that region. These are reflected in estimates of average calorie consumption in these regions. The 1985–86 surveys showed that the Southwest and Southeast regions had daily per capita calorie intakes ranging from 1,830 to 1,860 compared to over 2,000 for the Northwest regions.

Health and Control of Infectious Diseases

Since independence in 1960, Nigeria has made tremendous efforts to improve its capacity to control all categories of disease. The Government has invested heavily in building health facilities throughout the country and training various levels of personnel. Between 1975 and 1986, hospital beds increased by 67%, reaching a total of 9,407 in 1986. In 1987, there were 16,145 medical doctors, 59,184 nurses, and 42,931 midwives. The ratio of people per hospital bed improved from 2,520 in 1960 to 920 in 1987. The population/medical manpower ratios became favourable, going from 14,630 people per doctor in 1960 to 5,200 in 1987, and from 8,600 people per nurse to 1,630 over the same period. Similarly the population of women of reproductive age per midwife fell from 5,000 in 1960 to 400 in 1986.

In 1990, nearly two–thirds of Nigerian households had access to a health facility, up from 40% in 1983. About 41% of urban households lie within 1 km of a health facility, compared to 33% rural households. By contrast, 38% of rural households are situated over 5 km from the nearest health facility.

Despite such improvements in the capacity of the health care delivery system, government budgetary support for health services has remained very low, in absolute and relative terms, throughout the 1980s. Fees were introduced in public hospitals in 1985, after which time even moderate levels of treatment could cost the

equivalent of a month's salary of an average Nigerian.

In 1986, Nigeria officially adopted a National Health Policy and Strategy to achieve health for all Nigerians by the year 2000. The government has shifted its emphasis in health care from curative to preventive through the formation of a three–tiered system. Primary health care, as defined in the Alma Ata declaration, is the main vehicle for realizing the health objectives.

In Nigeria, about 70% of child mortality is attributable to preventable diseases. The five leading diseases primarily diagnosed among 0–1 year olds are: malaria, upper respiratory infections, diarrhoea, pneumonia, and measles. Among 1–14 year olds, the leading causes of morbidity are: malaria, upper respiratory infections, anaemia, pneumonia, and intestinal infections.

Immunization of children and pregnant women was successfully expanded in the last decade. The coverage for immunization of children against measles for example expanded from 10% in 1982 to about 60% by 1990. Estimates by the government indicates that this programme had prevented 200,000 deaths in 1985.

Women and Care Factors

Nigerian women are disadvantaged in society. Women rarely have a legal title to land, the rate of female literacy is only 25% (half of the male rate), and women farmers are far more constrained than men in obtaining access to credit, inputs, or extension services. Although schooling of females is rising and nearly comparable to males, the rates are still low – only 17% of girls of school age are in secondary school. The education sector, in general, was drastically affected during the economic decline in the 1980s with per caput government expenditures for education dropping from US$9 in 1975 to $2 in 1988.

Women suffer disproportionately from constraints on the labour supply, while the very uncertain rights of women in marriage and divorce highly limit their choices in life. Data on labour participation of Nigerian women shows a declining trend over the last two decades, al– though the rate of economic participation was quite high at 35% in 1990.

In spite of the generally long duration of breastfeeding in Nigeria, there is increasing evidence of a progressive decline in the practice in urban areas. In the 1986/87 studies in Ondo and Oyo states, the results indicated a mean duration of full breastfeeding of 19.5 months. It was observed to be longest among women with no primary education and progressively declined to about 13 months for women with completed secondary education. Rural women breastfed up to 20.4 months compared to 15.3 months for urban women.

Conclusion

The nutritional status of preschool children probably deteriorated in the 1980s. The Nigerian economy suffered a series of shocks since the end of the oil boom in 1981. The adverse consequences of the neglect of agriculture during the 1970s, when oil revenues were used to fund food and other consumer imports and large capital–intensive urban projects, were increasingly felt. The standard of living for many Nigerians declined remarkably as prices escalated sharply without concurrent increases in incomes. This deterioration in real incomes has in turn adversely affected the food security of many households. Since 75% of Nigerians are dependent on agriculture, this neglect has been very costly. The agricultural growth rate which averaged 1% in the last 20 years, lags behind the 3.2% population growth rate, and mirrors the need to improve agricultural productivity. Re–investment in smallholder farming, seen as essential to boost incomes and food security, has been a major focus of current government efforts. The economic decline seriously affected the government's capacity to maintain adequate budgetary support to the social sectors, particularly education and health.

Tanzania

Tanzania's national census in 1988, assessed the total population at 23 million, compared with 17.5 million in 1978, indicating an average annual growth rate of 2.8%, compared with 3.2% in the previous decade. Population density is relatively low at 25 people per square kilometre, yet there are wide regional disparities, with the highest population densities reaching over 250 per square kilometre on the slopes of Mt. Kilimanjaro and on the shores of Lake Malawi.

Trends in Nutrition

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The recent national survey on nutrition (1991/92) indicates that 25.2% of children under five are underweight (below –2 s.d. weight for age using NCHS standards). This result is derived from the nutrition module of the national household budget surveys, and is intended to be representative of the national nutrition situation. The DHS also carried out a national survey at about the same period in 1991/92 and gave a national figure of 28.5% underweight children. The two surveys are not strictly comparable because the DHS survey excluded some regions, although the estimates are generally within a similar range.

There are no comparable national data in previous years. However, it is possible to discern trends over time in a few regions of the country where large programmes have been implemented. Iringa Region has the longest series of nutritional status data based on community level monitoring systems in the country. These show a declining trend in the prevalence of underweight children in all its districts (56% in 1984, 35% in 1991, using a cut–off of 80% of Harvard standard). The improvements in Iringa can be attributed to the activities within the Iringa Nutrition Programme, which has been underway in the area since the early 1980s, working with local administrative structures to empower communities to deal with their nutritional problems.

In Ruvuma Region, underweight prevalences (80% of Harvard standard for weight for age) fell from 55% in 1987 to 38% in 1991. There are substantial differences between districts in reported rates of underweight children, with Mbinga District better off than Tunduru and Songea Rural Districts. While Ruvuma Region is a high potential production area especially for maize, Tunduru District is prone to food deficit.

The three districts of Mtwara Region covered by the monitoring system indicate improvements in the prevalence of underweight children (55% in 1987 and 41% in 1991). In Masasi district, improvements in 1988 were reversed during 1989 as the region went through calamities of bad weather. Masasi District was most severely hit and required food assistance.

Kilimanjaro Region has only one district, Hai, operating a community–based information system. Information generated indicates a downward trend in underweight prevalences from 34% to 18% from mid–1987 to the end of 1989, and further improving to 12% in 1991.

Kagera Region has shown substantial improvement in the rates of underweight children for all districts. Ngara and Biharamulo Districts, which had total Underweight rates of 60% in 1985, are now reporting rates of 44% and 40%, respectively.

In Zanzibar, underweight prevalence has increased between 1985 and 1990 from 37% to 51%. This may be due to the economic crisis which has adversely affected access to food in this area where most households depend on the market for food. The major nutritional disorders in Tanzania are protein energy malnutrition, anaemia, iodine deficiency disorders, and Vitamin A deficiency. Visible goitre is prevalent throughout mainland Tanzania, with a low prevalence of under 10% along the coast, while in the mountainous areas prevalence rates are very high. The high prevalence of goitre point to high rates of cretinism, especially in the offspring of mothers with goitre. The prevalence of goitre in women of child–bearing age is three times higher than that in men.

> *Note:* Based mainly on *Nutrition–Relevant Actions in Tanzania* by F. Kavishe and S. Mushi. Tanzania Food and Nutrition Centre, Dar es Salaam (1992).

Economic Trends

Tanzania followed a socialist development path shortly after independence in 1961, in sharp contrast to the capitalist approach adopted by neighbouring Kenya. The Arusha Declaration in 1967 promoted accessible health care for all the population, along with a decentralisation of power to the village–level.

(Estimates in 1990)

Population	: 25 million	IMR	: 115
Population Density	: 26 per sq. km.	GNP US$ (Per Capita)	: 110
Population Growth Rate	: 3.1% per annum	Urban Population	: 33%

CHILD GROWTH AND SURVIVAL

Underweight preschool children (Percent below –2 s.d. weight for age)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

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Debt service ratio (Debt service/exports)

FOOD

Food production index (Per caput, 1979−81=100)

Dietary energy supply (Kcals/caput/day)

Consumer price index (1980=100)

FPI/CPI ratio (1980=100)

HEALTH

Measles: Children

Tetanus: Pregnant women

Immunization coverage (Percent)

Population with access

Access to local health care (Percent)

12 (Est.) 13 (Est.)

Low birth weight (No. < 2.5 kgs./100 live births)

Access **Sanitation facilities**

Safe water

Access to potable water & sanitation (Percent)

The first half of 1980s was characterized by a severe economic crisis with production in all major sectors declining steadily, leading to a fall in per caput incomes. The GNP per caput was estimated at US$110 in 1990, down from US$290 in 1980. For want of essential repairs, the country's physical and social infrastructure rapidly deteriorated. Other signs of the strain in the economy were acceleration in inflation, a growing scarcity of foreign exchange, shortage of food and basic consumer items, and a sharp deterioration in the quality of essential services.

A structural adjustment programme was implemented during the mid–1980s, debt service having peaked at 40% in 1982. Following the devaluation of the shilling to more competitive levels, and the controls on government spending and borrowing, an improved performance of the economy is anticipated. To a degree, this depends on increasing the value of foreign trade, which, in turn, requires an increasing return from the country's main cash crops – coffee and cloves, although world prices for both of these products have been low and remain unreliable.

Food Security – National Level

Although not a famine–prone country, Tanzania can not be described as food secure. Agriculture is the single most important sector in the economy, accounting for over 72% of export earnings in 1989. For the majority of Tanzanians, agriculture is the main source of livelihood; some 85–90% of the labour force is engaged in agricultural activities, including about 20% of the urban population. Most of the agricultural production is done on small–scale farms, with subsistence farming comprising about 70–75% of total food production. Agriculture provides raw materials for over 85% of the country's industrial production.

Tanzania has one of the largest agricultural potentials of all East and Southern African countries. Mainland Tanzania has a land area of 88.6 million hectares of which 45% can be cultivated under rainfed conditions. Of this, only 16% or 6.2 million hectares were cultivated in 1984 when the population was estimated at about 20 million. The population/arable land ratio in Tanzania is still so favourable that, in principle, Tanzania is said to be able to provide all the food its neighbours may need. However, there is a large difference between this potential and its realization, and for many years Tanzania has been importing huge amounts of grain, sometimes from its less potentially endowed neighbours. Growth in the agricultural sector has been slow, with a rate of only 1.4% on average between 1978–88.

Despite the occasional maize and rice surpluses, there are severe internal food distribution problems. The level of cereal sufficiency is estimated to be at 91%, national cereal food security at 94%, and national food aid dependency at 3%. A better situation than a number of countries in the SADCC region.

The country's regions have different agro–climatic conditions. Mtwara and Arusha are food–surplus regions while Ruvuma and Singida are food–deficit. Even though the country may experience a bumper harvest such as the one in 1988–89, inter–regional differences mean that most of the production occurs around the borders of the country, necessitating transport into the central populous urban centres. Food–surplus regions such as Kagera, Shivanga, and Rukwa produce more than 150% of the food energy they require, yet almost 40% of the Tanzania population lives in food–deficit areas, such as Dar–es–Salaam, Kigoma, Dodoma, and Mara. Transport is costly, and the long–term viability of such an approach to regional food security is questionable if current economic conditions persist. The situation is compounded by the growing urban population resulting from high birth rates and migration from the countryside. The average annual growth for all urban districts combined was 4.1% between 1978 and 1988, well above the 2.8% for the country as a whole. Dar–es–Salaam, with an annual growth rate of about 8%, is the fastest growing urban centre. Rapid growth

will continue to place additional demands on the social and physical infrastructure in the urban areas, which is already in dire need of repair. Unemployment is rampant, housing is unaffordable, if available at all, and there are serious problems with water and environmental sanitation.

Food Security – Household Level

In the 1980s, calorie availability based on food balance sheets was fairly constant at about 2,200 kcals/caput/day, with cereals contributing less than 40% of the total. Maize contributed about 60% of the energy from staple foods. Cassava, sorghum and millet were the other main staple sources.

In the early 1980s, scarcities of basic food staples became widespread, leading to extensive government controls, with essential goods rationed through special permits. The bureaucratic hurdles of the nationwide controls and the 1983 crackdown of "economic saboteurs" concentrated government efforts on distribution. Since 1983, prices of food outstripped the growth in overall consumer price index.

On average, Tanzanians spend 64% of their income on food – indicating the high cost of household food security. The majority of the population derive their economic livelihood mainly from small–scale foodcrop production which relies on rainfed hand–hoe technology. The agricultural survey of 1986/87 found that as high as 41% of rural households derive their main source of income from sale of crops, and 31% from non–agricultural income sources.

WOMEN AND CARE

Secondary schooling

Total fertility rate (Births per woman)

Antenatal care (Percent)

Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

110

Health budget (Percent of government expenditures)

Education budget (Percent of government expenditures)

TRENDS REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN

111

Chart 1 (top left):

Y-axis: 60, 50, 40, 30, 20, 10, 0

Legend:
- 1987
- 1989
- 1991

X-axis categories: IRINGA, KAGERA, KILIMAN-JARO, MOROGORO

Map (top right): Kagera, Mara, Mwanza, Shinyanga, Arusha, Kilimanjaro, Kigoma, Tabora, Singida, Tanga, Dodoma, Dar Es Salaam, Rukwa, Morogoro, Pwani, Mbeya, Iringa, Lindi, Ruvuma, Mtwara

Chart 2 (bottom left):

Y-axis: 60, 50, 40, 30, 20, 10, 0

Legend:
- 1987
- 1989
- 1991

X-axis categories: MTWARA, RUVUMA, SHINYANGA

Percent underweight children (Below 80% Harvard standard, < 5 years old)

In urban households and in an increasing number of households in the rural areas, cash income is necessary to ensure access to food. Thus the price of food relative to earnings will determine the food security situation. The real value of formal sector earnings depreciated by 20% during the 1980s. Whereas in 1980 a day's minimum wage could buy nearly 13 kgs of maize flour (the basic urban staple), in 1990, it could only buy less than 2 kgs. The situation was made worse by the scarcity of commodities including foodstuffs during the first half of the 1980s. Although during salary reviews, the government has always sought views on the minimum wage to ensure minimum dietary requirements, due to economic constraints, the actual salaries set have always been far less than recommended. Each wage increase, moreover, is accompanied by increases in commodity prices, including food.

Health and Control of Infectious Diseases

Although many of Tanzania's socialist policies were abandoned in the 1980s, the emphasis on egalitarian–ism is still reflected in the lack of disparity in social services across rural and urban populations and income groups. 72% of the rural population has access to health services, 42% to safe water, and 80% to sanitation facilities. In the urban areas, coverage of these services is almost 100%.

The most visible public health achievement in Tanzania during the past five years is universal child immunization. When a national programme for immunization was established in 1981, the vaccination coverage for measles was a mere 31% and only 22% for a complete course of three vaccinations against polio. A national infrastructure of trained staff and cold chain operations was established and, in 1986, the

government launched an accelerated programme to achieve universal child immunization by 1988. From a coverage survey conducted in early 1989, the immunization coverage rate against each of the six major childhood diseases for children aged one to two years rose from 53% in 1986 to over 80% by the end of 1988, thus surpassing in advance the 1990 global goal of 80%, two years before the target date.

The developments in the health care system over the past two decades have been possible due to a number of factors which include an equitable rural based national health policy, government commitment to its implementation, donor support, cash and kind contributions by the community, and contributions of voluntary agencies. Multilateral donors, bilateral donors, and NGOs based mainly in Europe and North America, all provide substantial development assistance to the health sector, which is second only to the agricultural sector as a recipient of foreign aid (sometimes receiving nearly 15% of bilateral technical assistance). DANIDA through UNICEF has been the most important contributor to medical supplies in Tanzania since 1983. Between 1983 and 1987, DANIDA gave nearly US$30 million in drugs and medical supplies. From 1989, the annual inflow for pharmaceutical supplies from DANIDA has been estimated at about US$11 million.

Due to the severe economic crisis in the past 10 years, there has been a decline in the government's ability to finance health care. While the health expenditure from 1972 to 1990 has been increasing in nominal terms, the proportion of total government expenditure it represents has remained stable at around 6% of the total, slightly above the 5% average for Sub–Saharan Africa. Since, in real terms, the value of the health budget as well as the total government budget has been falling, the stability of the proportion of the health budget only indicates the government's commitment not to cut health services. There has also been an exemption in the freeze on additional government recruitment to allow for continued allocation of health staff for health facilities.

Women and Care Factors

The total fertility rate in Tanzania has remained very high at about 7 births per woman throughout the last two decades. Despite such reproductive stress, Tanzanian women's participation in the labour force has been high – at around 50% for those above 10 years old – particularly in agricultural activities. The physical strain is compounded by the psychological and mental strain of bearing all their responsibilities. During pregnancy, women need additional attention. But traditionally, most ethnic groups in Tanzania expect women to undertake their normal workload up to the end of pregnancy. There are instances where women have delivered in the fields while farming. In some places like Rombo, the district's member of Parliament has advocated resting for pregnant women and pursuaded the district authorities to offer facilities for early prenatal admission during the last weeks of pregnancy. However, in periods of heavy agricultural labour many women still feel obliged to continue working to ensure adequate harvests.

Depending on the region, after child birth, rural women rest at home for periods varying from one week to six months, in order to recuperate. During pregnancy, domestic chores may be assisted by relatives or neighbours, while agricultural work will be done by the husband. Women in formal employment are allowed a legal ma– ternity leave of 84 days, which can start before the birth of the child. The government has recently announced on the prompting of the Tanzanian Food and Nutrition Centre (TFNC) that it is considering to allow husbands to take their annual leave at the time of delivery of their wives, in the hope that they will assist their wives during this critical time – a form of "paternity leave."

Formal antenatal clinics have high attendance rates of up to 95%, although the medical screening and care given is constrained by the inadequacy of supplies and, more importantly, by lack of a transport system for referral of high risk pregnancies. As a result, only 60% of women deliver in the health facilities; the rest preferring to be delivered by the Traditional Birth Attendants (TBAs) who are more experienced in giving individual care and assurance.

The available systems of maternal care are under strain not only because of the rapid social changes taking place, but also because of the economic pressures which require everyone to work harder and for longer hours in order to earn a living. Frequent diseases and particularly the problem of AIDS have resulted in an added strain on women, who tend to shoulder the burden of caring for orphaned children and sick relatives.

Nutrition Programmes

The nutrition programmes expanding throughout Tanzania, based on the Iringa design, show a number of important characteristics. Firstly, they are community–based with strong community involvement and management through the Government and Party administrative structures. National, regional and district technical supportive mechanisms were strengthened or in some cases established to support programme activities. Secondly, there is a strong component of social mobilization through advocacy, information and

communication which has led to the creation of community concern with the problem of child deaths and malnutrition. Thirdly, active participation has been sustained through improved management – the result of the systematic strengthening of the circular process of assessment, analysis and action. Management systems have emphasized improved information through quarterly child growth monitoring using growth cards and the understanding by both men and women of the child's growth pattern. Management was also strengthened through training at all levels and the discussion of results from the information systems in the health and nutrition committees. Fourthly, an integrated multidisciplinary approach was used. Actions aimed at improvements in the areas of household food security, caring capacity, health services, education and water were carried out simultaneously. Throughout, emphasis was placed on the development of a process for reducing child and maternal mortality and malnutrition.

Conclusions

Despite a virtual absence of economic growth, Tanzania has achieved some improvements in nutrition and infant mortality in under–five children. It has demonstrated that a country does not have to wait for economic development before setting up effective social sector and health delivery systems, although sustainability is a serious concern now. Food and nutrition policies have been strongly advocated in the country since 1973 with the formation of the Tanzania Food and Nutrition Centre by an act of parliament. This politically favourable climate has spawned an unprecedented grass–roots social mobilization which has resulted in a kind of nutrition movement in Tanzania. Several community–based programmes were successful – particularly in Iringa, which attracted large donor support. The future of nutrition is dependent on the sustainability of such a strong social policy, and on the expansion of Iringa–type community–based approaches to other problem regions in the country.

The economic reforms and structural adjustment programme which followed the economic crisis in Tanzania during the 1980s have begun to generate economic growth currently at a rate of above 4% per year, compared to a population growth rate of 2.8%. This kind of economic growth is essential to enable the government to effectively finance "social security" for the poor and further develop human resources for sustained development. Political reforms are meant to strengthen people's participation in the growth of the economy.

Zimbabwe

Zimbabwe gained independence in 1980 after a protracted civil war. The population has more than doubled in the last 25 years and is now estimated at 9.8 million. Migration out of the country, which was high in the years before independence declined significantly, and there are indications of a net inflow of foreign workers. The urban population (26–30% of the total) grew by 7% between 1969 and 1982, twice the rate of the overall population. Children under five years are 23% of the population.

Trends in Nutrition

Before the 1992 drought (whose effects are still uncertain), the trend since independence in 1980 has been toward substantial improvement in the nutritional status of preschool children. Nutritional wasting no longer seems to be a serious problem and levels of stunting are reported to have fallen considerably. (Data comparability, however, poses some problems in deriving trends in stunting for which firm conclusions will have to await future findings.) According to an indirect estimate used in this report, the proportion of underweight children remained fairly constant between 1975 and 1980 at about 25%. A national survey in 1982 estimated that 10% of urban and 20% rural 0–3 year olds were below 80% NCHS median weight–for–age. In 1984, another national survey (this time of 1–5 year olds) found a prevalence of 14.5% using the same indicator, and a repeat survey in 1985 gave 11%. The 1988 DHS survey found that among children 3–60 months, 11.5% were underweight, 29% were stunted and 1.3% were wasted.

Zimbabwe is divided into four human settlement patterns and nutritional indicators correspond to this pattern. Commercial farming and mining areas, urban, and resettlement areas tend to be geographically located in the most productive areas of ecological regions where rainfall and soils are good for agricultural production. In contrast, communal areas (where the majority lives) occupy ecological regions characterised by marginal soils, low rainfall, and high population pressure. The most nutritionally affected groups, in order of declining severity, are children of farm and mine labourers, newly resettled families, domestic workers in the communal areas, and finally, newly established housing schemes in the urban areas. The highest rate of stunting was found in Matabeleland North (36%), where chronic drought is experienced, while the lowest was in

Harare/Chitungwiz, where the figure was 11%. The prevalence of stunting in under–fives in rural areas was more than twice that in the urban areas, i.e 33% compared to 14%.

Infant mortality rates fell sharply since 1982 from 80 per 1,000 live births to 45 per 1,000 in 1990, reflecting the gains made by the post–independence government in providing health care to the majority of Zimbabweans.

Other significant nutrition problems are iodine deficiency disorders, vitamin A deficiency, anaemia and pellagra. Malaria is prevalent and accounts for about 8% of in–hospital morbidity in children under five years old. Bilharzia is common, with the highest prevalence found in the north and northeastern parts of the country. Hookworm too is widespread, with a high prevalence in the Zambezi valley.

> *Note:* Based mainly on *Nutrition–Relevant Actions in Zimbabwe* by T. Jayne, J. Tagwireyi, and N. Lenneiye, Harare. (1992).

Economic Trends

The economy is heavily dependent on agriculture, and has experienced sharp fluctuations in the growth rate, due mainly to a series of severe droughts which have plagued the country since late 1981. GNP per caput fell from its peak of $900 per caput in 1982 to $560 in 1987, and recovering somewhat in 1989. Severe droughts in 1991/92 again stalled the path to recovery. Zimbabwe's level of external debt grew sharply after independence, with the debt ratio reaching nearly 40% in 1981. The drought years led to an increase in short–term commercial loans, and consequently the debt service ratio. Inflation peaked at 14% in 1987, and with wages held constant, many wage earners have felt a deterioration in their income.

Starting in late 1982, the government under the stimulus of an IMF stand–by credit, began implementing a series of economic stabilization and adjustment packages which continue up to the present and include devaluation of the Zimbabwe dollar, restrictions on government spending, and the removal of subsidies. Subsidies on food were cut in 1982/83, and administered prices increased as part of an IMF agreement, while wage increases were restricted to half the annual rise in the consumer price index.

(Estimates in 1990)

Population	: 9.8 million	IMR	: 49
Population Density	: 25 per sq. km.	GNP US$ (Per Capita)	: 640
Population Growth Rate	: 3.4% per annum	Urban Population	: 28%

CHILD GROWTH AND SURVIVAL
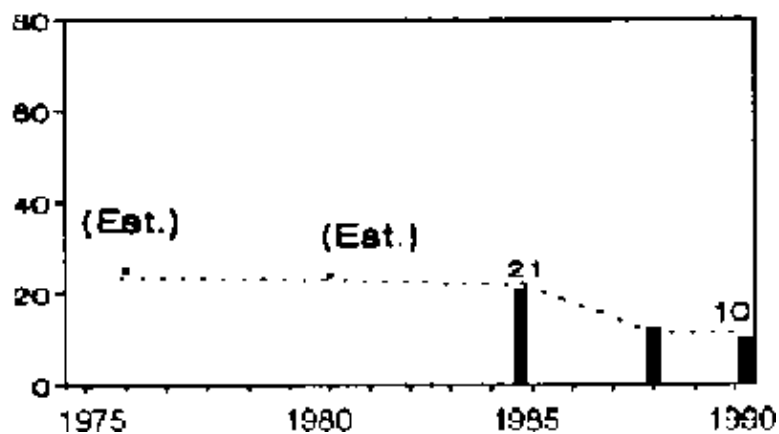
115

Underweight preschool children (Percent below −2 s.d. weight for age)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

Debt service ratio (Debt service/exports)

FOOD

Food production index (Per caput, 1979–81=100)

Dietary energy supply (Kcals/caput/day)

Consumer price index (1980=100)

FPI/CPI ratio (1980=100)

HEALTH

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Immunization coverage (Percent)

Measles: Children

Tetanus: Pregnant women

Access to local health care (Percent)

Population with access

Low birth weight (No.<2.5kqs./100 live births)

15 (Est.)

6 (Est.)

Access to potable water & sanitation (Percent)

Access

Sanitation facilities

Safe water
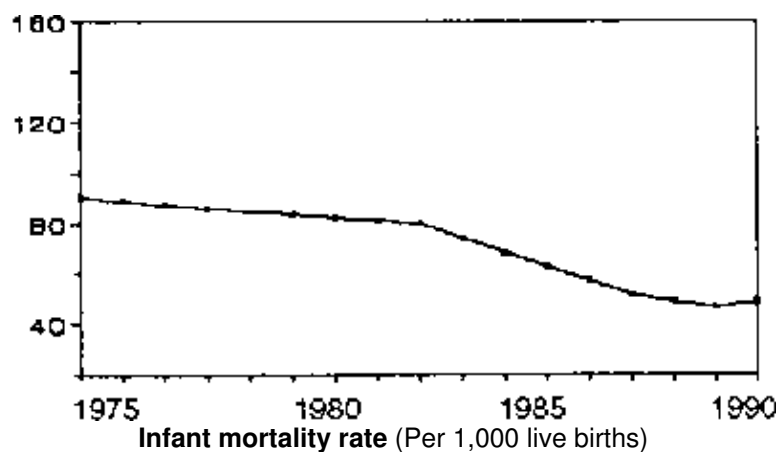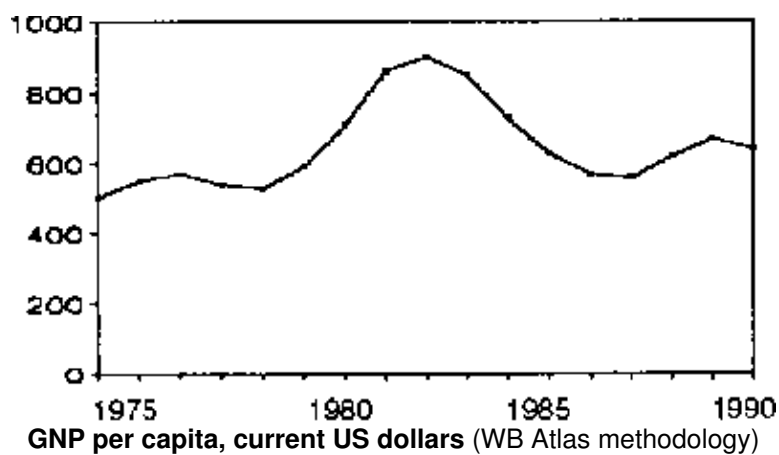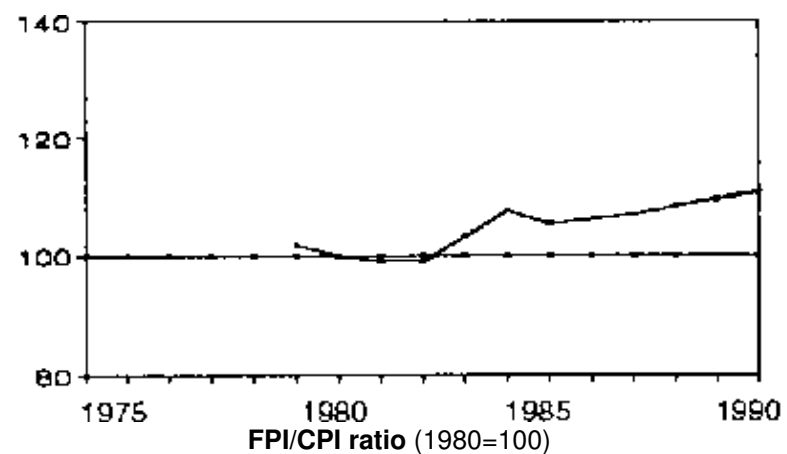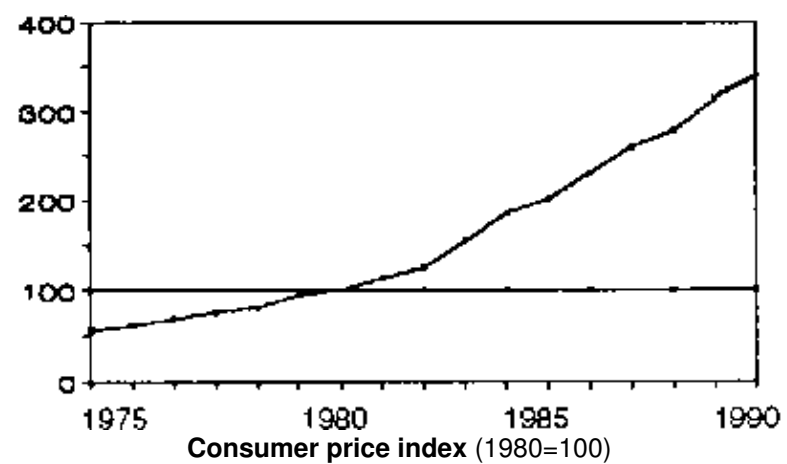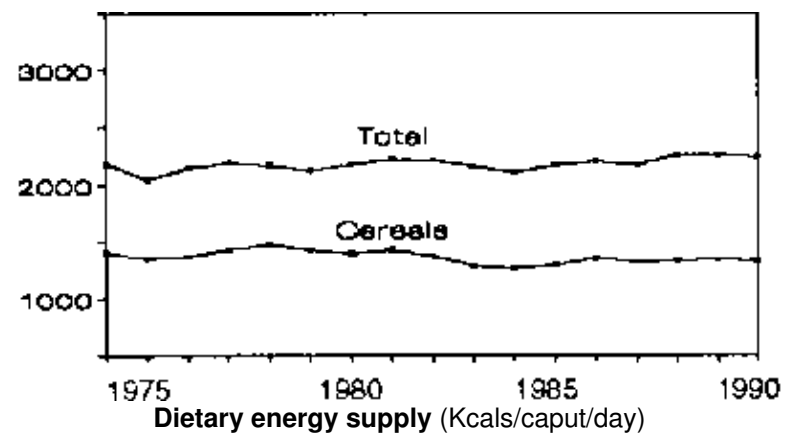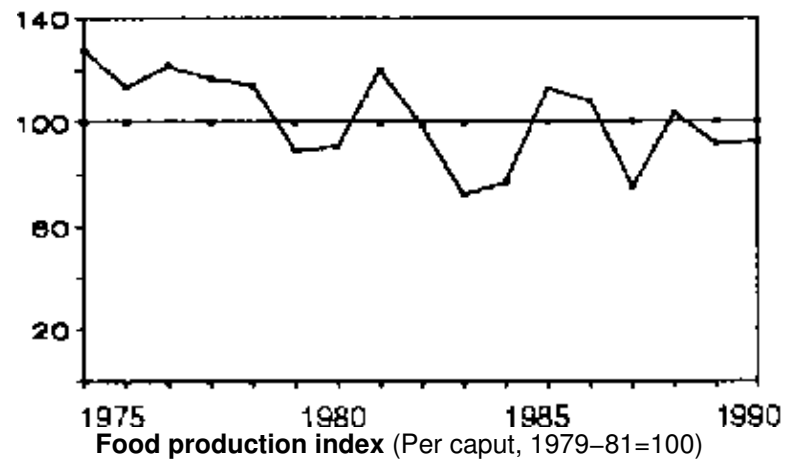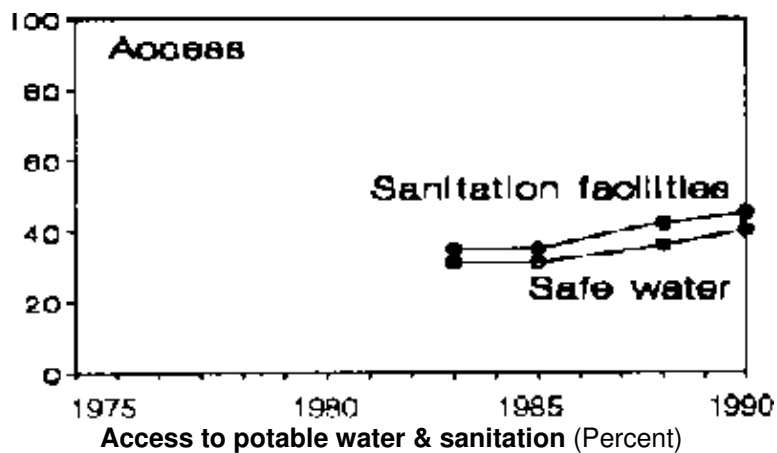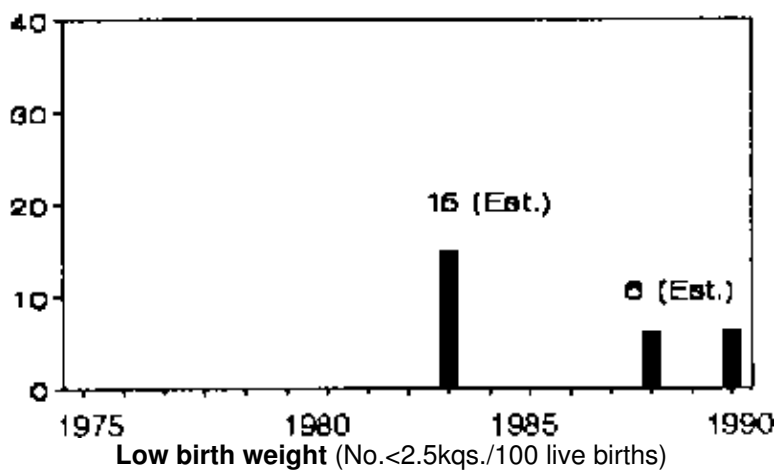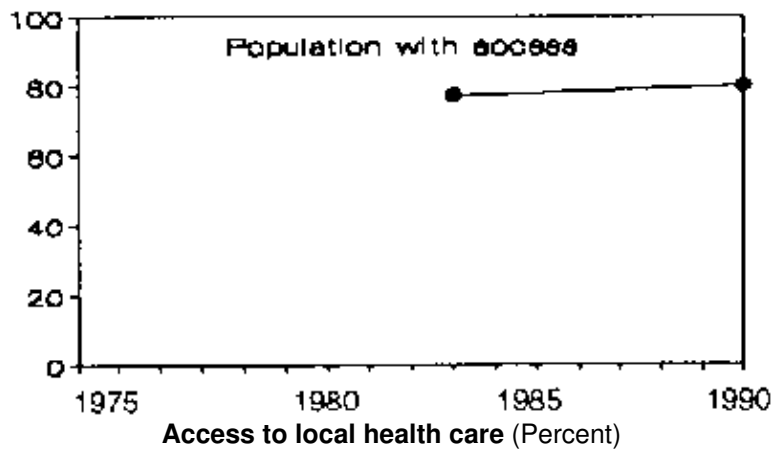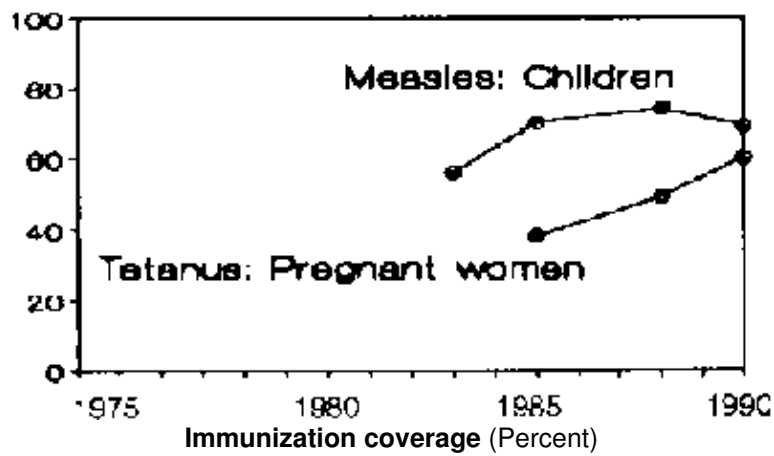
The employment situation continues to deteriorate in Zimbabwe, and there is a serious job shortage. The formal sector employed an estimated 1.15 million at the end of 1988, with only 100,000 new jobs created

since 1975. These new jobs were balanced by job losses particularly in the agricultural sector. The situation is expected to worsen as some 300,000 school leavers flood into the labour market each year after 1990.

Food Security – National Level

The production of staple foodgrains has generally exceeded domestic needs, with maize stocks reaching 1.8 million tons in 1986 – equivalent to two years of domestic consumption requirements. For several years, a large part of the emergency needs of neighbouring countries such as Angola and Mozambique were met through donor–supported purchases of Zimbabwe's surplus. However, the serious drought conditions in 1991 exhausted the country's stocks. The drought continued into 1992, requiring substantial food aid from donor countries.

Agriculture employs more than two–thirds of the population and comprised 20 to 33% of export earnings in the 1980s. At independence, the agricultural sector had a dualistic farming system. Large commercial farms on fertile land were owned by a small white minority, while less–fertile land owned by Africans was given over to subsistence production. Since independence, the government has attempted some resettlement programmes. Extensive effort has been made to raise production on smallholder farms. The government has maintained high producer prices – for example, until 1987, Zimbabwean farmers were getting more for their maize than it was fetching on the world market. The government has also increased extension services and input subsidies to smallholder farmers. During 1980–86, the sector grew at an average of 4% per annum in real terms, and agricultural exports at 4.3% per annum. Smallholder producers increased their contribution to total agricultural production from 15% to 35%, to marketed maize from 10 to 40%, and to cotton production from 7% to 53% during this period.

The country imports wheat and rice. Export crops such as tobacco, beef, and sugar contributed about 70% of agricultural production in 1987. The 1989 harvest was exceptionally good, with tobacco reaching a post–independence record and all major crops except cotton reported to be close to the record level of 1988. Zimbabwe is the third largest exporter of flue cured tobacco, with about 15% of world trade. The eroded productive base for maize over the past five years means that there is no longer a national surplus, even during a normal rainfall year.

Food Security – Household Level

Average household incomes increased moderately in the years immediately following independence in 1980. Minimum wages were set, food subsidies were enacted, land resettlement began, and investment in social areas increased. However, the implementation of the structural adjustment programme in 1982 led to increasing food prices. Food prices have been higher than overall inflation since 1982. Trends in calorie availability per caput had been fluctuating between 2,100 to 2,300 in the 1980s – generally lower in the drought years.

The intermittent shortages of food, particularly in drought years, are exacerbated by seasonal changes. It is estimated that an average of about a quarter of rural farming families do not have sufficient food stocks to last from one harvest to the next, with food in shortest supply between October and January, prior to the main harvest.

The Zimbabwean government's main policy response to chronic and transitory (seasonal) food insecurity has been drought relief food transfer programs, which currently feed over a million people each month. This approach puts the burden of food distribution upon the government – specifically the ministries associated with food aid, food–for–work, and supplementary child feeding. In the drought years between 1982–87, large proportions of the country lacked access to food for several months at a time – one to two million people having been registered for drought relief during those years. The need for these costly short–run programmes became apparent only after long–run food policies had failed. One problem was the absence of direct trade between grain surplus and deficit areas and its replacement with circuitous grain flows featuring redundant transport routes, overcentralized and high–cost milling operations, and artificially inflated consumer prices of staple food. This appears to be a major cause of food insecurity and loss of real income among the rural and urban poor. If national maize shortages persist, the government's ability to cushion vulnerable groups through conventional food and income transfers will be affected.

In the current environment of dwindling governmental maize buffer supplies and declining real wages, Zimbabwe is facing a food price dilemma. The solutions to this dilemma will require both short–run and long–run strategies. In the long run, new farm technology, resettlement, and/or the successful generation of employment and income growth would relieve the dilemma, while in the short run, a Government investment

policy that effectively develops small–scale milling capacity would significantly reduce milling and marketing margins. This would restrain staple maize price rises for low–income consumers, self–target to the poor (providing straight–run meal is milled), and still allow producer prices to remain high. Furthermore, this would require no subsidy on maize meal. In the very short run, however, before such markets develop, subsidies probably cannot be avoided. This being the case, a subsidy on straight–run meal would more cost–effectively self–target low–income groups than the current policy of subsidies on the more refined meals, which leaks benefits to consumers of all income categories and results in substantially larger budget deficits.

WOMEN AND CARE

Secondary schooling

Total fertility rate (Births per woman)

Antenatal care (Percent)

Maternal mortality rate(Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

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Health budget (Percent of government expenditures)

Education budget (Percent of government expenditures)

REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN

26
20
15
10
6
0

MANICALAND CENTRAL EAST WEST MASVINGO
MASHONALAND

Mashonaland West Mashonaland Central Harare Mashonaland East Matabeleland North Midlands Manicaland Bulawayo Masvingo Matabeleland South

25
20
15
10
6
0

NORTH SOUTH MIDLANDS BULAWAYO
MATABELELAND

Percent below 3rd percentile weight for age (NCHS) preschool children (1989)

To cushion vulnerable groups from the adverse effects of the structural adjustment programme, the government has also established a social fund to provide a safety net. Nutrition has been singled out as an indicator to be monitored with respect to the impact of the Structural Adjustment Programme.

While no national food consumption surveys have been made, information on dietary patterns has been collected in a few communal lands in several provinces. About 40% of household incomes is devoted to food. In general, the main staple in the Zimbabwean diet is maize, consumed with a relish or sauce of vegetables, groundnuts, beans, and, less frequently, meat. The increased consumption of maize has replaced other staple grains such as sorghum and millet. There is some evidence that traditional diet patterns are changing and there may be a reduction of legumes in the diet, corresponding to an increase in white bread.

Health and Control of Infectious Diseases

Zimbabwe has a strong political commitment towards health objectives. The public health expenditure of around US$15–20 per caput for most of the 1980s (or about 6–8% of the government national budget) is nearly three times that of Kenya or Nigeria and about twice as large as Egypt, a country with nearly the same level of GNP per caput. More than 80% of the population were considered to have access to local health care in 1990, while 42% had access to safe water.

After independence, the country's health sector was restructured to address inequalities in the distribution of health services. Health care expenditures increased immediately after independence but have stagnated since the mid–1980s. Under the new reforms, health care became free to those earning less than Z$150 per month in 1980; at that time, when the minimum wage for industrial workers was Z$85 per month, this policy

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covered the vast majority of the population. Since July 1986, the minimum industrial wage has exceeded Z$150 and is currently Z$200 per month, effectively excluding all industrial workers from the free service.

Immunization rates increased in the mid–1980s from 56% in 1983 to 74% in 1988, but there was a decline in 1990 to 69%, partly due to the effect of the drought, which hampered the provision of health services. Immunization against tetanus for pregnant women increased from 38% in 1985 to 60% in 1990.

A diarrhoeal disease control programme (DDCP) was launched in 1982, emphasizing use of Oral Rehydration Therapy (ORT), epidemic control, better nutrition, prolonged breast–feeding, and environmental hygiene through improvements in water supply and sanitation. Survey data in 1984 and 1988 indicate that knowledge of a sugar–salt solution to deal with diarrhoeal cases has become widespread and the incidence of diarrhoea cases at health care facilities had declined. Zimbabwe has also invented the Blair toilet, a screened device which prevents flies and other insects from entering the waste area.

Women and Care Factors

The position of women in Zimbabwean society is surprisingly inferior for a country with a reputation for social awareness. Because of the migration of men for paid labour, more than 50% of rural households are headed by women. Since independence, female literacy has been rising. The percentage of school–age girls in secondary school in 1988 was estimated at nearly 40%. The gender gap in educational attainment, however, has been widening. In 1987, at ages 10–14 years, 95% of girls as well as boys attended school, but at ages 15–19, only 62% of the girls attended school compared to 79% of boys.

The fertility rate of Zimbabwean women is quite high at nearly 6 births per woman in 1990 – although this was lower than the 7.2 births per woman in the 1970s. Health services to women in Zimbabwe compare favourably with most of its neighbours. In 1990, more than 80% of pregnant women received antenatal care from trained health staff, compared to around 33% in 1983. Close to 70% of birth deliveries were attended by trained health personnel.

Nutrition Programmes

Community–based actions such as the Community Food and Nutrition Programme (CFNP) have been important in Zimbabwe. During the drought of 1982–84, food supplements for children and adults in most rural areas were distributed by government. The Department of Nutrition in the Ministry of Health took the lead in child supplementary feeding, with assistance from the Ministry of Labour and Social Welfare. The Child Supplementary Feeding Programme (CSFP) was successful in mobilising various ministries, extension workers, and communities to prepare and feed children in groups in the communal areas. The project also registered success in replacing imported biscuits and food products, traditionally used in emergency feeding programmes, with locally produced foods (beans, maize and cooking oil). The CSFP also utilised locally–constituted committees made up of parents to calculate food quantities required, and receive and distribute the food to mothers at the group feeding points in the community. The success of community action led the programme to develop a production element, and the Supplementary Food Production Programme (SFPP) was born. Like the CSPP, the SFPP utilised a complex inter–ministerial management system (the National Steering Committee – NSC) with district–based management committees (Food and Nutrition Management Teams – FNMTs). Government extension workers (in health, community mobilisation, agriculture, etc.) were mobilised and organised for this programme. Components of the SFPP included nutrition education, promotion of appropriate technologies for food preservation, processing and storage, training of extension workers in planning and monitoring, production of nutritious foods at communal gardens worked on by mothers of malnourished children, and communal cooking and feeding of children using the food produced.

The mandate of the FNMTs evolved to go beyond food production, and programmes on iodine deficiency control, community–based nutrition surveillance, nutrition surveys etc. were handled by these committees. The NSC no longer coordinates the SFPP alone, but has taken the lead in the development of a National Nutrition Policy framework. These developments have taken place because as nutrition programmes developed, gaps became evident, and the NSC/FNMTs readily took up these roles. Evaluations of NSC during the 1985–90 period indicated the need for the SFPP to address broader issues beyond community food production. The SFPP subsequently evolved into a Community Food and Nutrition Programme (CFNP) to reflect the broadening of its objectives. Community mobilisation for nutrition, provision of agricultural extension support, nutrition and health education, linkages to local institutions for development planning, and extensive inter–sectoral collaboration remain the main features of this programme.

Conclusion

Zimbabwe has in the recent past been cited as an example of how health and welfare services can be maintained or improved in the face of adverse economic trends. The relatively low infant and young child mortality rates, combined with the fact that wasting seems to have fallen to very low levels during a period when, despite relative stagnation in the economy, there was a steady improvement in health services, suggests that progress has been made in reducing the health–sector related causes of malnutrition in Zimbabwe. Much evidence suggests, but does not prove, that access to food is inadequate several months each year for a substantial proportion of families in Zimbabwe, despite successes in increasing overall agricultural production. Drought, inequity of land ownership and consequent crowding in many communal areas, the dislocation and lack of infrastructure and poor support given to resettled families, and an inefficient inherited grain marketing system only just beginning to be liberalized, are all certainly partly to blame, though there is no way to quantify their effects on nutrition.

Growth retardation is occurring mainly at very early ages in Zimbabwe. The average height–for–age declines rapidly during the first nine months of age in rural areas, and reaches its low by 20 months of age. This is associated with early problems with infant feeding, particularly premature supplementation of breastfeeding, although it is still not clear whether this is because of traditional beliefs, lack of information, misleading messages from the health professions and/or the infant food industry, or constraints on mothers' time. Among important factors contributing to Zimbabwe's nutritional improvement is the fact that the government has been generally committed to improving the health and education of its poorer citizens, including a willingness to give a certain priority to vulnerable groups such as young children. Allied to this, the spirit of cooperation and community spirit that characterizes Zimbabwean society (particularly manifest in the first years after the war of independence was won), along with active and continued support of nutrition projects at grass roots level from a large number of NGOs, has reinforced such commitment.

Brazil

Brazil has the largest population in South America and the fifth largest in the world. Between 1950–70, the population grew at an average annual rate of 2.9% a year, this dropped to 2.0% per year from 1980–91. Infant mortality has decreased in recent years, from 121 per 1000 live births in 1960 to 67 in 1986 and 57 in 1990. Life expectancy at birth has increased moderately, from 55 in 1960 to 65 in 1987, although there are strong regional variations, the lowest values being found in the Northeast – the poorest region of the country with nearly 25% of the population.

Brazil has experienced a boom in urban growth. Around 75% of the population lived in an urban area in 1990, compared to 51% in 1960 (in fact, 30% of the population live in nine metropolises). In the last three decades, the urban population has grown by 4.2% per year, although this is expected to fall to about 2.6% a year in the 1990s. By the year 2000, projections place Sao Paolo as the world's second largest city (22.1 m), second only to Mexico City (25.6 m).

Trends in Nutrition

National estimates of the prevalence of underweight children according to the 1975 and 1989 surveys show a marked improvement (see panel "Child Growth and Survival"). For the whole under–five population, the figures are, respectively, 18.4% and 7.1% – a prevalence reduction of around 0.8 percentage points per year on average over this 15–year period. Significant reductions were observed for both boys and girls of all ages. Taking into account population projections for 1975 and 1989, the number of underweight children in the country dropped by more than one million.

Improvements were observed all over the country, although those regions worse off in 1975 – the North and the Northeast – were those which benefitted least, further widening the regional gap. Taking as an example the extreme cases, the underweight prevalence in the Northeast dropped from 27.0% in 1975–77 to 12.8% in 1989, while, during the same period, the Southeast rate dropped from 13.4% to 4.1%.

Trends in the South and Southeast are similar for rural and urban children, with the higher rural underweight prevalence in 1975 persisting in 1989. In the Northeast, the rural strata benefitted less and the rural–urban gap in prevalences actually increased.

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Disaggregating the trend data by socioeconomic group, a substantial decrease in underweight prevalence is seen in each of four income quartiles. Similarly to observations with the regional stratification, however, the strata with the highest prevalence, in this case the children belonging to the poorest families, benefitted less. The consequence again is an increase in the gap in nutritional status between rich and poor. Comparing the two extreme income quartiles, it can be seen that the prevalence ratio increased in this period from 5 to 10. Available evidence indicates that it is plausible that both the economic changes and the provision of services and programmes had a positive role in the improvement observed in child nutritional status. On the other hand, the smaller economic gains and a slower universalization of basic services seem to explain the lower benefits to the North and Northeast regions as compared with the rest of the country.

However, based on the coincidence observed in the 1970s between extraordinary economic gains and expansion of services and programmes, it is argued that the nutritional improvement observed in the country was concentrated in the 1970s. Evidence that few, if any, gains were made in the 1980s can be found in (i) the stability of growth deficits presented by the 5−to−9−year−old children studied in 1989 (children born from 1980 to 1984), (ii) in the marked similarity in underweight prevalences observed in the Northeast region by the surveys of 1986 (DHS) and 1989 (children born from 1981 to 1986 and from 1984 to 1989) and (iii) even in increasing infant mortality rates observed in the early 1980s in some regions. If confirmed, this situation is reason for concern particularly in the North and Northeast regions.

Demographic trends observed during the two last decades were generally favorable for nutrition, in that there was a striking decrease in fertility and birth rates and consequently a lower demand for all services and programmes targeted to children. The proportion of smaller families with lower economic dependency ratios increased, and there was a continuous migration of families to the urban areas of the country where better income and employment opportunities and services infrastructure are found.

> *Note:* Based mainly on *"Nutritional Status in Brazilian Children: Trends from 1975−1989"* by R. Iunes and C. Monteiro. University of Sao Paulo, Brazil. (1992), and *"Growth and Nutritional Status of Brazilian Children: Findings from the 1989 National Health and Nutrition Survey"* by C. Monteiro, M. D. Benecio, and N. Gouvea. WHO: Geneva (1991).

(Estimates in 1990)

Population	: 150 million	IMR	: 57
Population Density	: 7.7 per sq. km.	GNP US$ (Per Capita)	: 2,680
Population Growth Rate	: 2.2% per annum	Urban Population	: 75%

CHILD GROWTH AND SURVIVAL

Underweight preschool children (Percent below –2 s.d. weight for age)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

Debt service ratio (Debt service/exports)

FOOD

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Food production index (Per caput, 1979–81=100)

Dietary energy supply (Kcals/caput/day)

Index x 10^5

Consumer price index (1980=100)

FPI/CPI ratio (1980=100)

HEALTH

Immunization coverage (Percent)

Immunization coverage (Percent)

Low birth weight (No. < 2.5 kgs./100 live births)

Access to potable water & sanitation (Percent)

Economic Trends

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In the late 1960s and early 1970s, the Brazilian economy expanded very rapidly, a period often referred to as the "economic miracle" when GDP growth rates of 11% per year were realized. Changes in the economy, however, were not uniform in the 1970s and 1980s. From 1970 to 1976, the GNP per caput grew more than 50%. In the same period, even with a deterioration in the profile of income distribution, the proportion of population below the poverty line fell by 50%. From 1976 to 1980, the rate of economic growth was modest, income concentration remained high, and family income and the proportion of individuals living below the poverty line remained stable.

The country's economic success, fueled largely by foreign borrowing, came to an abrupt end in the early 1980s when high oil prices and declining exports resulted in large current account deficits. Real GNP per caput fell by 18% between 1982 to 1985. Brazil had borrowed heavily from abroad in the late 1970s, the total external debt reaching 71 billion dollars by 1980. Declining export revenues made it exceedingly difficult for Brazil to make repayments on its debt. In 1982, the debt service peaked at around 85% export revenue. Inflation was also spiraling upwards, peaking in 1989 at 2,000%.

In 1983, the government responded to this enormous debt service burden and the inflation rate by implementing a stringent structural adjustment programme. A major emphasis was placed on reducing the public sector deficit, primarily by cuts in state enterprise investment, gradually lowering credit and interest rate subsidies, increasing the pace of devaluation, and redoubling efforts to increase the domestic production of oil and oil substitutes.

The contraction in public sector spending resulted in declining output and increased unemployment rates in 1983 and the beginning of 1984, especially in construction and manufacturing, where unemployment rose to 30%. The structural adjustment programme was successful in curbing imports and increasing exports, thus achieving record trade surpluses. By the second half of 1984. the country had initiated a strong economic recovery. Increasing exports had a positive impact on the debt service ratio, which declined significantly in 1984 and 1985.

Inflation, however, continued to escalate, and food prices also rose significantly, but as evidenced by the FPI/CPI ratio (see panel) did not grow as rapidly as non–food items. The inflation rate, as well as recurring deficits in the current account, led to an unmanageable debt service situation and, in 1987, the government announced an interest payment moratorium on about US$68 billion of commercial bank debt. In 1989, Brazil's real GDP rose 3.6%, while inflation still spiraled out of control. A new president in 1990 announced "The Cruzado Plan" to reduce inflation, reduce public corruption, privatize various state enterprises, and initiate import liberalization and exchange rate reforms. An important effect of the plan was to be an improvement in the distribution of income, which had worsened markedly in the 1980s.

Some of the economic gains from the period of intense economic growth were therefore lost during the 1980s. The observation of trends in poverty in the five macro–regions (comparing 1970–76 with 1985–88 averages) indicates improvements in all regions, although with differing degrees; around 40% reduction of poverty in the regions of the Centre–South, 27% in the North, but only 17% in the Northeast region.

Despite the deterioration of the economic situation, government allocations to the social sector were relatively less affected. Health expenditure as a percentage of total government expenditure averaged 8% in the early 1980s, and, except for a brief increase in 1987, averaged around 6% from 1985–1988. The Brazilian Government has increased its spending on education, from 2% of government expenditure in 1980 to 4.2% in 1988. Due to a massive adult literacy campaign, combined with a great expansion at all levels of school enrolment, there has been a marked improvement in literacy rates. By 1978, 78% of the population could read, an unusually high rate for a developing country. Literacy remains significantly lower in rural than in urban areas (approximately 54% compared with 83%) and education opportunities remain linked to geographic location and socio–economic status. Virtually all public primary and secondary education is provided by state and local governments, which spend nearly twice as much on education as the federal government; 23% of total government education spending goes towards universities, compared with 9% to secondary schools.

Food Security – National Level

Brazil is an important agricultural producer, becoming, in 1977, the second largest agricultural exporter in the world. Agriculture was the source of employment for 26% of the population from 1985 to 1987, down from the 1965 figure of 49%. Brazilian agricultural production permits self–sufficiency, except with regard to wheat. Primary crops are soybeans, oranges, coffee, bananas, maize, and sugar. Agriculture has been growing at a rate of 2.2%, and its annual participation in the GDP ranges from 7% to 11%, while it provides 30% of total

employment. Around 80% of the crop and livestock production is concentrated in the central and southern zones. Agriculture techniques remain simple, yields are comparatively low, and the government has tended not to provide extensive support and resources to the development of this sector.

WOMEN AND CARE
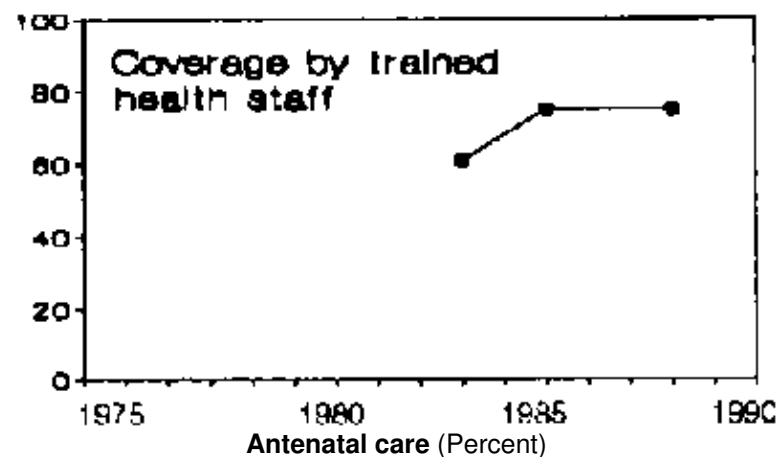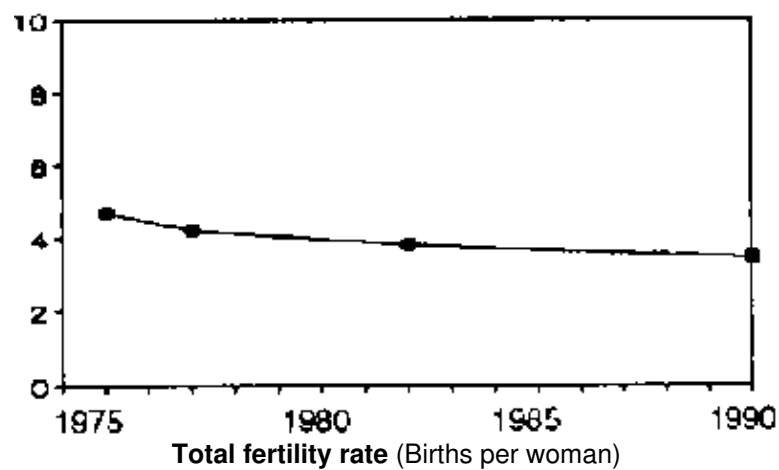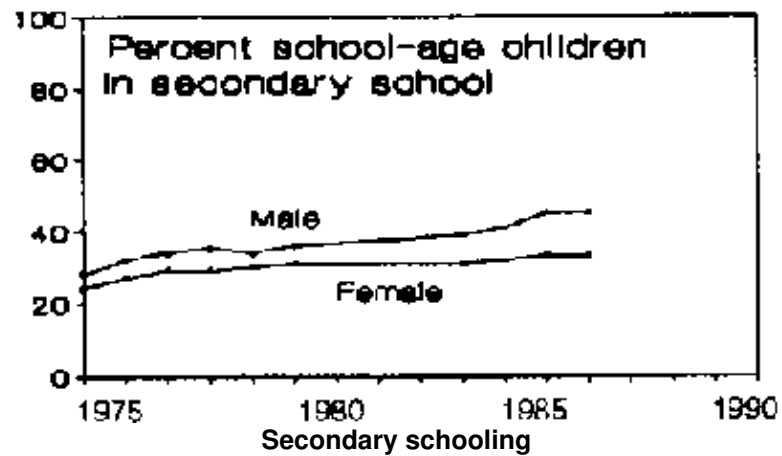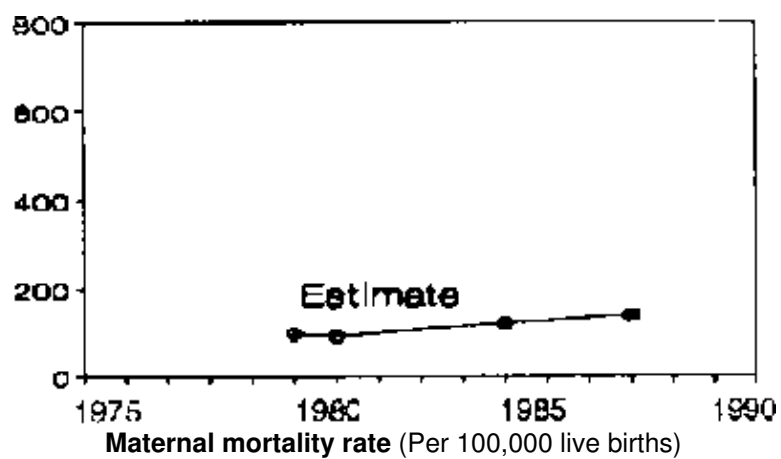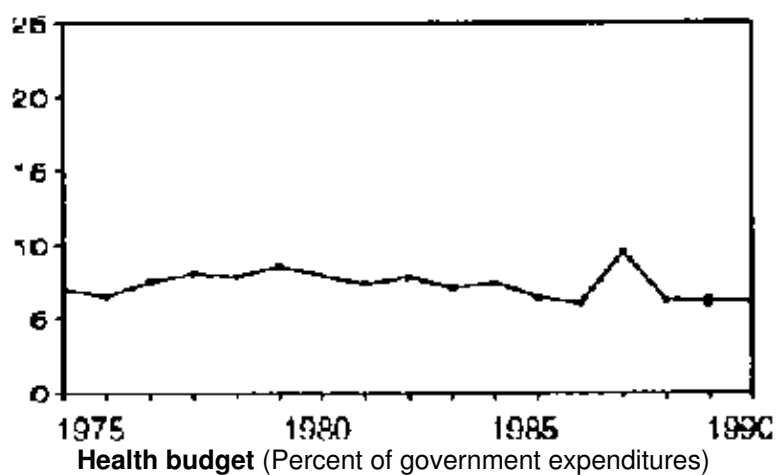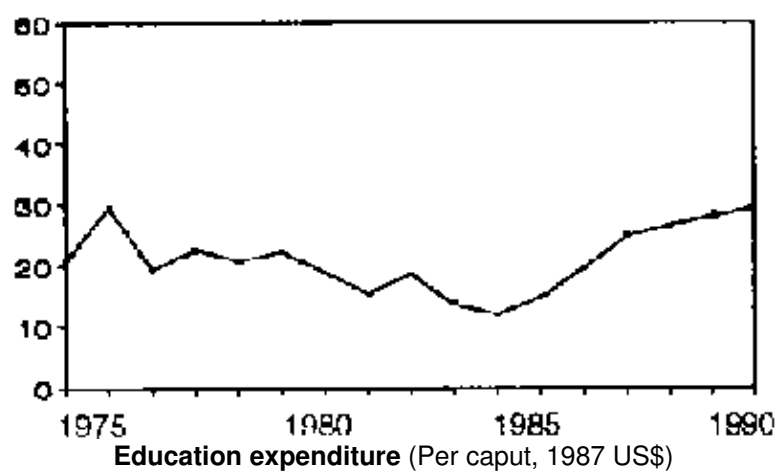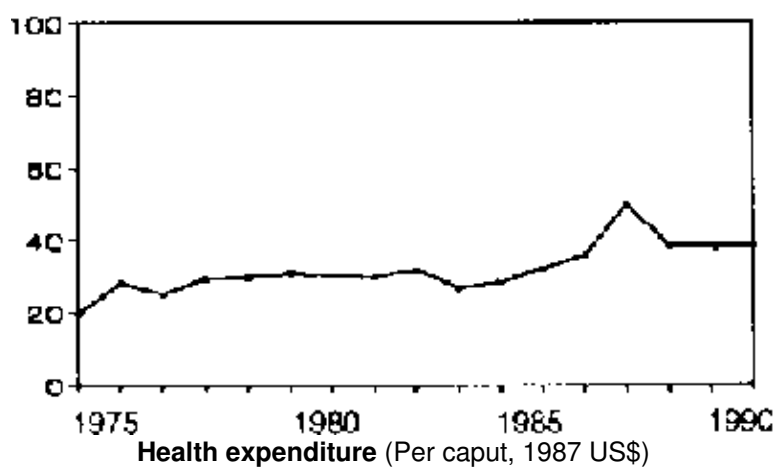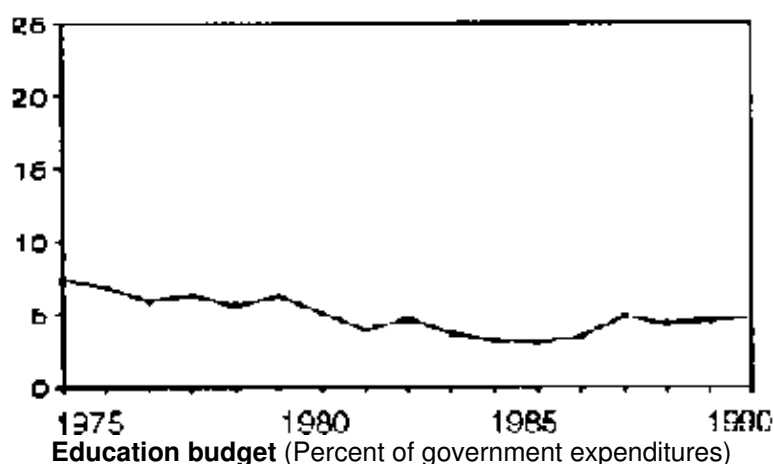
Secondary schooling

Total fertility rate (Births per woman)

Antenatal care (Percent)

Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

Health budget (Percent of government expenditures)

Education budget (Percent of government expenditures)

TRENDS REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN
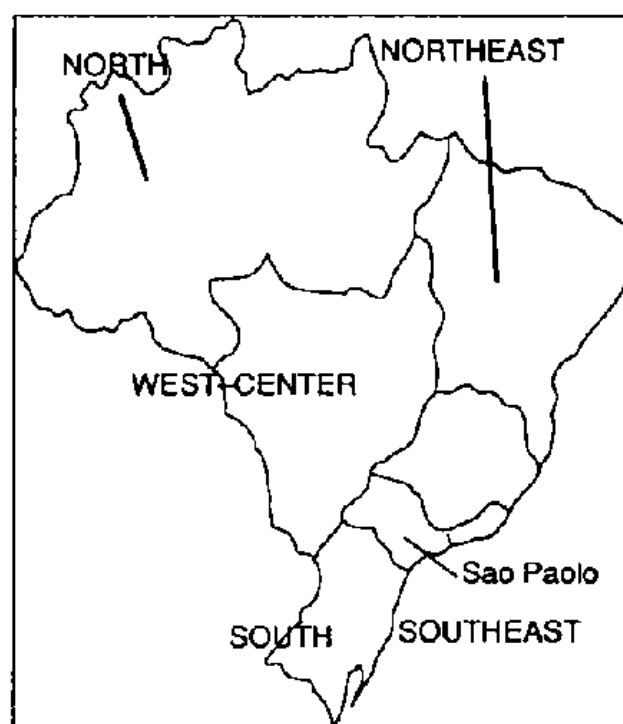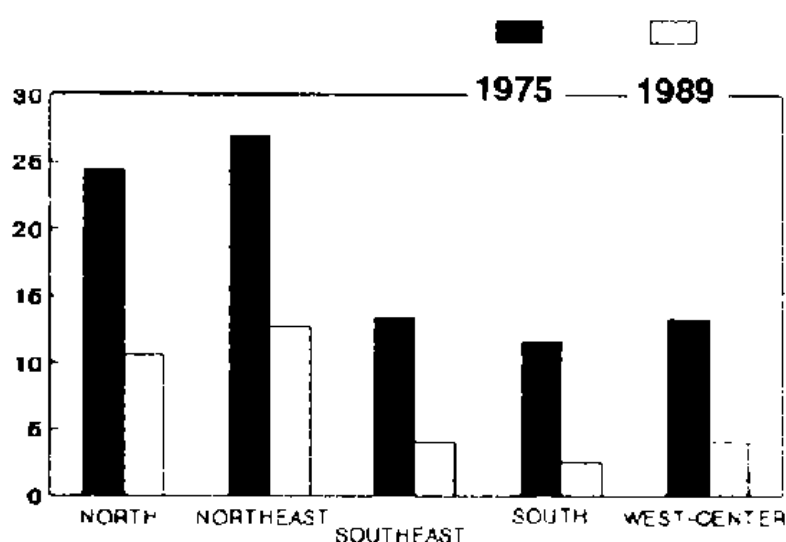
Prevalence of underweight children, 0–59 months (Percent < –2 s.d. weight for age, NCHS)

Nevertheless, Brazil is one of the world's most important traders of agricultural produce, being a major supplier of coffee, soya, soymeal, and sugarcane. Other agriculture exports include meat, poultry, cocoa, beans, and cassava. Food production experienced significant fluctuations between 1980 and 1986: production dropped by 6% between 1982–84, but increased steadily between 1986–88 (see panel, Food Production Index). Overall, agricultural production increased by an annual average of 6.5% during the first half of the decade, and showed a stronger growth trend during the late 1980s. There does, however, seem to be a significant drop in both agricultural and food production in 1990, the latter registering a fall of more than 8% from the 1989 level.

Cereal availability is largely a result of domestic production, and except for 1983, steadily increased – by 33% between 1980–1990. Cereal imports show a significant drop since 1986. The production of rice and beans, the staple foods of the poor, has been steady, while soybean and sugar production, important export crops which have been enjoying a favourable producer climate, has been increasing.

Food Security – Household Level

The per caput GNP figure of US$2,680 in 1990, while quite high relative to other developing nations, does not reveal the extremely poor income distribution – the poorest 40% of the population have 8% of the income,

while the top 20% control 63%. Income distribution varies substantially by region, with the situation worst in the Northeast which has a quarter of Brazil's population, but over half its poor. The average Brazilian household spent 35% of its total expenditure on food during 1980–85, though this proportion was likely to have been considerably higher among the poorest households. Real wages fell from a growth rate of 8.7% in 1980 to –11.0% in 1983, although it is estimated that they showed a small positive growth of 1.9% by 1989.

The 1974–75 National Survey of Domestic Expenses (ENDEF), which included a seven–day weighed food intake, reported 26 different types of diets for the different regions and socio–economic groups. Diets with cassava as the main staple were found to be characteristic of the poorest 14% of the population (mainly in rural areas and urban northeast). In contrast, diets based on rice were most common in more affluent sections of the urban and rural population, where meat and dairy products were also eaten more often.

Per caput calorie availability fell from 2,740 kilo–calories per day to 2,630 kilocalories per day in 1985, but began to increase again in 1987 and was estimated at 2,750 in 1989. Protein levels have remained virtually constant during this period (60.6g in 1980, 61.8g in 1989).

Beans are the most popular food item in the Brazilian diet and are the main source of protein in the low–income strata, while cassava flour and wheat provide the main source of calories. It has been estimated from food consumption surveys that cassava–based diets provide 1,700–1,900 kilocalories daily, while rice diets provide 2,000–2,200 kilocalories. Food items ranked according to their frequency of consumption are beans, rice, wheat bread, cassava flour, meat, pork fat, oils, maize, and milk.

Health and Control of Infectious Diseases

In contrast to the economic situation, trends in the availability of services are more uniform and positive in the two decades. The coverage of water supplies, sewage, vaccination, and basic education of young women was two to three times higher in the 1980s than in the 1970s. Regional trends in the availability of services were positive all over the country, although the rate of reduction in the share of the population not covered is quite different from region to region being in general, faster in the Centre–South. In parallel to the expansion of sanitation, health, and education services, the provision of food and nutrition programs, particularly supplementary feeding programs, also expanded.

Access to health services is relatively good. Around 86% of the urban population and 53% of the rural (giving a total of 76% for the country as a whole) had access to health services between 1980 and 1986. From 1985, health and education expenditure increased substantially; the government spent 1.3% of the GNP on health in 1986 (about average for developing countries). Brazil had a very low nurse per doctor ratio of 0.9 in 1984.

About 78% of Brazilians from 1985 to 1987 had access to safe water, increasing to more than 90% in 1990. While this compares favourably to the developing country average of 55% in 1987, it hides rural–urban differences – the figures are 89% for the urban population and 47% for the rural. UNICEF estimated that more than 60% of under–four children in Brazil live in houses with inadequate sanitation facilities; the corresponding figure is 90% in the Northeast. Brazil also has great regional disparities in health outcomes. In the Northeast, where the situation is worst, 20% of children in rural areas are born under 80% of average birth weight, compared to 12% in urban areas. Although nationally 95% births are attended by health personnel, there are some indications of poor prenatal care, particularly in the rural regions.

On a regional basis, IMR and life expectancy differ greatly from region to region. The larger, more urban areas benefit from a higher life expectancy as well as a markedly lower IMR. Government expenditures on health amount to about 3% of their budget, with about 4% on education, although national figures do not illustrate regional differences.

Women and Care Factors

The participation of women in the labour force continues to increase. In 1980, women comprised 31% of the economically active population, increasing to 35% in 1987. Although they are entering the work force in increasing numbers, women have yet to be accepted as equal to men in the workplace, frequently occupying jobs with less prestige and less pay. In 1987, women on average earned only an estimated 52% of men's wages.

The proportion of households that are female–headed is rising. In 1987, 20% of families were headed by women, the proportion being somewhat higher in urban than rural areas. The 1970s and 1980s have witnessed a drop in fertility rates, probably associated with increases in use of contraceptives and family

planning, levels of education, urbanization, and female participation in the work force. The total fertility rate for Brazil in 1984 was 3.5. The figure was higher in rural areas (5.3), and among the lower income levels (in the rural Northeast, the fertility rate in 1984 was 6.5). Although maternal mortality is lower than in most developing countries, the rate of 120 per 100,000 (for 1980–87) is high when compared to the average developed country rate of 24.

Brazil has an unusually high literacy rate for a developing country. In 1987,78% of the adult population could read, up from 66% in 1970. Female literacy rates are slightly below male rates. In 1970, the adult male literacy rate was 69%, compared to 63% for women. By 1985, literacy rates were 79% and 76% for females and males, respectively. The primary school enrolment rate from 1983 to 1986 was 108 for males and 99 for females. In secondary school, the gross enrolment rates for the years 1968 to 1988 were 32 and 41 for females and males, respectively. Despite an increase in the level of government expenditure on education (1.9% of GNP in 1960, and 3.4% in 1986), Brazil suffers from an extremely high dropout rate. About 78% of the first grade class do not even complete primary school. Children from poorer households have increased their attendance at primary schools, but the level of education they achieve is still inadequate.

Conclusions

Trends in nutrition indicate that large gains were made in the 1970s, following an economic boom. These improvements may have continued, although at a slower rate, despite the downturn in the economy in the 1980s. Some regions, the Northeast, in particular, lagged behind, thus pointing to inequality in improvements. Major efforts are currently underway in this region to redress the imbalances in development. The renovation of the basic health facilities in rural areas of the seven Northeast states are being carried out alongside maternal child health programme initiatives. Among the important contributing factors to nutritional improvement in Brazil are the strong policy priorities placed on health services, education, and direct food interventions. School feeding programmes are extensive. The country also benefitted from a very large fall in fertility rates.

The extraordinarily large gains in nutrition in the 1970s and early 1980s are not likely to be repeated in the 1990s. The absence of signs of economic recovery, the persistence of an inequitable income distribution, cuts on the social expenditures (always the first to be hit by stabilization), and the natural exhaustion of the changes due to the demographic transition all point towards a risk that further improvement will be much harder to achieve in the future.

Colombia

Colombia occupies an area of just over a million square kilometres in northern South America. Over half of Colombia's large land area is sparsely inhabited and contains only 3% of the population, while 95% of the people live in the area to the west of the Andes – an area encompassing 46% of the total territory. The country has experienced high rates of urbanization, with about 70% of the population living in urban areas.

Colombia's population was estimated at 32.9 million in 1990, with a population structure heavily biased towards youth, but this proportion is declining; 36% of the population is under 15 years of age, as compared to 49% in 1964. The total fertility rate fell from about 5 births per woman in the early 1970s to around 3.2 in 1990.

Trends in Nutrition

National surveys, which included child anthropometric measurements, were carried out in 1965/66,1977/80, and 1986/89. The prevalence of underweight preschool children fell by about half from 1965 to 1989. In 1966,21% of children under five years were estimated as underweight, whereas the 1977/80 survey gave 17%, and by 1986 only 10% of the children were underweight.

The prevalence rates for stunting tended to diminish as well over the last two survey periods. The prevalence rates (below –2 s.d. height–for–age) fell from 22% in 1977/80 period to about 17% in 1986/89 period, with reductions which were consistent across all age groups. The decline was greater in the rural areas, thus the urban–rural gap tended to narrow, as did regional differences.

Infant mortality rates decreased significantly, from around 70 per 1,000 live births in 1974 to around 41 per 1,000 in 1982 and then remained fairly constant until the end of the decade. The 1990 level was estimated at

37 per 1,000 live births.

Despite the overall significant improvement in nutrition, however, iron deficiency anaemia and, probably hypovitaminosis A remain important problems affecting the underprivileged sectors of the population, thus representing real challenges for the 1990s. The first two years of life remain the critical period, carrying the highest risk of physical growth retardation. In all surveys, the prevalence of both low weight–for–age and stunting tended to consistently increase throughout the first 24 months, and remained stable thereafter, whereas that of wasting tended to concentrate in the 6–24 months period.

Economic Trends

The country experienced rapid economic growth between 1974–1980 with the GNP per caput growing from US$500 to $1,190 per caput during this period. During the early 1980s (1981–1985), a coffee boom took place, but as the government was not successful in stabilizing coffee export earnings, inflation rose by 20–25%, and the real exchange rate appreciated. As a result, growth of non–traditional exports slowed considerably and economic growth slowed to 1.6% a year.

In late 1984, the government introduced an economic stabilization programme. Devaluation of the exchange rate was sharply accelerated. The government deficit was reduced through both tax increases and expenditure reductions. The economic adjustment programme was quite successful in curbing macro–level imbalances, and this, combined with a sharp rise in coffee prices, led to an economic recovery by 1986; the GNP per caput rebounding in the late 1980s.

The strong growth during the 1986–87 period was accompanied by rising inflation. In 1988, inflation rose to 28% and exceeded 30% in 1990. Annual wage hikes failed to keep abreast of inflation. Food prices rose sharply (and at a faster rate compared to the overall CPI) because of a drought and higher restrictions on food imports. Non–food prices also rose due to the emergence of capacity bottlenecks and high credit expansion. The unemployment rate averaged 15% in 1985 but fell to 10% in 1987.

In early 1990, the newly–elected government formulated a medium–term economic programme entitled "Programa de Modernizacion de la Economia Colombiana," extending beyond economic stabilization measures of the 1989–90 program to structural adjustment measures in trade, finance, and the infrastructure. In preparing this adjustment programme, the government was explicitly paving the way for negotiations with commercial banks to seek, at a minimum, the refinancing of amortization payments falling due during 1991–92, amounting to US$1.3 billion. Colombia's total external debt is still low by Latin American standards (41% of GDP in 1989), although the debt service ratio was on the rise in the mid–1980s. Colombia is the only country in the region which did not reschedule its debt during the 1980s. Total external debt outstanding and disbursed was about US$17 billion as of the end of 1989.

(Estimates in 1990)

Population	: 32 million	IMR	: 37
Population Density	: 28 per sq. km.	GNP US$ (Per Capita)	: 1,260
Population Growth Rate	: 2.0% per annum	Urban Population	: 70%

CHILD GROWTH AND SURVIVAL

Underweight preschool children (Percent below –2 s.d. weight for age)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars WB Atlas methodology)

Debt service ratio Debt service/exports)

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FOOD

Food production index (Per caput, 1979–81=100)

Dietary energy supply Kcals/caput/day)

Consumer price index (1980=100)

FPI/CPI ratio (1980=100)

HEALTH

Immunization coverage (Percent)

Access to local health care (Percent)

Low birth weight (No. < 2.5 kgs./100 live births)

Access to potable water & sanitation (Percent)

Specific programmes on poverty include the National Rehabilitation Plan (PNR) and the Integrated Rural Development Programme (DRI), ongoing land reforms and other initiatives which fall under "War on Poverty."

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These programmes involve a shift from the government to allocate finances towards the social sectors instead of large, capital intensive infrastructure projects.

Food Security – National Level

Agriculture has historically been the single most important sector of the economy and continues to play a major role with the economy's heavy dependence on coffee exports. Coffee comprises about 20% of the country's total exports, providing 20% of the agricultural GDP and employing 35% of the country's agricultural work force.

The proportion of the population in rural areas compared to urban fell significantly from 52% in 1960 to 30% in 1988. The reasons for the high migration rates are underemployment, low wages, and political violence caused by guerrilla–army confrontations. The violence has disrupted production in several areas, forcing producers to leave the area. Unequal landholding has been a major source of discontent; progressive measures of land redistribution began in the 1960s with the creation of such agencies as the National Institute for Agrarian Reform (INCORA), but have played only a marginal role.

Colombia is self–sufficient in rice, cassava, plantain, meat, milk and beans, and imports wheat, vegetable oil, and barley. Since the 1960s, the government has been providing credit, irrigation, training, and establishing cooperatives in the agricultural sector. High–yielding rice varieties have had a dramatic effect on food production and consumption patterns, with rice gaining an important part of the urban diet. Rice is mainly grown in four regions: Huila, Tolima, Costa Atlantica, and Meta.

Food production increased only moderately during the 1980–1985 period, resulting in a decline in per caput availability. Cereal availability fell to a low in 1981, when cereal imports dropped by more than 50%, while slightly rising cereal aid and domestic cereal production provided a buffer. Between 1982 and 1986, domestic cereal production steadily fell while imports remained high. However, the effect of the variation in cereal availability on total dietary energy availability is not significant. While rice is the principal cereal consumed by more than 90% of the households, it contributes, on average, only 15% of total calories consumed, reflecting a highly diversified diet.

Food production grew much more rapidly in the 1985–1990 period, averaging 6% growth annually; this is reflected in significant increases in per caput availability. The sharp increase in 1987 in domestic cereal production was also reflected in the total cereal availability.

Food Security – Household Level

Calorie availability per caput has been steadily rising – from around 2,300 calories per day in 1974 to 2,600 in 1990. The share of food in an average household budget was estimated at 29% in 1985, an indication of the relatively high level of income compared to other developing economies.

Inflation started to rise rapidly at around 1986. In 1988, the rate of inflation rose to 28% from the 21% average inflation rate recorded in the previous five years. Food prices were sharply rising because of drought and restrictions on food imports. In 1989, agricultural growth was strong, and food prices were significantly lowered.

One of the government's attempts at providing food security for those at risk is through the Colombian Community Child Care and Nutrition Project supported by the World Bank. The target group are two to six year–old children and their parents – drawn mainly from the poorest 20% of the population. A group of mothers selects a "community mother" to provide day care and other services for 15 children in her home. She receives training, a small stipend, and credit to upgrade her home to hygiene and safety standards. Food is also provided by the National Family Welfare Institute " sufficient to meet 80% of each child's daily requirements. The child is also exposed to preschool learning activities while parents have the opportunity to seek remunerative employment without worrying about their child. The project is popular and has expanded from its inception in 1987 to cover 500,000 children by late 1989, i.e., nearly half of Colombia's "at risk" children. It costs about US$11 per month per child.

Health and Control of Infectious Diseases

The lack of data on health expenditure prevents a trend analysis. The three years for which data are available (1982 to 1984) indicate that health services comprised about 4% of the total government budget with real per caput expenditure averaging US$7 during these years. Although the level of local health care coverage is high

compared to many developing countries, an estimated 15% of the eligible population is unable to access public health care services due to a lack of outreach capacity and shortage of staff and supplies.

WOMEN AND CARE
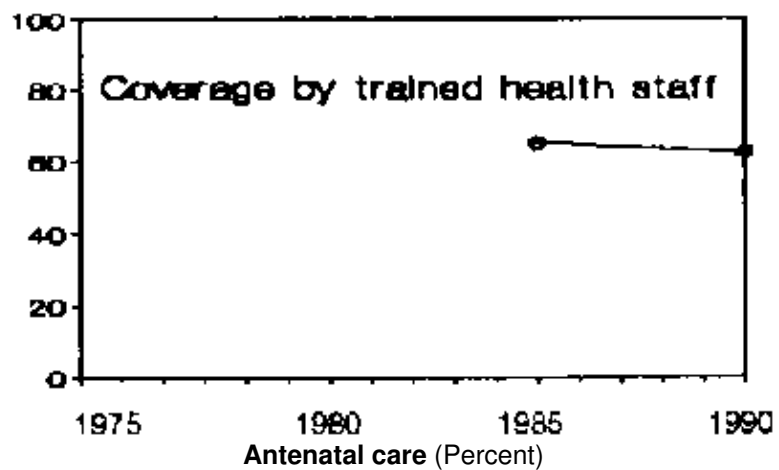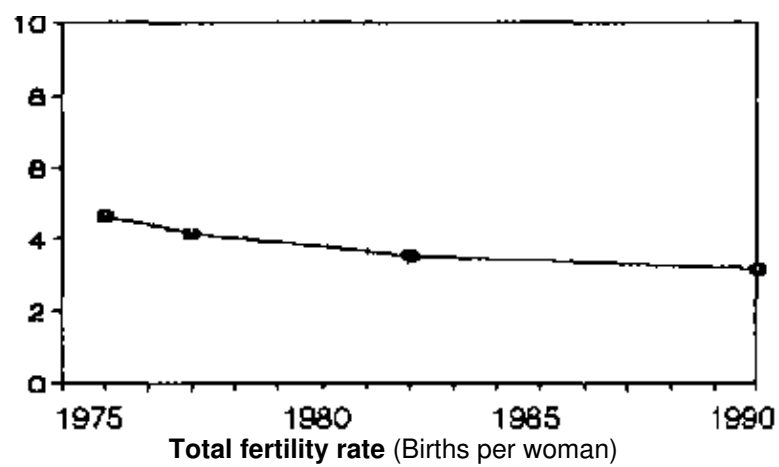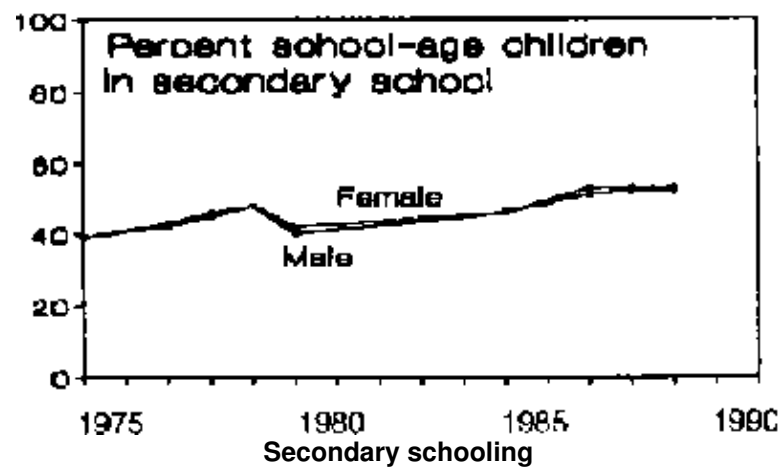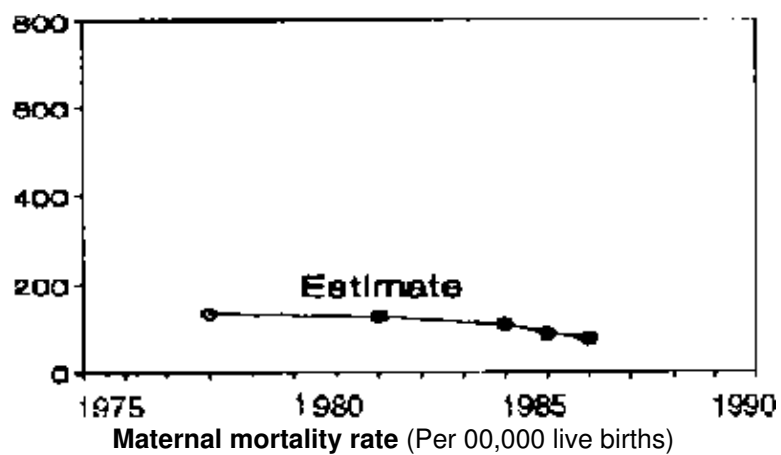
Secondary schooling

Total fertility rate (Births per woman)

Antenatal care (Percent)

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Maternal mortality rate (Per 00,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

Health budget (Percent of government expenditures)

Education budget (Percent of government expenditures)
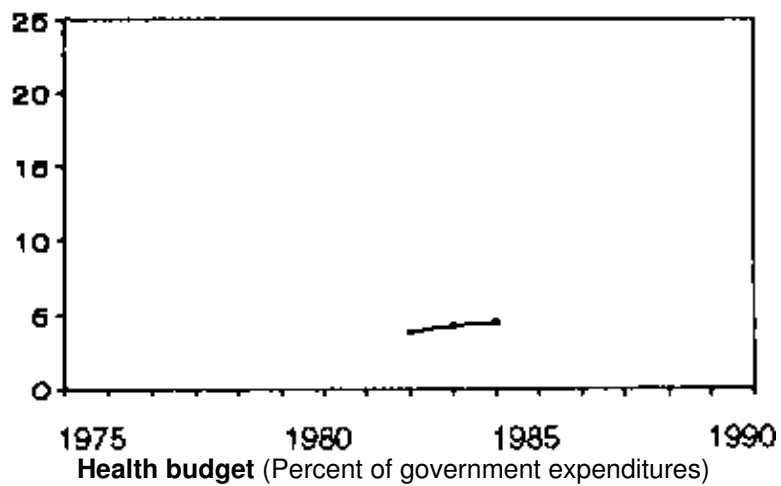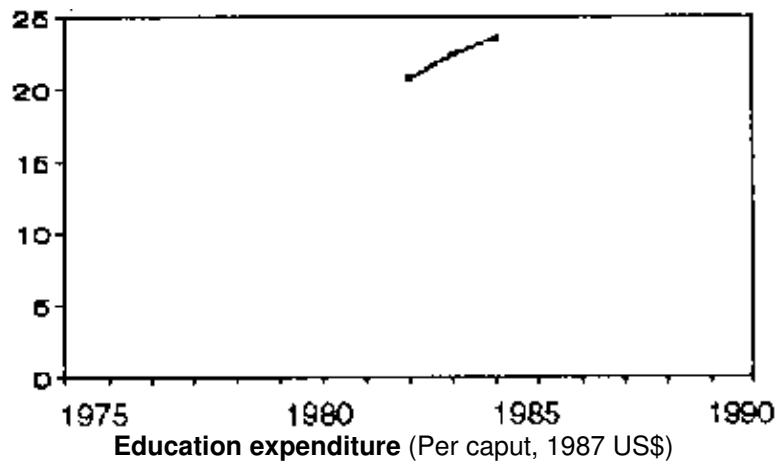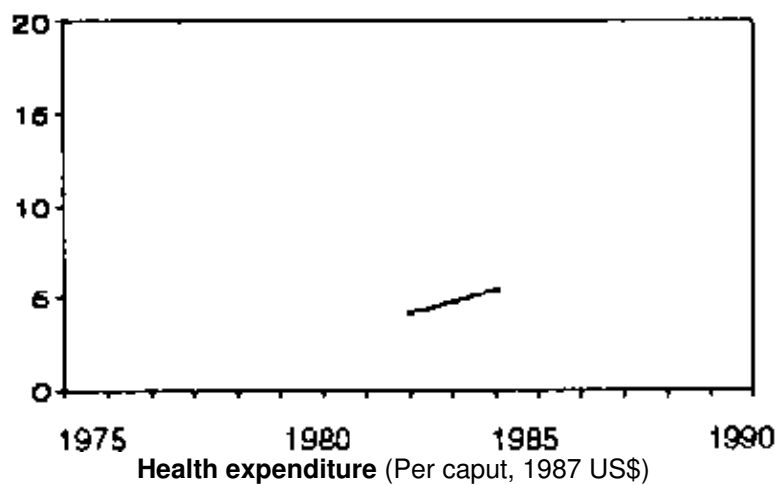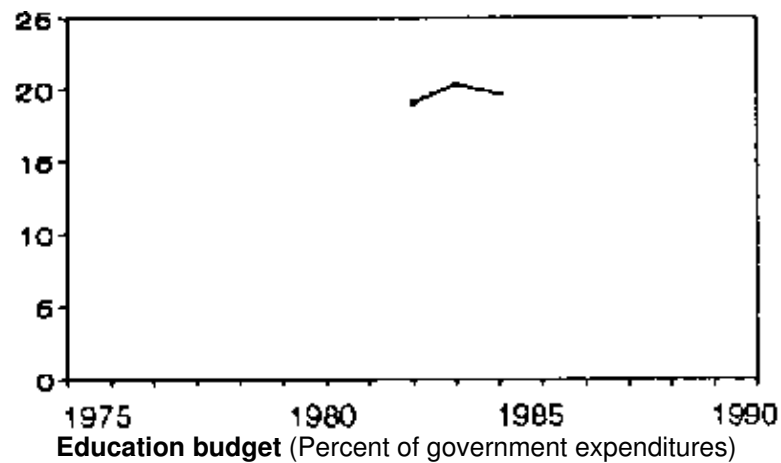
REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN
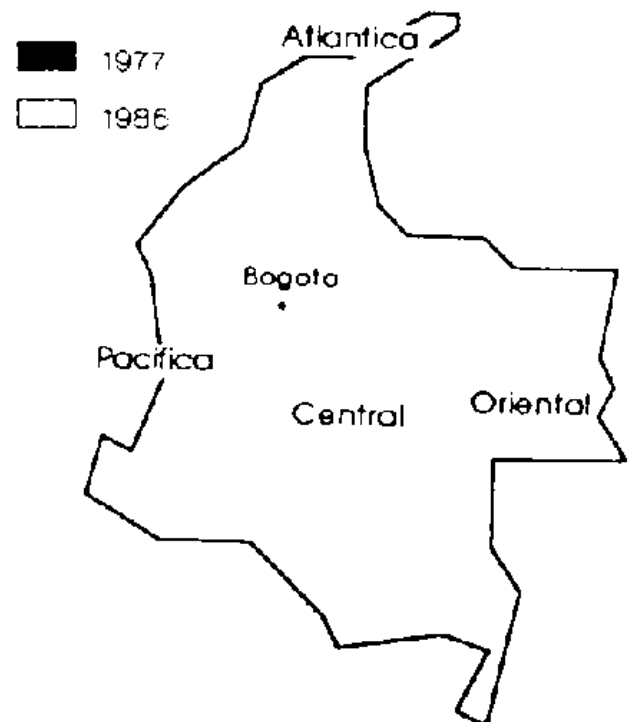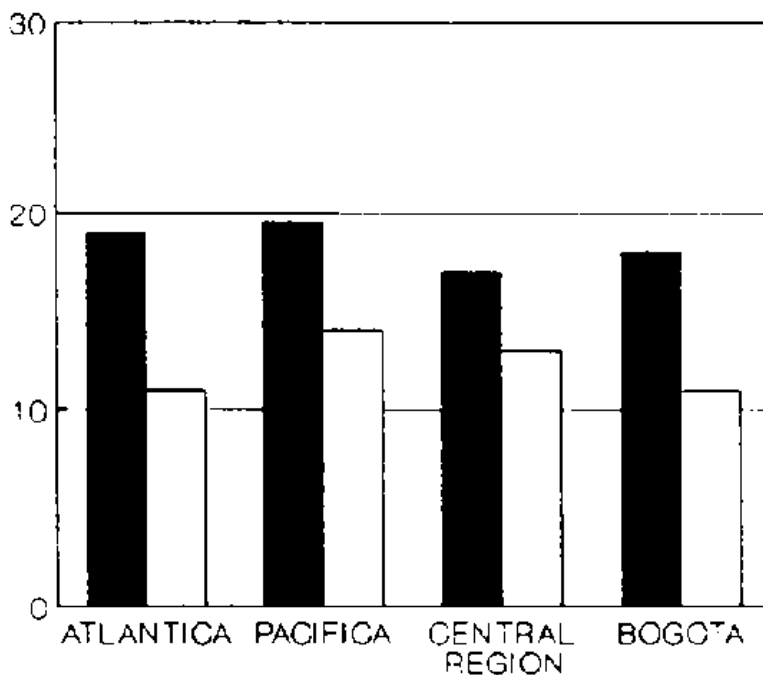
Prevalence of underweight children, 6–35 months (Percent < 3rd percentile, weight for age, NCHS)

In Colombia, health care is financed in one of three ways–privately paying the full cost to a private practitioner or hospital; via social security contributions or payments to similar plans; and by using services provided free at public out–patient clinics and hospitals under the Public Assistance programme. Inequality of distribution characterizes the health care system. Personnel and facilities are concentrated in large cities to the detriment of rural districts. Over 90% of doctors practice in towns of over 20,000 inhabitants, serving only about a third of the country's total population. Most of the remaining doctors are concentrated in the richer parts of the rural areas, around the coffee plantations. The remaining areas are served by "barefoot doctors," who provide basic medical services.

Public sanitation has improved; by 1985/87, about 92% of the population had access to safe water, 100% in the urban areas and 76% in the rural area. Significant declines in mortality due to diarrhoea have been noted. Housing, and hence the health environment improved, as shown by the following indicators. Between 1973 and 1985, the percentage of households with four or more people per room fell from 22% to 13%, whereas the ones with protected floors moved up from 65 to 84%, and those with access to electricity substantially increased (from 58% to 78%), especially in the rural areas. Immunization rates achieved unprecedented levels in 1990: TB, 99%; DPT, 87%; polio, 93%; measles, 82%; and tetanus in pregnant women, 40%. The immunization rates at the beginning of 1980 were only around 10 to 20%.

Women and Care Factors

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Colombian women have increased their educational levels significantly: the country has both universal primary enrollment and higher education levels for women; and the proportion of women with at least secondary education rose from 33% to 45%, whilst the male/female ratio of enrollment in university education changed from 65/35% in 1975 to 52/48% in 1985.

The decline in fertility has been accompanied by a similar fall in the rate of maternal mortality, from 160 per 100,000 live births in 1980 to 110 in 1987. The reductions in maternal mortality can also be attributed to pre−natal care reaching around 77% of pregnant women in recent years.

Conclusion

Nutritional levels have shown significant improvement over the last two decades. This can be attributed in part to Colombia's ability to weather the economic recession which gripped most of its neighbours in the 1980s. Although economic growth slowed during the early 1980s, there was no significant deterioration similar to some other countries in the region. However, the improvements in nutrition generally flattened in the mid−1980s due to the structural adjustment programs.

The stable relative prices of food through most of the 1970s and the first half of the 1980s helped in maintaining adequate dietary energy intake. The overall trend towards improvement was also clearly influenced by the falling fertility rates and by the high and improving education among women. Most of the population have access to local health care and safe water supply, and immunization rates for infants climbed to more than 80% from only 20% in 1983.

If the trends of reduction in prevalence of child underweight in the early 1980s continue, Colombia would largely solve the protein energy malnutrition problem amongst its children in 10 years.

Mexico

Mexico, bordered to the north by the U.S. and to the south by Guatemala and Belize is by far the largest country in middle America. Mexico's population was estimated at 88.5 million in 1990, and is expected to reach over 100 million by the year 2000. The population growth rate was about 3.1% at the beginning of the 1980s but declined to 2.2% by 1990. Life expectancy has increased from 66.6 in 1980 to 69.0 in 1990.

The country experienced accelerated growth of its urban population, comprising 71% in 1990. Spanish is the country's principal language and almost all Mexicans profess Christianity, 96% being adherents of the Roman Catholic Church.

Trends in Nutrition

Only one survey at the national level is available for Mexico, conducted in 1988 by the Ministry of Health, showing a prevalence rate of underweight children (below −2 sd) of 13.9%. The southern region of the country had the most serious nutritional problem with 20% of the children underweight compared to the metropolitan area of Mexico City, which had a prevalence of only 7%. The north and central regions had malnutrition prevalence close to the national mean.

In the figure on child growth trends, the dotted line represents an estimate of the trend from the interpolation model used in this report. It seems likely that the prevalence of underweight children fell from around 20% in the mid−1970s to 14% recently, but it is not possible to draw any firm conclusions about current trends themselves.

The national rural surveys of 1974, 1979, and 1989, conducted by the Institute Nacional de Nutricion, point to an overall improvement in nutritional status in the last two decades. But many Mexicans who were poor and already vulnerable to malnutrition experienced further deterioration in nutritional well−being. By looking at various regional zones, one can see the huge disparity in nutritional well−being: the seven northern zones show a relatively low prevalence of underweight, with less than 7% of pre−schoolers weighing below the −2 standard deviation cut−off. The central zones of the country show a small improvement, but still about 14% of the children were underweight. The six south and southeastern zones of the country, as well as the Huasteca zone of the Gulf of Mexico, which have traditionally had the worst nutritional levels, showed some deterioration in malnutrition. The regions with the worst nutritional outcomes house the largest segment of the Indian population, indicating the extent to which this group has been marginalized in the country's

development process. Other indicators also point to significant disparities: there is a difference of more than 10 years of life expectancy and 40 per thousand live births in the rate of infant mortality between the poorest states and the most developed ones.

> *Note:* Based mainly on *Food and Nutrition Situation in Mexico: Trends in 1960–1990* by A. Chavez, A. Avila, J. Roldan, and H. Madrigal. Instituto Nacional de Nutricion. Mexico City (1992).

Economic Trends

Mexico experienced accelerated economic growth during the late 1970s, with per caput GNP rising by more than 8% per year between 1978 and 1981. By the mid–1970s, however, the government's high level of expenditure was increasing rapidly ahead of public sector revenues, and external borrowing became an important source of revenue. The country's foreign debt grew from US$4.5 billion in 1970 to US$29 billion in 1976. By 1990, total debt reached US$85 billion, implying a per caput debt of close to US$1,000.

Fiscal austerity measures were implemented in 1976, but the discovery of new oil reserves soon thereafter encouraged the government to maintain high levels of public spending. Inflation, however, continued to soar, reaching 98% in 1982. Moreover, Mexico became increasingly dependent on oil–export revenues while non–oil exports deteriorated.

By 1982, the recessionary conditions of the developed countries, falling oil prices, and rising interest rates, led to massive capital flight and further economic decline. The country faced the most serious economic crisis since the Great Depression. Mexico declared a moratorium on its external debt, precipitating a major debt crisis. The GDP in 1982 registered a negative growth of –0.6 and –4.2% in 1983. The Mexican peso underwent a 70% devaluation in that period.

The government responded to this economic crisis by implementing a three–year stabilization programme formally agreed upon with IMF in late 1982. The main goals of this programme were to lower the inflation rate and reduce the current account deficit. To achieve these measures, the fiscal deficit was sharply reduced.

With lower investment, on the one hand, and restrictive demand management, on the other, there was no cumulative real growth between 1982 and 1988, and per caput GNP continued to severely fall. Moreover, a serious earthquake in late 1985 and a major terms of trade deterioration in 1986 due to falling oil prices affected Mexico's prospects. Inflation began to escalate in 1986, and prices spiralled upwards by 160% by 1987.

The country finally showed signs of recovery in 1987/88. Real GDP registered a positive growth rate of 1.6%. After reaching an astronomical growth rate of 130% in 1987, inflation fell to 20% in 1989. Private investment jumped 10.1% in real terms, 5.8 percentage points more than the gain in 1987, and the U.S. border–area assembly industry grew 14.3%, accounting for approximately one–fifth of the boost in industrial production. The number of individuals employed in manufacturing increased by 1.7% in 1987 and 2.1% in 1988. Mexico also started to diminish its dependence on oil earnings; petroleum represents 35% of total exports as against 77% in 1982, and interest on the external debt represents only 28% of exports, instead of the 47% posted in 1982. One important factor in curbing the inflation rate has been the government's ability to force an agreement (PACTO) among labour unions and businesses to abide by wage and price controls. Wage earners suffered severe economic hardships during the 1980s. Surveys carried out by the National Consumer Institute and the National Nutrition Institute show that in 1988, the purchasing power of wages was 50% less than in 1980.

Food Security – National Level

Agriculture accounts for only 9% of the GDP, while employing around 26% of the total working population. The sector has experienced negative growth rates for most of the last 10 years. Much of the agricultural sector is dominated by smallholders and many farmers engage in subsistence farming. About 50% of the total cultivatable land is held by "ejidos," communal plots of land divided so that many farmers till as little as an acre each.

Through the 1970s and up to the mid–1980s, the agricultural sector was highly regulated by the government. Parastatal agencies controlled access to credit, technology inputs, storage facilities, and marketing of produce. Through the National Commission for Popular Subsistence (CONASUPO), the agency responsible for coordinating government policies in the agricultural sector, support prices for producers were set at each

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planting season.

The principal food crops are maize, wheat, rice, barley, potatoes, soybeans, and dry beans. Sorghum is grown mainly to feed livestock in support of the growing internal demand for animal products. Agricultural production has stagnated in recent years, being severely affected by drought, insufficient irrigation (less than 30% of cultivated land is irrigated), and an under–developed marketing and infrastructure.

Food production from 1980–90 remained at or below the 1979–81 level. In recent years, drought has been a primary reason for low output. Normal rainfall in 1990 allowed for a normal harvest in this year. Food imports have consistently been higher in the 1980s compared to the 1970s. In 1990, the country imported 4 million metric tons of corn out of a total consumption of 18.6 million tons, or a sufficiency level in this major food grain of 76%. The corn imports have permitted the maintenance of a relatively high caloric intake of the population and have contributed importantly to food consumption particularly in the big cities.

In accordance with the structural adjustment programme initiated in the late 1980s, the government removed all indirect production subsidies on water, electricity, fertilizer, transportation, crop insurance, and credit. The government–owned fertilizer monopoly, FERTIMEX, is in the process of being broken up and privatized. Recent attempts have also been made to abolish "ejidos" and reclaim them as private property. These reforms have meant increasing production costs for farmers and with the normal harvest in 1990, they have also been faced with low prices.

Food Security – Household Level

Inflation has risen rapidly in the late 1980s, although the food price index has risen more slowly than the general CPI. Hyper–inflation has caused serious hardships for workers since wages have not kept up with these price increases. According to IINEGI and the Bank of Mexico, the purchasing power of the minimum legal wage in Mexico City dropped steadily throughout the 1980s, hitting its lowest level in 1988, when its was worth half its 1978 value. Linked to the decline in real wages, unemployment rose from 4.3% between 1980 and 1982 to a rate of 6.3% in 1983. It fell steadily thereafter, reaching 3.5% in 1988. The proportion of families that spent less than 40% of their wages in food did not vary between 1981 and 1989, but those who needed to spend more than 60% went up from 22% to 35% in 1987 and 32% in 1989.

(Estimates in 1990)

Population	: 86 million	IMR	: 39
Population Density	: 44 per sq. km.	GNP US$ (Per Capita)	: 2,490
Population Growth Rate	: 2.0% per annum	Urban Population	: 73%

CHILD GROWTH AND SURVIVAL

Underweight preschool children (Percent below –2 s.d. weight for age)

Infant mortality rate (Per 1,000 live births)

ECONOMICS

GNP per capita, current US dollars (WB Atlas methodology)

Debt service ratio (Debt service/exports)

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FOOD

Food production index (Per caput, 1979–81=100)

Dietary energy supply (Kcals/caput/day)

Consumer price index (1980=100)

FPI/CPI ratio (1980=100)

HEALTH

Immunization coverage (Percent)

Access to local health care (Percent)

Low birth weight (No. < 2.5 kgs/100 live births)

Access to potable water & sanitation (Percent)

Maize is the main staple food of the population, occupying 50% of cultivable land and providing 36% of the energy content of the national diet. There have been significant changes in diet during the post 1982 period,

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with a move away from milk, pork, and beef towards eggs and poultry. It is interesting to note that the consumption of cereals increased after the crisis period. Data from the National Nutrition Institute indicates that consumption of fats in Mexico City reached a peak in 1979 and then declined throughout the 1980s. The consumption of fibre, however, has increased, and this may be a result of the increased use of bread in the diet.

Within the confines of the structural adjustment programme, the government took action to help the food insecure. It started to eliminate general food subsidies which were not reaching the poor population and replace some of them with targeted subsidies. In 1986, the government introduced a tortilla programme (Tortibonos) targeted at low−income urban neighbourhoods with an income below two minimum wages. Another food programme targeted at urban areas is the Liconsa subsidized milk programme. Households must have an income below two minimum wages and have at least one child under 12 years of age to qualify for the service. One programme that is directed at rural areas is the price subsidy for maize. The subsidized price for rural consumers is almost equal to the wholesale price.

By 1989, more than one−third of the US$1.4 billion devoted to food subsidies was used for targeted programmes such as the ones mentioned above and others, including the National Welfare Institute's distribution to high−risk populations. Yet these programmes are criticized for inefficient targeting. For example, according to the 1983−84 National Expenditure data, the income limit is high enough to qualify 48% of all Mexican households. In addition, most of the subsidies are directed at the urban areas, while the population at the bottom 30% is rural. Other subsidies on items such as cooking oil, bread, and eggs have been gradually eliminated altogether.

The World Bank has incorporated food and nutritional objectives in the Agricultural Sector Loan II (1991) to Mexico. This will identify the groups at risk, specifically through the monitoring of pregnant and lactating mothers and the nutrition status of small children, particularly those under 5 years of age. The delivery of basic health and nutrition assistance will be extended to 13 million un−insured individuals in Oaxaca, Chiapas, Hidalgo, Guerrero, and the Federal District, especially undernourished pregnant and nursing women and children under the age of 5. The second programme will extend nutrition and basic health programmes to 45,000 families in the poor rural areas of Nuevo Leon, Tamaulipas, and San Luis Potosi.

Health and Control of Infectious Diseases

From 1976 to 1981, the budgets of health care institutions grew steadily in real terms, gaining 70% overall. As a result of the economic crisis in the 1980s, the financial outlays were reduced to only 47% of the 1981 total. Thus, for seven years, the economic crisis caused stagnation in the development of available financial resources. Health expenditure as a share of the total government expenditure decreased from about 17% in 1980 to about 7% in 1988. Although the government's system of basic health services is designed to service all localities through rural health posts within reasonable access, as much as 35−40% of the rural population in the poorest states remain outside this coverage.

In spite of the reductions in the health budget, the government was committed to critical health programmes the immunization rate, for example, increased from 38% in 1982 to 82% in 1990. The population with access to local health care increased to more than 90% in 1990 from about 50%. Populations with access to safe water rose to 80% in 1988, although this declined somewhat in 1990.

As with health expenditure, the share of the total government expenditure on education fell significantly during the crisis period. Education expenditures averaged around 5% during the 1970s, but was decreased by half during the 1980s. The country has a high rate of literacy and the difference between male and female literacy rates is much smaller than in other developing countries; 92% for men and 88% for women. The gross enrollment ratios for primary school and secondary school are similar for males and females. Government expenditure on primary education is, however, small, accounting for only a quarter of the total education expenditure.

The economic recovery initiated in 198 8 has meant that the government's capacity to provide social services has increased; social spending was 32% of the total programmable spending and 6% of the GDP in 1988, increasing to 44% of the total programmable spending and 8% of the GDP by 1991.

Women and Care Factors

One of the positive developments in Mexico's social sector is the large drop in total fertility from 6.7 births per woman in 1975 to around 3.3 in 1990. This figure is lower than most of its neighbouring countries. This partly

explains the increasing proportion of Mexican women in the labour force which is estimated at 27% in 1990 – up from the low 20% in the previous decade.

WOMEN AND CARE
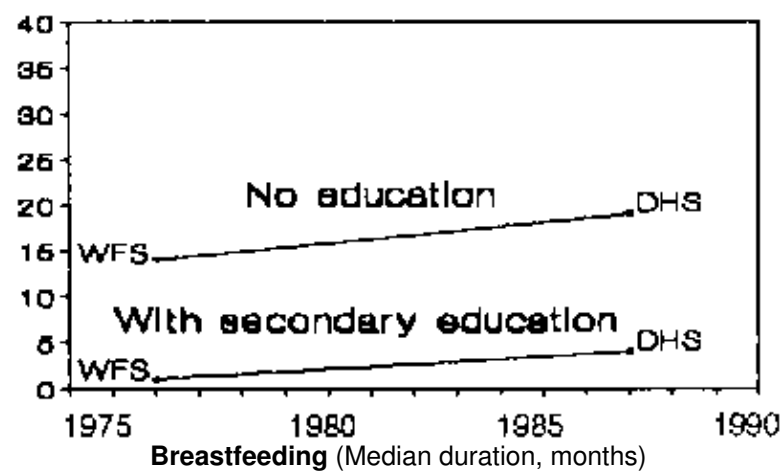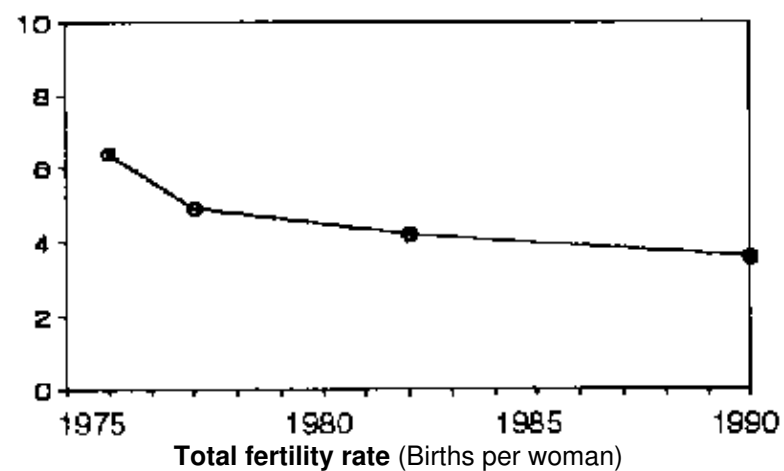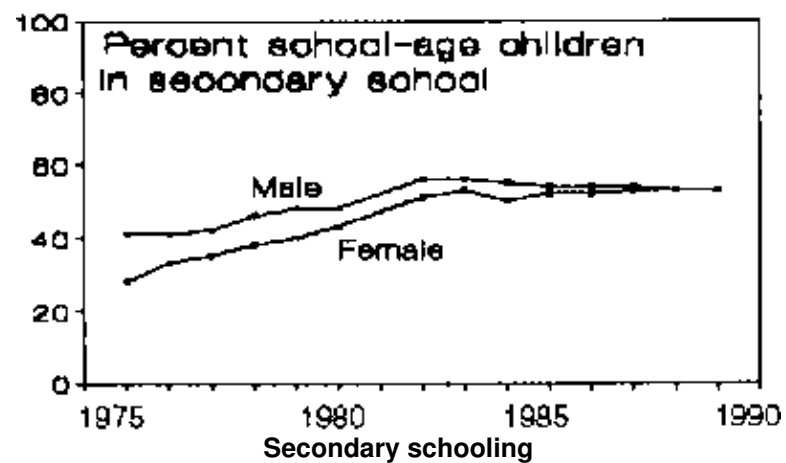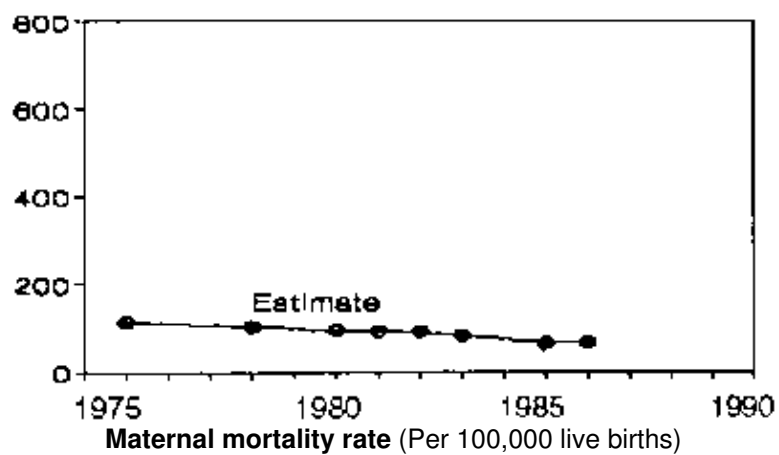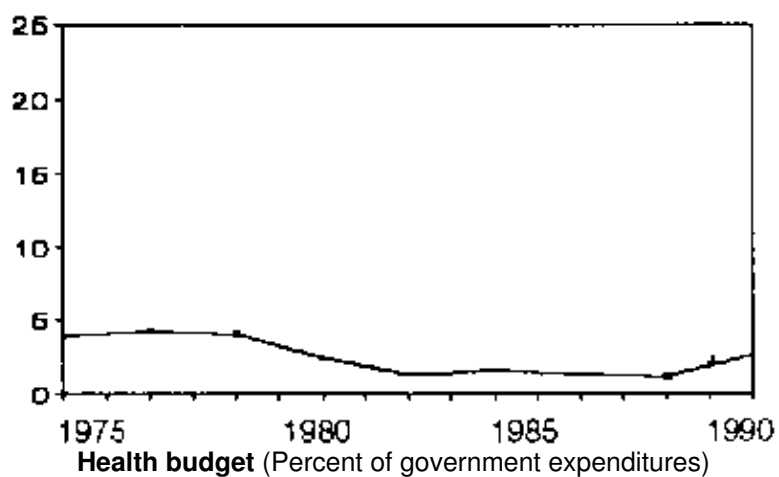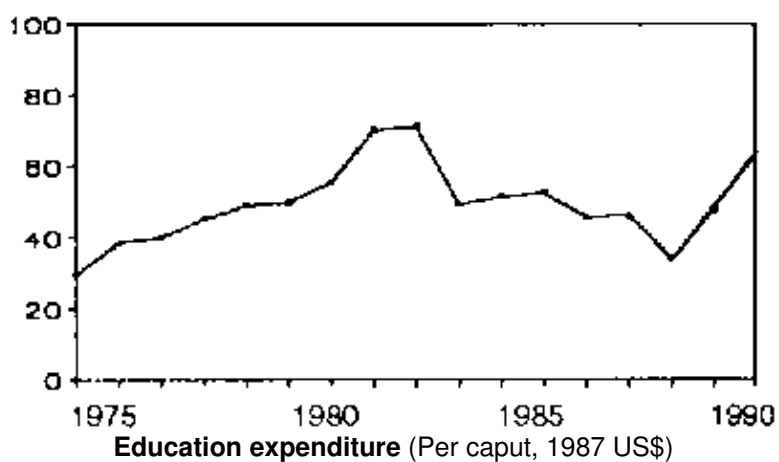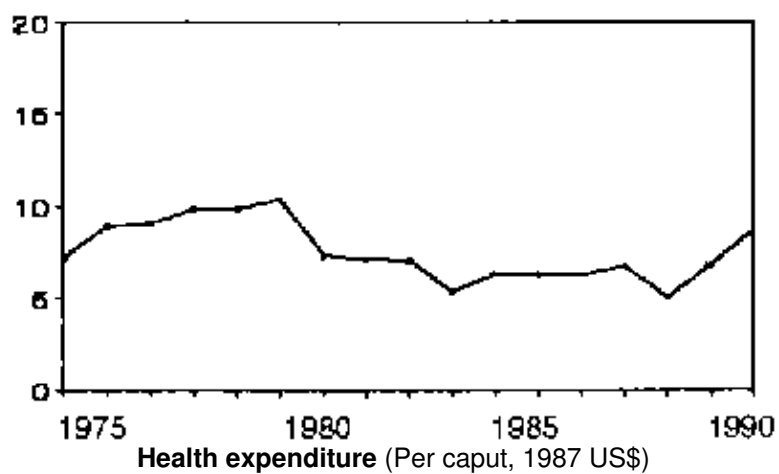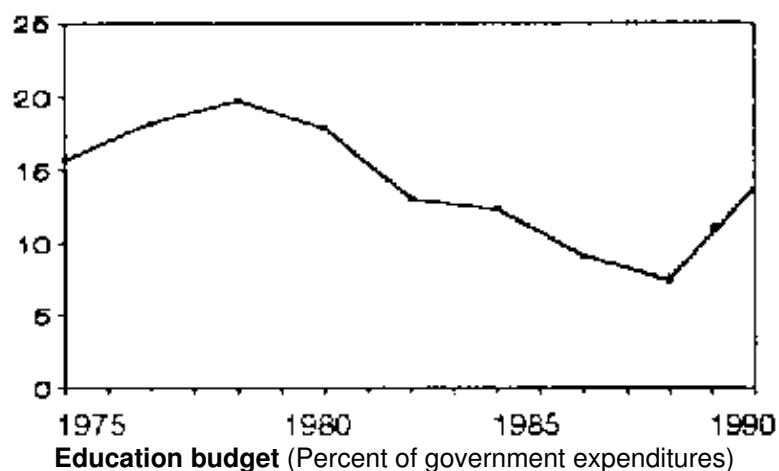
Secondary schooling

Total fertility rate (Births per woman)

Breastfeeding (Median duration, months)

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Maternal mortality rate (Per 100,000 live births)

PUBLIC EXPENDITURES

Health expenditure (Per caput, 1987 US$)

Education expenditure (Per caput, 1987 US$)

Health budget (Percent of government expenditures)

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Education budget (Percent of government expenditures)

REGIONAL PREVALENCE OF UNDERWEIGHT CHILDREN
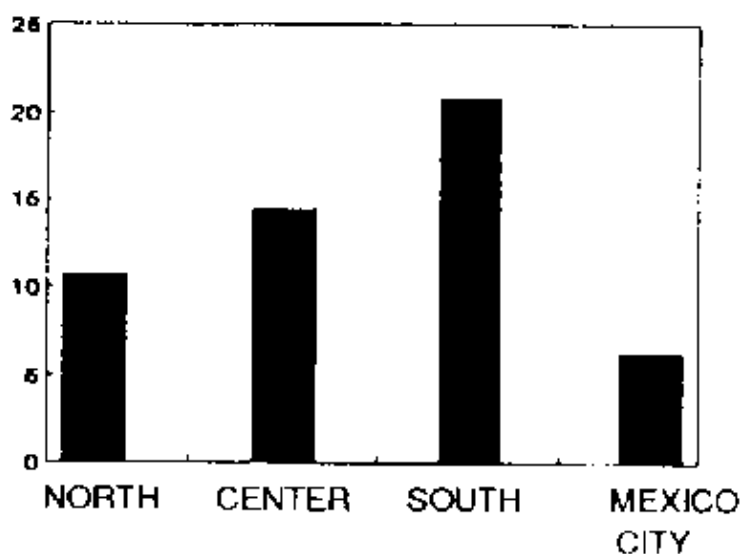
Prevalence of underweight children, 0–59 months (Percent < –2 s.d. weight for age, NCHS)

Maternal mortality rates in Mexico have been steadily declining. The most recent estimates in 1986 were placed at 65 per 100,000 live births, compared to 113 per 100,000 in 1975. More than two–thirds of pregnant mothers avail themselves of ante–natal care and birth delivery from trained health personnel.

Breast–feeding practices in Mexico have been changing in the last two decades. Based on results comparing data from the World Fertility Survey in 1976 and the DHS Survey in 1987, the median duration of breast–feeding has been low, but is rising – in both the educated and non–educated mothers. There is, however, a marked difference between the duration of breast–feeding between these two groups. In 1987, the DHS data indicates that mothers with at least a secondary education had a median duration of breastfeeding of 4 months, compared to 19 months for those without education. The majority of Mexican women are literate, the rate having increased from 69% in 1970 to 88% in 1990.

Conclusion

Mexico has endured extremely serious economic hardships for the greater part of the last decade. Huge price increases and a declining GDP have resulted in an economic "free–fall" during the mid–1980s. The impact on nutrition, measured by the prevalence of underweight among children, seems to be less serious than one would expect. However, the negative effects of the economic slow–down were borne disproportionately by the poorest social groups especially in the poor rural regions of the country. Mexico has a long history of direct food interventions in order to assure food security, particularly amongst the vulnerable segments of the

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population. Corn and milk were heavily subsidized. School feeding programmes were extensive. Immunization campaigns continued despite the cutbacks in health budgets. In other words, the role of the state in the social sector can be considered high.

However, future actions would have to address the regional disparities in services, and the challenge of reaching the needy and identifying the groups at risk remain priorities. The southern part of Mexico, for example, has experienced a deterioration in nutritional status. It has nearly three times the proportion of underweight children compared to Mexico City's metropolitan area.

2. Methods and Statistics

Introduction

The aim of this chapter is to provide the reader with statistics and information necessary to understand the methodology and statistical procedures used for the Second Report on the World Nutrition Situation, Volumes I and II.

Over the past 20 years, information on nutritional outcome indicators has become increasingly available. Since anthropometric data can be analysed in a number of ways, the interpretation of a country's nutrition situation has become more complicated, with indicators having contrasting cut−offs, age groups, reference growth standards, etc. The First Report on the World Nutrition Situation of 1987, to a considerable extent, clarified many of the standardization issues. These problems were also addressed in the ACC/SCN publication on Uses of Anthropometric Indices in Children (ACC/SCN, 1990). The present report will continue such efforts to familiarize readers with the estimation methods and standardization issues.

This chapter covers the following topics:

- Methods for estimating the regional prevalence and numbers of underweight preschool children

- Methods for diagnosing and correcting age mis−reporting errors

- Modelling of GNP−malnutrition relationships

- Methods for estimating 'underfed' populations

- Women's nutritional status data

- Data for the non−communicable chronic diseases

- Definitions of other data used and their sources

Prevalence and numbers of children underweight

Data Sources

A compilation of 100 surveys covering the period from 1975 to 1991 for 66 developing countries are used in the global and regional analysis in this Report. By comparison, the First World Report in 1987 included only 45 surveys in 36 countries. A number of other national surveys have been reported since 1987 but were excluded from the present analysis because the data did not meet the standardization criteria discussed below. The compilation of nationally representative surveys has been continually carried out at WHO (see WHO, 1989) and UNICEF (UNICEF, 1993) for purposes of monitoring children's nutrition worldwide. Other international sources include the World Bank, Arab League (PAPCHILD project), USAID, and DHS. The DHS surveys have been the most important source of national data on nutrition in the last five years. The minimum

criteria for a survey to be included in the global analysis is that it should at least be a national sample. Exceptions were: the Indian survey of 1975–79 and 1988–90 which covered only eight states, surveys in Kenya (1982, 1987), Zambia (1985), Rwanda (1985), Bangladesh (1975, 1981), and El Salvador (1975), which used rural samples. A tabulation of the nationally representative anthropometric data is given in Table 2.1 and sources are listed in Annex 1.

Steps in calculating underweight prevalence at regional level

The Technical Notes of Volume I of the Second Report on World Nutrition Situation briefly summarized the methods used in calculating the regional estimates of underweight children for 1975, 1980, 1985, and 1990. The methods are discussed in more detail in this section. Statistical results and justification for the choice of procedures are also presented.

Table 2.1. Nationally representative nutrition data and related variables (1975–1992)

Region/country	Year	Percent children underweight (< –2 s.d. W/A)	IMR (per 1,000 live births)	GNP per capita (US $)	Calorie per capita (kcals/caput/day)	Female secondary education (%)
Sub–Saharan Africa						
Botswana	1984	27.0	72	980	2385	28
Burundi	1987	31.0*	73	250	2385	3
Cameroon	1977–78	17.3	107	500	2250	12
Cameroon	1991	13.6[5]	87	940	2201	21
Congo	1987	23.5	117	930	2604	19
Cote d'Ivoire	1986	12.4	95	700	2610	11
Ethiopia	1982	38.1[4]	155	120	1735	7
Ghana	1987–88	27.1	88	400	2240	30
Guinea	1980	23.4	166	140	2224	8
Kenya	1982	22.0[1]	84	390	2189	15
Kenya	1987	18.0[1]	72	340	2173	19
Lesotho	1976	17.3	126	250	2169	16
Lesotho	1981	13.3	117	490	2295	30
Liberia	1976	20.3	149	470	2329	3
Madagascar	1983–84	32.8	64	270	2901	28
Malawi	1981	23.9	170	180	2271	2
Mali	1987	25.1*	168	200	2133	4
Mauritius	1985	23.9	26	1100	2758	49
Mauritania	1981	31.0	143	480	2095	10
Nigeria	1990	35.7	99	290	2312	16
Rwanda	1976	27.8	140	120	2078	1
Rwanda	1985	27.5	128	280	2043	5

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Senegal	1986	17.5*	78	410	2440	9
Sierra Leone	1975	31.0	197	210	2017	7
Sierra Leone	1977–78	23.2	185	230	2064	8
Swaziland	1983–84	9.7	125	880	2359	41
Tanzania	1991–92	25.2	115	100	2206	4
Togo	1977	20.5*	116	310	1989	12
Togo	1988	24.4*	92	370	2135	12
Uganda	1989	23.3[4]	101	290	2153	8
Zaire	1975	28.8	122	300	2288	8
Zambia	1985	20.5	85	370	2132	13
Zambia	1988	25.8	78	300	2061	14
Zambia	1992	25.1[5]	82	420	2019	14
Zimbabwe	1984	20.7	77	730	2204	30
Zimbabwe	1988	10.0*	49	660	2301	42
South Asia						
Bangladesh	1975	84.4	138	130	1977	11
Bangladesh	1981	70.1	132	160	1955	11
Bangladesh	1985	71.5	124	150	1941	10
Bangladesh	1989–90	66.5	118	170	2025	11
India	1975–79	71.0*[3]	122	170	2043	17
India	1988–90	63.0*[3]	97	340	2229	29
Iran	1980	43.1	118	n.a.	2906	30
Nepal	1975	69.6	150	110	1983	4
Pakistan	1977	54.7**	135	190	2216	6
Pakistan	1985–87	48.8	107	340	2178	11
Pakistan	1990	40.4	103	380	2219	12
Sri–Lanka	1976	58.3	52	230	2182	48
Sri–Lanka	1980	47.5	44	260	2170	57
Sri–Lanka	1987	36.6*[4]	21	410	2283	74
Near East/North Africa						
Algeria	1987	8.6	72	2630	2802	46
Algeria	1990	9.2[5]	67	2330	2989	53
Egypt	1978	16.6	110	400	2909	36
Egypt	1988	10.0*	83	640	3327	58
Egypt	1990	10.4[5]	66	610	3318	71
Jordan	1975	17.4	80	530	2325	23

Jordan	1990	6.4[5]	51	1340	2704	78
Morroco	1987	11.8*	71	680	2975	30
Tunisia	1975	20.2	111	710	2567	15
Tunisia	1988	7.8*	48	1230	3080	38
Yemen Arab Rep.	1979	61.2	128	500	2293	32
Yemen Peoples Rep.	1982/83	25.8	139	n.a.	n.a.	n.a.
Yemen (combined)	1991/92	30.0[5]	122	540	n.a.	n.a.
South East Asia						
Indonesia	1987	39.9	68	490	2646	42
Laos	1984	36.5	117	378	2462	19
Malaysia	1983	25.6	26	1900	2762	51
Malaysia	1986	17.1	20	1850	2686	59
Myanmar	1982	42.0	95	460	2395	17
Myanmar	1987	42.0	68	498	2504	23
Myanmar	1990	32.4	60	510	2445	24
Papua New Guinea	1984	34.7	69	710	2318	9
Philippines	1978	33.3	52	500	2269	60
Philippines	1982	33.2	52	800	2374	68
Philippines	1987	32.9	43	590	2318	71
Philippines	1990	33.5	42	720	2380	72
Thailand	1982	36.0	38	780	2293	n.a.
Thailand	1987	22.2*	31	850	2303	51
Thailand	1990	13.0	28	1420	2316	55
Vietnam	1986	51.5	44	420	2233	55
Vietnam	1989	41.9	44	480	2233	58
China	1987	21.3[2]	31	310	2632	37
Middle America/Caribbean						
Costa Rica	1978	16.0	25	1560	2546	30
Costa Rica	1982	6.0	25	1440	2628	49
Dominican Republic	1986	12.5	63	740	2469	18
Dominican Republic	1991	10.4[5]	54	950	2297	n.a.
El Salvador	1975	21.6	90	440	2059	17
El Salvador	1988	15.5*	57	940	2333	31

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Guatemala	1980	43.6	80	1120	2118	17
Guatemala	1987	28.5*	57	950	2248	15
Haiti	1978	37.4	134	200	2008	11
Honduras	1987	20.6	68	810	2199	21
Jamaica	1978	15.0	23	1390	2720	63
Jamaica	1985	14.9	18	900	2585	65
Jamaica	1989	7.2	11	1260	2609	68
Mexico	1988	13.9	46	1770	3061	53
Nicaragua	1980–82	10.5	84	800	2211	42
Panama	1980	15.7	29	1680	2203	64
Trinidad and Tobago	1976	16.3	28	2470	2677	57
Trinidad and Tobago	1987	5.9*	16	3970	2988	85
South America						
Bolivia	1981	14.5	131	540	2106	31
Bolivia	1989	11.4*	108	620	1916	35
Brazil	1975	18.4	85	1070	2564	28
Brazil	1989	7.1	60	2540	2751	45
Chile	1978	2.1	40	1330	2616	55
Chile	1982	1.1	30	2220	2638	61
Chile	1986	2.5	20	1340	2530	71
Colombia	1980	16.7	52	1220	2509	45
Colombia	1986	10.2*	39	1280	2578	56
Colombia	1989	10.1	39	1200	2544	56
Ecuador	1987	16.5	62	1050	2512	57
Guyana	1981	22.1	42	730	2463	62
Paraguay	1990	3.7	41	1090	2750	29
Peru	1975	16.1	105	1000	2259	41
Peru	1984	13.4	95	1120	2147	55
Peru	1991/92	10.8[5]	67	1020	1890	61
Uruguay	1987	7.4	23	2260	2727	57
Venezuela	1982	10.2	41	4920	2504	48
Venezuela	1987	5.9	37	3230	2552	59

Note: Data on prevalence of underweight are given in terms of proportion of children aged 0–59 months, who are below –2 s.d. weight for age of the NCHS standards.

underweight prevalences of 0 through 59 month–old equivalents (see correction procedures). The two surveys of India which were reported for 12–72 months children were also adjusted into the 0–59 month old equivalents.

** Adjusted for age–misreporting bias (see section on age–misreporting)

(1) National rural

(2) Nine provinces, reasonably representative of all China

(3) Eight Indian states, reasonably representative of all India

(4) Excludes some districts/provinces/zones

(5) New data published in early 1993. These data were not included in the regression analysis in this chapter.

(6) Percent school–age females enrolled in secondary school.

REFERENCE CHILD GROWTH STANDARDS. Most of the surveys were analysed using the NCHS growth standards. The data from a number of countries, however, were analysed using other standards, such as those for the Philippines (1978, 1982, 1986, and 1990) and India (1975–79 and 1988–90), which employed locally derived references. Many others used the Harvard standards, such as the Indonesian surveys in 1986,1987, and 1989. The NCHS standard is based on a reference population made up of children from the United States who were assumed to be well–nourished and is adopted by WHO as the reference population (WHO, 1983). It has been assumed that these US children constitute a reasonable reference group on the basis of studies of children in higher income groups in developing countries. These studies showed that well–nourished children under five do not differ in growth from this NCHS reference group (Martorell and Habicht, 1986).

CUT–OFFS. An important standardization issue relates to the cut–off point used in defining low anthropometric values. A child is considered underweight when his or her weight falls below – 2 s.d. of the expected weight forage of healthy children. In a normal distribution, it is expected that 2.3% of the children will fall below the –2 s.d. cut–off. Prevalences above this figure imply that there is a nutrition problem in the population. Such numbers may also indicate more general developmental problems in the society as a whole (ACC/SCN, 1990). The rationale for using the s.d. cut–off is based on the assumption that the variance of weight for age changes at different age groups. For example, 80% of median weight for age may indicate more severe underweight at age one than at age four. Computing the standardized z–scores is typically done to normalize the anthropometric measures for the age–specific variances. Many of the earlier surveys, particularly those in Latin America, reported cut–offs using Gomez (i.e., below 75% of median standards to designate moderate malnutrition), and others such as 80% of median. For comparability, all previous country results which reported other growth standards and cut–offs were recalculated using the NCHS standards at –2 s.d. cut–offs. These were done by the country institutions themselves. Examples of these countries where standardized z–score cut–offs were recalculated are India, Philippines, Indonesia, and Pakistan.

AGE GROUPS. For the present report, the unit of analysis includes children from zero through 59 months of age. A review of the surveys indicates that at least 19 contrasting age categories were used (see Table 2.2). The 0–59 month age group was the most frequently reported category (62 out of the 100 surveys), followed by the 3–36 month age group (9 surveys) and 3–59 month age group (5 surveys). In analysing cross–country underweight prevalence, comparability in age groups is crucial because several studies suggested that growth failure tends to be more pronounced at certain age groups. For example, Alderman and Garcia (1993) reported that in Pakistan, the prevalence of underweight increases dramatically after 6 months until the 30th month. This pattern was also found in 22 countries based on surveys by DHS in Africa and Asia (Teller and Zerfas, 1990).

Table 2.2. Frequency distribution of age groups used in 100 national nutrition surveys

Reported age group	Number of surveys
0–59 months	62

6–59 months	3
3–59 months	5
12–59 months	1
0–60 months	3
6–60 months	2
0–65 months	1
0–72 months	1
0–71 months	1
12–71 months	1
12–72 months	1
6–72 months	1
0–36 months	3
3–36 months	9
3–35 months	1
6–36 months	1
3–48 months	1
0–23 months	2
Total number of reports	100

In addition to the observed differences in growth faltering across age groups, an analysis of non–random errors related to age–misreporting (see page 100–110) in anthropometric surveys found that results may be biased when child age is systematically rounded down (for example, an 18–month old child who is wrongly reported as "one–year old"). If rounding down of age is frequently reported, there will be differences in results between an analysis using 0–60 month old children and an analysis that using 0–59 month old children because those who were reported to be "60 months" would likely include older children.

To determine the likely error of using different age groups for reporting underweight prevalence, an analysis was done on available anthropometric data from 12 different surveys conducted by IFPRI in the 1980s in the Philippines, Guatemala, Kenya, India, Bangladesh, Sudan, Ethiopia, Mexico, Ghana, Gambia and Rwanda. This involved comparing prevalence estimates based on alternative age groupings for each survey. The main finding from this analysis is that the use of the 36 months and under age categories (0–36, 3–36, 0–23, and 6–36 age groups) would likely overstate the 0–59 month prevalence by a factor of about 1.15 to 1.30. This is because there is a higher prevalence of underweight in the early years of childhood. The likely errors for the rest of the age groupings were about 1 to 6%.

On the basis of the above findings, adjustments were made on published country reports that used children 36 months and under as the unit of analysis. These include most of the early DHS surveys (1986–1988) in 12 countries. The published prevalences in these countries were adjusted to the 0–59 months–equivalent of underweight prevalence using parameters calculated from the IFPRI surveys. As an example, the reported underweight prevalence for the Morocco (1987) survey of 15.7% covering 0–36 month old children has been adjusted to the 0–59–months equivalent prevalence of 11.8%. Among the country surveys where the adjustments were applied are Burundi (1987), Mali (1987), Senegal (1986), Sri–Lanka (1987), Egypt (1988), Morocco (1987), Tunisia (1988), Thailand (1987), Guatemala (1987), Trinidad and Tobago (1987), Bolivia (1989) and Colombia (1986). The published rates in India (1975–79 and 1988–90), which referred to the 12–72–month group, were adjusted to the comparable 0–59 group.

Models to predict underweight prevalence

Multivariate regression methods were used in deriving estimates for each of the country prevalences for the reference years of 1975, 1980, 1985, and 1990. The models developed for the present volume are generally in line with those used in the First Report on the World Nutrition Situation in 1987, with some modifications in the choice of independent variables. It should be emphasized that the models were developed mainly to derive the factors that had the best predictive value for interpolation. It is not crucial whether such factors necessarily cause malnutrition, although they may legitimately relate to potential causal contributions.

Two models (Table 2.3) were eventually used in the analysis – a global model with N=100 and a separate model for Sub–Saharan Africa with N=20. Preliminary regressions indicate that a global model does not predict well for Sub–Saharan Africa. As a result, a separate model was constructed for that region.

The most important independent variable is the per caput calorie supply, which accounts for more than half of the explained variance in prevalence of underweight. Preliminary regressions also indicate that calorie supply for the year prior to the nutrition survey had a higher correlation with underweight prevalence compared to calorie supply for the same year that the survey was conducted – which suggests a potential lagged effect of calories. The simple bi–variate relationship between the prevalence of underweight and the lagged per caput calorie supply is shown in Figures 2.1 and 2.2. The simple regression line of prevalence underweight on kcals/caput/day and the statistics are also listed below the respective figures. As expected, the prevalence of underweight declines as kcals/caput/day increases, as seen from the fitted regression line. In Figure 2.2, a separate regression line is drawn representing the interaction term between kcals and South Asia dummy. The interpretation of such a vastly different slope is that the underweight prevalence in South Asia (India, Bangladesh, Pakistan, Nepal, Sri–Lanka) is much higher at a given level of kcals/caput/day. There is a clear need, therefore, for the use of the interaction term in the regressions.

Table 2.3. Models to estimate underweight prevalence in children, weighted least squares

	Global Model		Africa Model	
Intercept	53.55	(11.75)**	69.86	(6.40)**
Kcals/caput/day (lagged one year)	–0.0112	(–5.49)**	–0.0215	(–4.43)**
Female secondary education	–0.075	(–2.31)**	–0.204	(–2.28)**
Percent government social support	–0.185	(–3.07)**		
Child population under 5	0.000093	(2.89)**		
Interaction South Asia * kcals/caput	–0.053	(–4.18)**		
Dummy South Asia	144.19	(5.03)**		
Dummy South America	–4.16	(–2.61)**		
Dummy South East Asia	15.06	(8.12)**		
Percent calories from root crops			–0.629	(–1.88)*
Roots calories squared			0.021	(2.54)**
Percent calories from animal sources			0.315	(1.66)*
Total population			0.00017	(4.07)**
Number of observations	100		20	
R–squared, adjusted	0.90		0.82	
F statistic	95.3**		9.6**	

> *Note:* T–statistics are given in parentheses.
> * Significance at 0.10.
> **Significance of at least 0.01.

The final models chosen are highly predictive of the prevalence of underweight at the national level. One important difference between these models and those used in the First Report is that the interaction of the South Asia dummy with infant mortality rate (IMR) in the previous model has now been replaced with kcals/caput/day. This interaction is obvious from the plots in Figure 2.2 which showed a very different slope for South Asia.

The results for the global model also showed the strong association of the variable "percent government social support." The variable is defined as the percentage of government fiscal expenditures devoted to health, education, and social security. The other factors that are strongly related to underweight prevalence include education of females and population. The significant t–values of female education variables strongly suggest potential effects of education on prevalence of underweight children. The positive and significant coefficient of total child population shows the relatively higher prevalences in larger countries. The regional dummies for South Asia, Southeast Asia, and South America improved the precision of the model. In general, these meant that certain undefined regional differences explain the differences in national prevalences.

Although a separate regression model was used for Sub–Saharan Africa, the global model nevertheless included observations from that region in the regressions to preserve the degrees of freedom. In the Sub–Saharan model, fewer variables were used since the number of observations was small, hence, the concern for the degrees of freedom. In that model, the variables that had strong associations with prevalence of underweight are kcals/caput/day, female education, and population. The concern for accuracy in kcals estimates was refined by using the proportion of calories derived from root crops, and proportion from animal sources. The population variable shows positive and significant effects, which suggests higher prevalence in larger countries, all things equal.

Data for the independent variables used in the regressions were obtained from various sources. Kcals, and proportion of calories from root crops and from animal sources were retrieved from FAO's AGROSTAT (FAO, 1992a), while data on government expenditures from health, education, and social security were calculated from IMF's Government Financial Statistics (IMF, 199 la). GNP per capita, and females enrolled in secondary education were derived from the World Bank's World Tables (1992a) and Social Indicators of Development (World Bank, 1991).

KEY

f Sub-Saharan Africa
a South Asia
e Near East and North Africa
s South East Asia
c Middle America and the Caribbean
m South America
$ Cases where different regions coincide

Regression statistics of prevalence
on kcals/caput/day
(100 cases plotted)

Correlation -.49385
R Squared .24389
S.E. of Est 15.44203 Sig. .0000
Intercept(S.E.) 98.24204(12.75582)
Slope(S.E.) -.03060 (.00536)
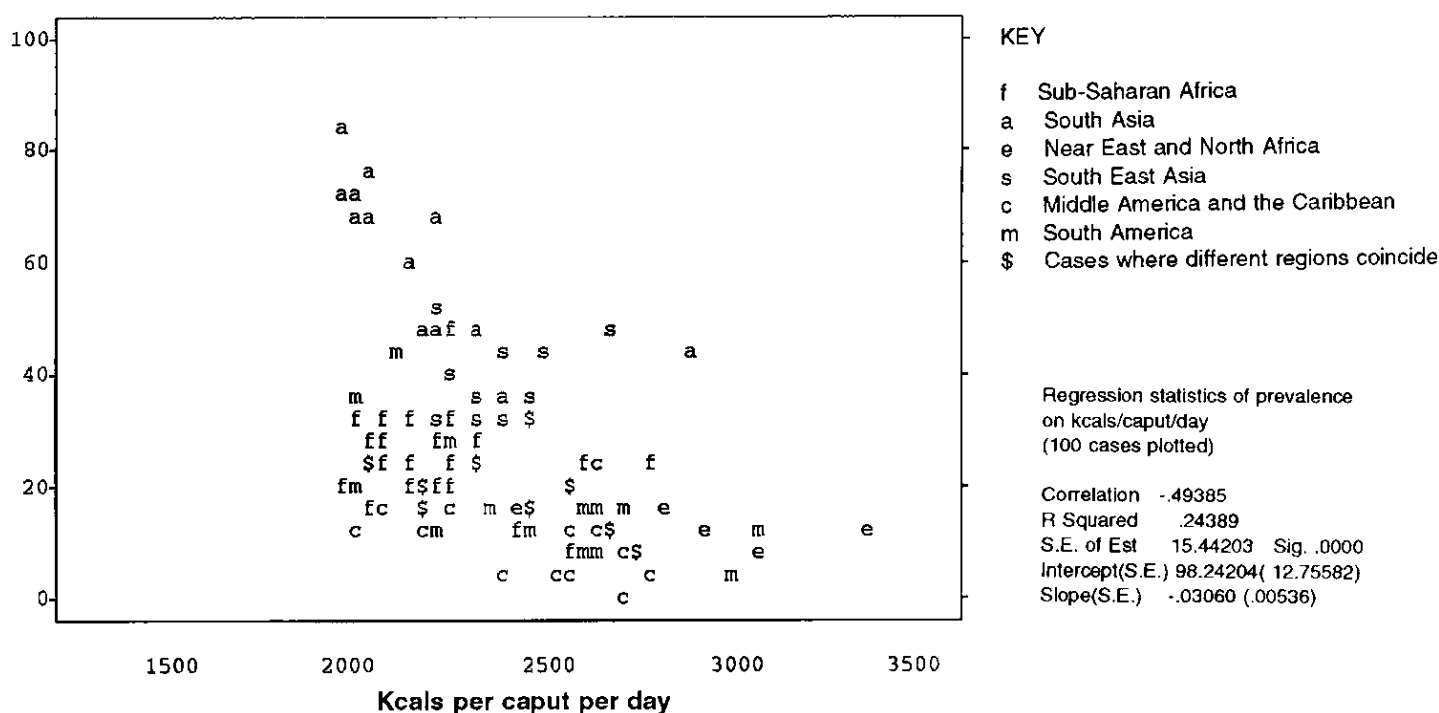
Fig. 2.1 Plot of prevalence of underweight children by kcals/caput/day Prevalence of underweight children (%)

KEY

f	Sub-Saharan Africa
a	South Asia
e	Near East and North Africa
s	South East Asia
c	Middle America and the Caribbean
m	South America
$	Cases where different regions coincide

Regression statistics of prevalence
underweight on kcals/caput/day, kcals * DASIA
(Plotted on 100 cases)

R squared   0.83,
Significance of regression = 0.000 with N=100
Intercept = 61.54 (7.34)
Coefficient of Kcals = -0.017 (-4.86)
Coefficient of Kcals*DASIA = -0.026 (-2.11)
Coefficient of DASIA = 91.56 (3.34)

The Lines

South Asia (DASIA)   Prev= 153.10 - 0.043 (Kcals)
Other Regions   Prev= 61.54   - 0.017 (Kcals)

Fig. 2.2 Plot of prevalence of underweight children by kcals/caput/day (With interaction term between kcals and South Asia) Prevalence of underweight children (%)

A weighted multivariate regression technique was used in order to remove the bias from countries that had more than one data point.

Several variants of the model were explored with the view of generating estimators with the best fit. The objective was to minimize the residuals for each of the country predictions, particularly for those with large populations. Residual analyses tables of the models are presented in Table 2.4 for the 100 countries in the global analysis and in Table 2.5 for the 20 countries in the Sub–Saharan Africa analysis. The case–wise plots shown here compare the actual survey values with the predicted prevalence. The value of "0.0" means no difference between the actual and predicted values – i.e., the further away from this value, the larger the difference between actual and predicted values. These were standardized, and results are shown in the case–wise plots to illustrate graphically each country case. The plot of the actual values and the predicted values are given in Figures 2.3 and 2.4 which also summarize graphically the case–wise plots in Tables 2.4 and 2.5. The graphs confirm the close agreement between the actual data and predicted prevalence values generated by the models.

The final models give a standard deviation of the residuals of 3.3% for the global model and 4.6% for the Sub–Saharan Africa model. The interpretation of these residuals in the global model is that we would expect two–thirds of the estimates to be within +/– 3 percentage points, and 95% to be within +/– 6 percentage points. In the Africa model, we would expect two–thirds of the estimates to be within +/– 4 percentage points, and 95% to be within 9 percentage points. These are considered estimates of the likely errors in the predicted values.

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Value of ZRESID

	-3.0 0.0 3.0	Actual[1]	Predicted[2]		
COUNTRY	0:.........:........:0	Prevalence	Prevalence	Residual[3]	ZRESID[4]
Botswana	27.00	21.37630	5.62370	1.07058
Burundi	31.00	24.27108	6.72892	1.28097
Cameroon	17.30	23.90981	-6.60981	-1.25830
Congo	23.50	16.98718	6.51282	1.23984
Cote d'Ivoire	12.40	17.41442	-5.01442	-.95459
Ethiopia	38.10	36.52664	1.57336	.29952
Ghana	27.10	19.66517	7.43483	1.41536
Guinea	23.40	22.72279	.67721	.12892
Kenya	20.50	21.79312	-1.29312	-.24617
Lesotho	17.30	24.09185	-6.79185	-1.29295
Lesotho	13.30	17.72891	-4.42891	-.84313
Liberia	20.30	24.11623	-3.81623	-.72649
Malawi	23.90	22.08051	1.81949	.34637
Mali	25.10	24.49966	.60034	.11429
Mauritania	31.00	24.69762	6.30238	1.19978
Nigeria	35.70	26.03541	11.48439	1.91598
Rwanda	27.80	24.58792	3.21208	.61148
Rwanda	27.50	24.78171	2.71829	.51748
Senegal	17.50	20.56384	-3.06384	-.58326
Sleon	31.00	25.94766	5.05234	.96181
Sleon	23.20	25.33734	-2.13734	-.40688
Swaziland	9.70	15.91142	-6.21142	-1.18246
Togo	20.50	24.92048	-4.42048	-.84152
Togo	24.40	23.34433	1.05567	.20097
Uganda	23.30	24.73877	-1.43873	-1.11152
Zaire	28.80	22.86701	5.93299	1.12945
Zambia	20.50	23.90865	-3.40865	-.64890
Zambia	25.80	25.71901	.08099	.01542
Zimbabwe	20.70	21.51181	-.81181	-.15454
Zimbabwe	11.50	18.97449	-7.47449	-1.42291
Bangladesh	84.40	70.85373	13.54627	2.57878
Bangladesh	70.10	72.95118	-2.85118	-.54278
Bangladesh	71.50	70.46633	1.03367	.19678
Bangladesh	66.50	67.56304	-1.06304	-.20237
India	71.40	74.62463	-3.22463	-.61387
India	63.20	60.19375	3.00625	.57229
Nepal	69.60	68.95492	.64508	.12280
Pakistan	54.70	56.40932	-1.70932	-1.88642
Pakistan	40.40	57.41320	-17.01320	-3.23878
Sri Lanka	58.30	54.38316	3.91684	.74564
Sri Lanka	47.50	39.31917	8.18083	1.55737
Sri Lanka	36.60	32.86756	3.73244	.71054
Algeria	10.00	14.08270	-4.08277	-1.04373
Egypt	16.60	15.19554	1.40446	.26737
Egypt	10.00	7.15832	2.84168	.54097
Jordan	17.40	19.66424	-2.26424	-.43104
Morroco	11.80	13.32336	-1.52336	-.29000
Tunisia	20.20	18.05403	2.14597	.40852
Tunisia	7.80	10.11455	-2.31455	-.44062
Yemen PDR	25.80	19.97547	5.82453	1.10881
Myanmar	42.00	36.47003	5.52997	1.05273
Myanmar	42.00	34.57229	7.42771	.57767
Myanmar	33.00	34.76217	-1.76217	-.33546
Indonesia	39.90	34.35391	5.54609	1.05580
Laos	36.50	34.84857	1.65143	.31438
Papua	34.70	37.11777	-2.41777	-.46027
Philippines	33.30	36.65052	-3.35052	-.63783
Philippines	33.20	33.48641	-.28641	-.05452
Philippines	32.90	33.80106	-.90106	-.17153
Philippines	33.50	32.84709	.65291	.12429
Thailand	22.20	34.29018	-12.09018	-2.30159
Costa Rica	16.00	14.68030	1.31970	.25123
Costa Rica	6.00	11.63963	-5.63963	-1.07361

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Table 2.4 Case–wise plot of standardized residuals: Prevalence of underweight preschool children, global model

COUNTRY	Value of ZRESID	ACTUAL[1] PREVALENCE	PREDICTED[2] PREVALENCE	RESIDUAL[3]	ZRESID[4]
Botswana		27.00	21.18684	5.81316	1.43627
Burundi		31.00	24.79201	6.20799	1.53382
Congo		23.50	22.89056	.60944	.15058
Cote d'Ivoire		12.40	12.04392	.35608	.08798
Ethiopia		38.10	37.11317	.98683	.24382
Ghana		27.10	25.32086	1.77914	.43958
Guinea		23.40	27.56417	-4.16417	-1.02885
Kenya		20.50	21.35920	-.85920	-.21228
Lesotho		13.30	16.72826	-3.42826	-.84703
Malawi		23.90	20.42961	3.47039	.85744
Mali		25.10	25.34495	-.24495	-.06052
Mauritania		31.00	31.72183	-.72183	-.17834
Nigeria		36.10	35.41472	.68528	.16931
Rwanda		27.50	31.37923	-3.87923	-.95845
Senegal		17.50	17.91888	-.41888	-.10349
Swaziland		9.70	10.94264	-1.24264	-.30702
Togo		24.40	21.24934	3.15066	.77844
Uganda		18.90	25.83073	-6.93073	-1.71239
Zambia		25.80	23.41379	2.38621	.58956
Zimbabwe		11.50	15.05529	-3.55529	-.87841

The column "Value of ZRESID" shows a plot scaled from -3.0 through 0.0 to 3.0, with asterisks plotting each country's standardized residual.

[1] Actual percent prevalence of preschool children below -2 s.d. weight-for-age.

[2] Predicted prevalence based on the Africa model.

[3] Residual value, or actual prevalence less predicted prevalence.

[4] Standardized residual (residual/s.d. of residual) - plotted.

Table 2.5 Case–wise plot of standardized residuals: Prevalence of underweight preschool children, Sub–Saharan Africa model

The coefficients from the regression models were used to predict prevalence of underweight children for each country at the historical reference periods – 1975,1980, 1985, and 1990. This required substitution of the values of the independent variables for the reference periods; for example, data on female education of the country for 1975,1980 and so on. In the case of kcals per caput, the model uses a one–year lag; hence, the kcal data for 1974, 1979, 1984, and 1989 were applied. The process can be envisaged as a matrix, with the columns defined by year and the rows defined by country, which would have 1,504 cells (94 countries × 16 years – 1975 to 1990), of which 100 are filled in with available survey results; the problem is to fill the gaps for the reference years.

The process generated country level predicted prevalences, which are given in Table 2.6. In most cases, the predicted values computed from the model were used for the trend analysis. Prevalences from direct estimates were used when surveys coincided with the reference years. The country level estimates were then

used in estimating the prevalence by regions (country groups) weighted by the child population of countries. The underweight prevalence estimates by region (country groups) are given in Table 2.7.

Age misreporting: Diagnosis and correction of non–random errors

> [1] This section was contributed by Rudo Niemeijer and Wim Dechering of the University of Leiden, Netherlands.

An important methodological issue that was examined as part of the preparation of this report is concerned with the misreporting of child age in nutrition surveys. Since anthropometric data here are analysed with respect to the age of the child, it is clear that the interpretation of data would likely be sensitive to the accuracy of age reported to the survey enumerators. Most surveys do not require proof of age such as birth certificates and, therefore, age is simply reported by mothers.

Regression statistics of WA2SDM on PREDWA2:		KEY	
100 cases plotted		f	Sub-Saharan Africa
Correlation	0.94067	a	South Asia
R Squared	0.8846	e	Near East and North Africa
S.E. of Est	5.89577 Sig. .0000	s	South East Asia
Intercept(S.E.)	.00000 (1.10372)	c	Middle America and the Caribbean
Slope(S.E.)	1.00000 (0.03682)	m	South America
		$	Cases where different regions coincide
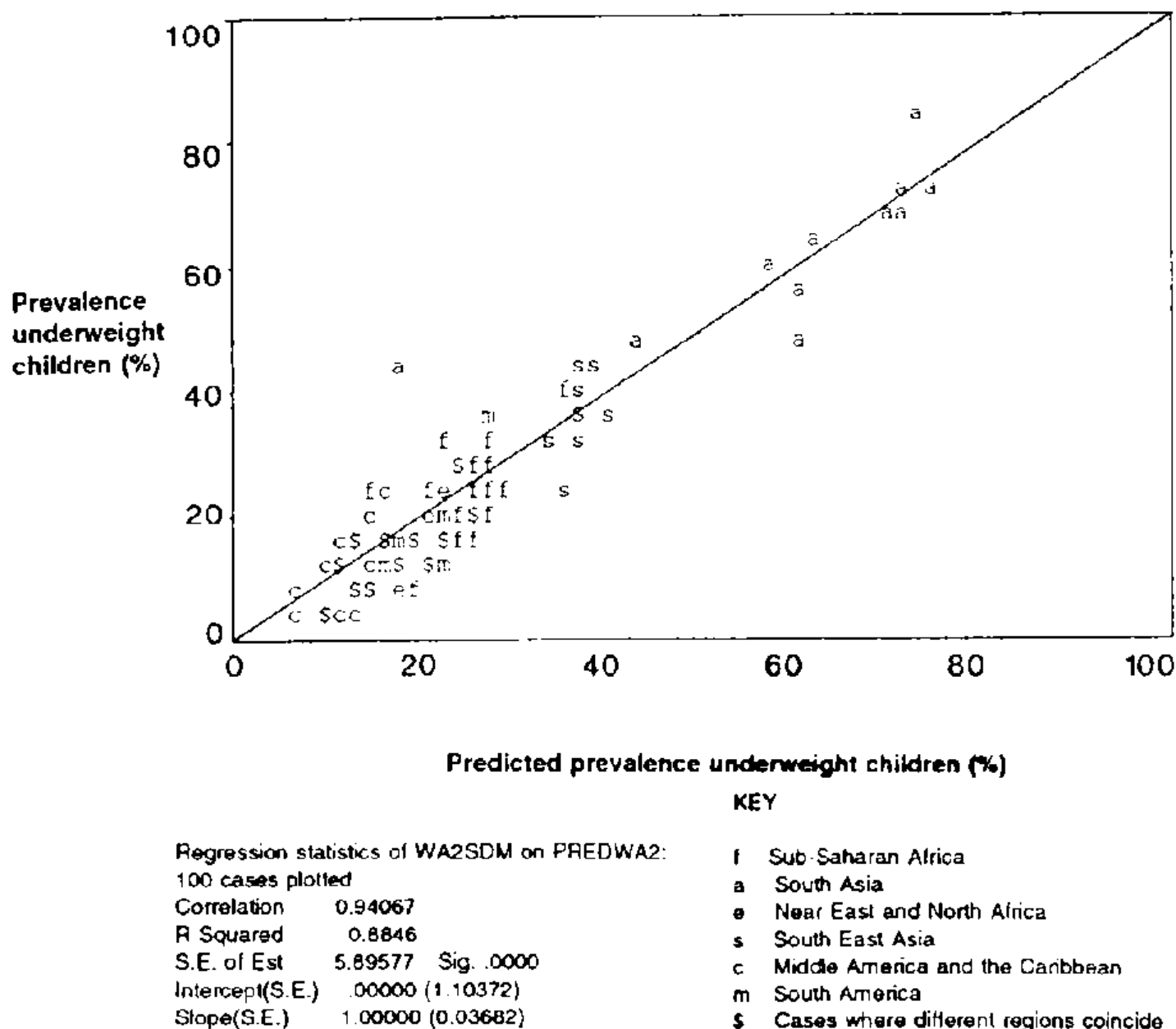
Fig. 2.3 plot of prevalence of underweight children by predicted prevalence from the global model

Predicted prevalence underweight children (%)
Regression statistics of WA2SDM on PREDWA2:
20 cases plotted.
Correlation   0.9034747
R Squared   0.8167426
S.E. of Est   3.4396333   Sig. .0000
Intercept(S.E.)   .00000 (2.721863)
Slope(S.E.)   1.00000 (0.011659)
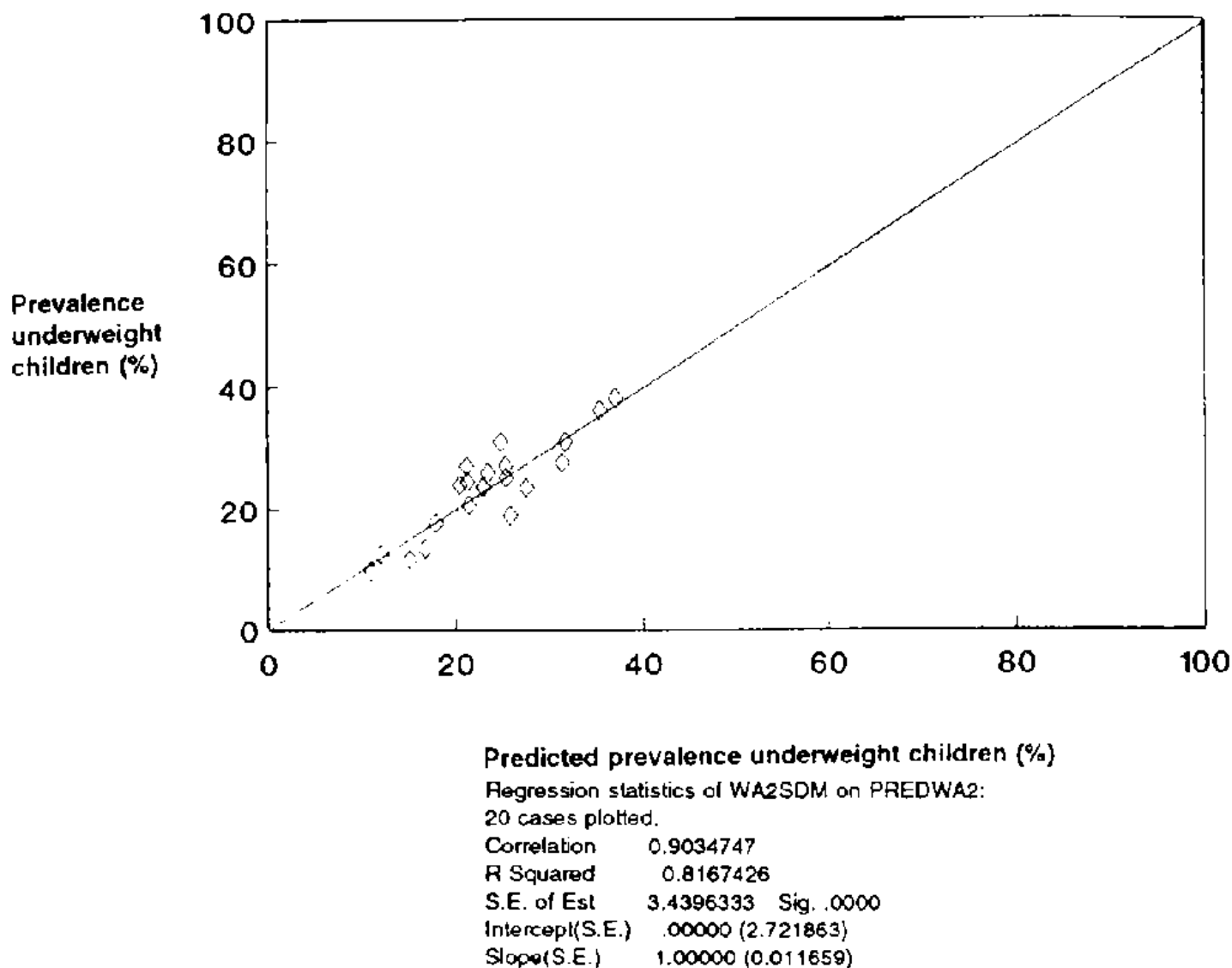
Fig. 2.4 Plot of prevalence of underweight children by predicted prevalence from the Sub–Saharan Africa model

For this report, five surveys done in the 1970s and 1980s in Pakistan and Egypt were examined to explore the direction as well as degree of bias from wrongly reported child age. The main conclusion from the analysis that will be described below is that such biases do exist in varying degrees. The bias, for instance, tended to underestimate the degree of improvement in Pakistan for the period from 1977 to 1990. Previous analysis from these data sets concluded that the prevalence of underweight has been virtually unchanged over the same period.

In the surveys examined, there is extensive rounding of ages to exact years – the examples in Figures 2.5,2.6, and 2.7 on the surveys in Pakistan in 1977,1987 and 1990 are not atypical. If rounding of ages is randomly up or down, little bias is introduced into the estimates. If on the other hand, there is a systematic tendency to round ages up (or down) then a substantial bias is introduced. For example, if the child is reported as two years old but is actually 35 months, the child's degree of underweight for his age will be substantially underestimated.

DIAGNOSING AGE MISREPORTING. If the age distributions of the three Pakistan surveys are compared (in Figures 2.5, 2.6, and 2.7), the peculiar age distributions of the earlier surveys clearly stand out. In the 1977 Pakistan survey, many ages appear to have been rounded to multiples of six and twelve months. In the second survey rounding is less pronounced, but still involves a considerable part of the survey population. The 1990 data set does not show immediate evidence of rounding, but the saw–tooth pattern of the age distribution still suggests a cyclical effect, and careful testing for non–sampling errors is indicated. Demographers have been using different measures to diagnose age heaping (or so–called digit preferences) for this purpose. More sensitive tests can be based upon a time series analysis approach: the data should not show significant auto–correlations after a removal of trend effects.

What are the likely consequences of age heaping in nutrition surveys? In the case of the Pakistan 1977 survey, a group of 209 children has been coded as having an age of 48 months. If these children represent an age range of 42 to 53 months, an average age of 48 months is about right, but if they represent an age range of four year olds (48 to 59 months), the coded age would on the average be about 6 months too low. That would suggest a considerable bias in the final estimate underweight prevalence rate, which would be higher than the rate calculated from the uncorrected survey data.

Table 2.6. Indicators by country: Predicted prevalence of underweight children, and per caput supply of calories, vitamin A, and iron

	Predicted prevalence of underweight preschool children (percent < –2 s.d. W/A)[a]				Dietary energy supply (kcals/caput/day)			Vitamin A supply (RE/caput/day)			Dietary iron supply (mg/capu				
											Vegetable sources			Animal so	
Country	1975	1980	1985	1990	1970	1980	1990	1970	1980	1989	1970	1980	1989	1970	1980
Sub Saharan Africa Angola	24.2	26.3	31.5	35.3	2034	2171	1807	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Benin	34.3	33.4	26.8	23.5	2078	2100	2305	1080	1130	1525	13.1	12.8	13.1	1.3	1.3
Botswana	36.9	34.4	27.0	26.8	2139	2142	2375	497	580	443	14.8	13.0	15.0	3.9	3.4
Burundi	27.3	25.9	29.6	29.1	2363	2304	1932	n.a.	n.a.	665	n.a.	n.a.	n.a.	n.a.	n.a.
Burkina Faso	34.2	32.2	33.3	27.1	1967	2030	2288	n.a.	n.a.	233	n.a.	n.a.	n.a.	n.a.	n.a.
Cameroon	19.1	17.5	19.1	16.7	2185	2159	2217	1641	1457	1674	19.7	19.7	18.3	1.2	1.4
Central African Republic	53.2	52.7	46.5	31.9	2160	2129	2036	426	363	467	14.7	13.4	13.8	1.8	2.2
Chad	33.5	32.1	36.6	30.6	2137	1793	1743	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Congo	43.3	39.1	22.5	27.5	2174	2473	2590	1474	1670	1434	12.0	12.5	12.8	1.2	1.7
Cote d'Ivoire	18.2	14.1	11.4	12.3	2369	2611	2577	n.a.	n.a.	1377	n.a.	n.a.	n.a.	n.a.	n.a.
Ethiopia	44.7	36.5	41.1	39.8	1702	1816	1667	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Gambia	28.3	25.6	19.9	17.1	2249	n.a.	2370	913	960	703	11.3	9.0	8.7	1.7	1.5
Gabon	19.5	16.1	15.5	15.1	1895	n.a.	2383	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ghana	34.7	30.9	31.2	26.7	2200	1796	2248	779	765	1150	14.4	13.1	14.5	1.9	1.6
Guinea	27.6	23.9	22.3	24.0	1907	1776	2132	1573	1345	1229	11.6	11.2	10.9	.4	1.0
Kenya	24.8	21.1	17.5	17.4	2244	2196	2163	473	572	549	15.2	12.8	11.6	1.9	2.0
Lesotho	19.7	17.9	17.0	17.5	2020	2398	2299	250	313	316	12.9	14.9	14.5	1.5	1.6
Liberia	23.7	20.8	20.7	20.1	2210	2375	2382	1712	1749	2176	12.4	13.4	12.1	1.1	1.0
Madagascar	30.4	30.1	32.8	38.1	2494	2515	2158	647	641	571	12.9	11.8	10.6	2.5	2.5
Malawi	18.9	19.9	21.2	23.5	2325	2452	2139	286	278	241	16.9	15.5	14.7	.8	.7
Mali	36.4	34.3	28.9	21.6	1836	1719	2314	368	378	395	16.8	15.2	20.4	2.2	1.9

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Mauritius	32.4	28.0	23.9	17.0	2301	2714	2887	222	316	358	7.4	8.8	10.9	1.0	1.7	2.2
Mauritania	38.7	32.9	27.3	15.7	1987	2006	2685	567	666	549	12.0	10.6	10.0	3.8	3.3	2.8
Mozambique	44.3	43.8	45.6	46.8	2074	1813	1680	211	219	425	12.5	11.4	10.7	.6	.6	.5
Niger	50.1	49.0	49.4	44.0	2002	2344	2308	322	381	457	21.6	24.3	24.3	1.8	1.7	1.4
Nigeria	30.2	30.4	32.8	35.4	2131	2253	2312	1587	1371	1312	16.7	16.4	17.7	1.0	1.1	.7
Rwanda	36.5	35.5	29.9	31.7	1968	2011	1971	640	836	818	18.8	18.7	17.8	.4	.5	.4
Senegal	19.2	19.4	20.4	19.6	2370	2393	2369	671	582	629	13.5	12.1	12.0	2.3	2.0	2.1
Sierra Leone	21.8	20.7	25.4	25.9	1956	2034	1799	2866	2691	2232	10.2	9.6	9.1	1.0	1.3	.9
Somalia	46.9	41.9	35.9	38.8	2182	2082	1906	616	515	552	10.6	12.4	13.6	3.4	2.9	2.9
Sudan	35.9	26.4	33.8	33.7	2117	2353	1974	465	542	484	27.3	25.9	22.1	2.6	3.1	2.3
Swaziland	14.4	12.6	10.3	8.8	2225	n.a.	2591	451	501	398	11.9	10.9	11.1	3.0	3.5	2.9
Tanzania	25.4	23.8	24.8	24.2	1949	2461	2206	632	632	569	10.8	14.0	13.5	1.5	1.4	1.5
Togo	25.3	23.2	22.4	18.4	2194	2218	2214	809	871	734	17.1	14.1	14.0	.9	.8	1.0
Uganda	28.2	24.8	24.9	25.5	2282	2183	2153	702	732	633	19.3	18.9	19.0	1.5	1.4	1.1
Zaire	28.1	27.9	31.9	33.2	2253	2124	1991	1613	1606	1327	13.2	12.3	11.7	1.0	.7	.7
Zambia	17.2	19.3	20.3	26.0	2192	2227	2077	310	286	261	14.8	13.7	13.1	2.0	1.5	1.2
Zimbabwe	25.3	23.5	16.9	14.1	2117	2119	2299	261	259	211	13.8	12.5	12.5	1.6	1.5	1.3
South Asia																
Afghanistan	18.8	20.9	31.2	40.3	2185	2215	2022	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bangladesh	84.4	70.1	70.9	65.8	2012	1821	2021	308	243	344	8.2	7.2	7.0	.7	.6	.5
India	71.3	68.0	65.0	63.1	2022	2005	2229	451	513	555	14.9	14.4	14.5	.3	.4	.4
Iran	43.0	43.1	39.0	39.0	2218	2861	3181	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Nepal	63.1	66.2	60.9	50.5	1996	1962	2077	278	289	336	9.8	9.8	10.3	.6	.9	1.0
Pakistan	47.0	47.0	47.1	41.6	2027	2190	2219	295	427	699	16.0	17.1	14.7	1.0	1.1	1.3
Sri Lanka	58.3	47.5	36.6	42.0	2261	2243	2277	448	374	461	11.7	11.6	11.6	.9	.8	.9
Near East and North Africa																
Algeria	22.7	18.0	15.3	12.3	1825	2685	2866	328	479	693	8.6	11.5	12.7	.9	1.1	1.5
Cyprus	8.4	6.6	7.3	7.5	3066	n.a.	3050	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Egypt	17.0	15.8	12.2	10.0	2499	3013	3336	561	706	919	17.5	18.2	20.0	1.4	1.8	2.3
Iraq	18.5	14.5	10.6	11.9	2250	2744	2887	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Jordan	17.5	14.2	13.5	12.7	2616	2766	2634	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kuwait	14.4	10.1	7.4	5.0	n.a.	3149	3195	913	1217	1254	12.4	14.4	14.6	3.3	5.1	5.0
Lebanon	17.1	14.0	12.0	8.9	2478	2968	3274	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Libya	6.6	4.1	3.4	4.0	2368	3636	3324	533	1020	1051	10.6	15.1	13.7	2.3	4.4	3.7
Morroco	19.3	16.6	14.9	12.0	2424	2740	3020	567	575	550	14.3	15.8	18.5	1.4	1.4	1.5

Saudi Arabia	24.6	14.9	12.3	12.6	1887	2807	2874	350	1302	1934	16.6	16.5	16.2	1.1	3.3
Syria	19.7	16.0	10.8	12.5	2356	2872	3003	466	905	736	12.9	16.8	15.9	1.6	2.9
Turkey	14.6	13.2	14.8	10.5	2820	3099	3236	612	658	738	14.4	14.2	15.2	2.0	2.0
Tunisia	17.3	14.8	12.1	8.9	2272	2759	3119	694	857	904	12.5	15.1	16.1	1.2	1.7
United Arab Emirates	9.0	8.9	8.5	7.0	n.a.	3536	3309	1153	1278	1478	9.5	14.4	17.1	3.9	5.9
Yemen PDR	61.3	61.2	56.6	53.1	2077	2297	2338	370	357	410	n.a.	n.a.	n.a.	n.a.	n.a.
Yemen Arab Republic	24.4	19.7	19.9	19.1	1842	2197	2256	262	643	948	n.a.	n.a.	n.a.	n.a.	n.a.
Myanmar	40.5	39.2	35.9	33.0	2069	2357	2440	405	427	438	7.4	7.6	8.4	1.5	1.9
South East Asia															
Indonesia	51.3	45.7	40.5	38.0	2013	2424	2750	200	456	782	10.4	12.3	10.8	.7	.9
Kampuchea	43.3	44.3	38.8	37.7	2743	1825	2166	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Laos	40.5	37.6	36.0	34.0	2024	2097	2630	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Malaysia	31.2	29.8	24.1	17.6	2410	2634	2774	431	1494	2006	8.5	7,9	8.2	2.6	2.8
Papua New Guinea	38.6	37.3	36.8	36.0	3525	2180	2403	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Philippines	38.7	33.2	33.3	33.5	2053	2381	2375	257	341	351	4.7	6.6	5.9	2.5	2.7
Thailand	36.0	33.2	20.1	13.0	2258	2316	2316	401	390	330	6.6	7.6	7.0	2.9	2.0
Vietnam	55.0	53.1	51.5	41.9	1788	2044	2233	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
China	26.1	23.8	21.3	21.0	n.a.	2291	2627	820	845	966	10.9	10.6	10.3	.6	.8
Middle American and Caribbean															
Costa Rica	10.2	9.0	10.2	8.1	2406	2612	2808	1015	1367	2102	9.2	8.4	8.5	2.7	3.7
Cuba	9.6	8.3	8.5	8.4	2574	2833	2730	520	623	669	7.8	9.3	9.5	4.1	3.7
Dominican Republic	17.0	14.0	12.5	12.0	2083	2333	2450	688	671	653	8.8	9.5	8.1	1.7	2.0
El Salvador	21.6	20.9	19.0	19.4	1854	2156	2317	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Guatemala	29.8	28.7	28.5	25.0	2101	2214	2235	276	251	264	11.5	11.6	12.0	1.5	1.1
Haiti	25.7	25.3	23.8	24.4	1920	1902	2013	841	863	879	16.9	16.6	16.3	.9	1.0
Honduras	22.6	21.2	20.7	19.8	2151	2184	2247	583	765	1267	12.1	10.7	11.0	1.1	1.5
Jamaica	14.0	15.0	14.9	7.2	2533	2583	2609	587	679	696	7.7	8.4	8.2	3.6	3.2
Mexico	19.2	16.7	13.0	13.9	2703	2903	3052	560	668	717	13.0	13.0	12.3	1.9	2.9
Nicaragua	19.9	19.7	19.6	18.7	2432	2320	2265	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Panama	13.9	15.7	11.8	11.0	2346	2324	2539	550	501	507	n.a.	n.a.	n.a.	n.a.	n.a.
Trinidad and Tobago	13.7	10.0	7.5	9.0	2567	2873	2853	363	612	635	8.7	10.9	9.5	2.2	3.1
South America															

Argentina	2.6	3.5	1.3	1.2	3318	3260	3113	1145	1054	1116	9.5	8.4	8.5	8.8	9.1	7.9
Bolivia	16.7	14.6	14.4	11.4	1972	2078	1916	522	549	605	9.9	10.3	9.2	2.2	2.7	3.1
Brazil	18.4	7.0	7.4	7.1	2472	2631	2751	522	549	552	11.1	9.4	9.0	1.7	1.9	2.2
Chile	2.1	1.1	2.5	2.0	2674	2628	2581	612	763	698	12.0	13.1	11.7	3.1	3.1	3.1
Colombia	19.0	16.7	10.2	10.1	2159	2512	2598	822	1100	1330	10.6	11.7	11.2	2.9	3.3	3.4
Ecuador	20.0	19.0	16.5	13.0	1957	2054	2531	615	541	550	10.0	7.9	7.9	1.9	2.3	2.2
Guyana	23.0	22.1	20.0	18.0	2292	n.a.	2712	338	258	256	7.1	6.8	7.9	2.6	2.3	2.4
Paraguay	8.5	7.0	4.0	4.2	2754	2777	2757	991	913	876	12.5	13.3	12.6	6.0	5.1	4.2
Peru	16.7	16.7	16.8	13.1	2290	2162	2186	538	497	599	10.5	9.0	8.4	2.2	2.1	2.5
Uruguay	6.1	6.5	7.4	7.0	3002	2811	2653	692	649	656	7.0	6.7	7.1	7.4	6.2	5.6
Venezuela	13.8	10.2	6.0	5.9	2412	2650	2582	533	642	527	7.5	7.2	7.1	2.4	2.7	2.6

n.a. Not available.
Sources: See Chapter 2. a. Based on regression models described in Chapter 2.

Table 2.7. Food and nutrition Indicators by country group

Country group	Year	Dietary energy supply (kcals/caput/day)	Vitamin A supply (RE/caput/day)	Dietary iron supply (Mg/caput/day)		Chronically underfed population		Underweight preschool children (Percent < –2 s.d. W/A)		Infan mortal rate (p 1,00 live birth
				Vegetable sources	Animal sources	(%)	(million)	(%)	(million)	
Sub–Saharan Africa	1970	2138	1043	15.9	1.4	35	94	n.a.	n.a.	n.a.
	1975	2118	n.a.	n.a.	n.a.	37	112	31.4	18.5	135
	1980	2120	970	15.4	1.4	36	128	28.9	19.9	124
	1985	2155	n.a.	n.a.	n.a.	n.a.	n.a.	29.9	24.1	116
	1990	2099	922	15.4	1.2	37	175	29.9	28.2	104
Near East and North Africa	1970	2415	527	14.4	0.5	23	32	n.a.	n.a.	n.a.
	1975	2586	n.a.	n.a.	n.a.	17	26	19.8	5.2	112
	1980	2875	704	15.5	2.0	0	15	17.2	5.0	92
	1985	2984	n.a.	n.a.	n.a.	n.a.	n.a.	15.1	5.0	76
	1990	3094	851	16.7	2.2	5	12	13.4	4.8	64
South Asia	1970	2054	411	14.2	0.4	34	255	n.a.	n.a.	n.a.
	1975	2060	n.a.	n.a.	n.a.	34	289	67.7	90.6	129
	1980	2125	472	13.8	0.5	30	285	63.7	89.9	116
	1985	2185	n.a.	n.a.	n.a.	n.a.	n.a.	61.1	100.1	104

	1990	2245	542	13.6	0.5	24	277	58.5	101.2
South East Asia	1970	2054	283	8.5	1.6	35	101	n.a.	n.a.
	1975	2118	n.a.	n.a.	n.a.	32	101	43.6	24.3
	1980	2328	275	9.9	1.6	22	78	39.1	22.8
	1985	2387	n.a.	n.a.	n.a.	n.a.	n.a.	34.7	21.7
	1990	2446	471	9.1	1.7	17	74	31.3	19.9
China	1970	2027	820	10.9	0.6	46*	406*	n.a.	n.a.
	1975	2125	n.a.	n.a.	n.a.	40*	395*	26.1	20.8
	1980	2357	845	10.6	0.8	28*	290*	23.8	20.5
	1985	2507	n.a.	n.a.	n.a.	n.a.	n.a.	21.3	21.1
	1990	2657	966	10.3	1.4	16*	189*	21.8	23.6
Middle America and Caribbean	1970	2471	567	12.1	2.1	21	21	n.a.	n.a.
	1975	2577	n.a.	n.a.	n.a.	21	21	18.3	3.4
	1980	2768	661	12.3	2.6	18	18	17.7	3.1
	1985	2795	n.a.	n.a.	n.a.	n.a.	n.a.	15.2	2.8
	1990	2822	731	11.8	2.9	20	20	15.4	3.0
South America	1970	2518	645	10.5	3.0	32	32	n.a.	n.a.
	1975	2562	n.a.	n.a.	n.a.	32	32	15.7	4.8
	1980	2659	686	9.5	3.1	29	29	9.3	3.1
	1985	2641	n.a.	n.a.	n.a.	n.a.	n.a.	8.2	2.9
	1990	2625	714	9.1	3.2	38	38	7.7	2.8

n.a. Not available.
* Includes countries in East Asia.
Sources: See Chapter 2.
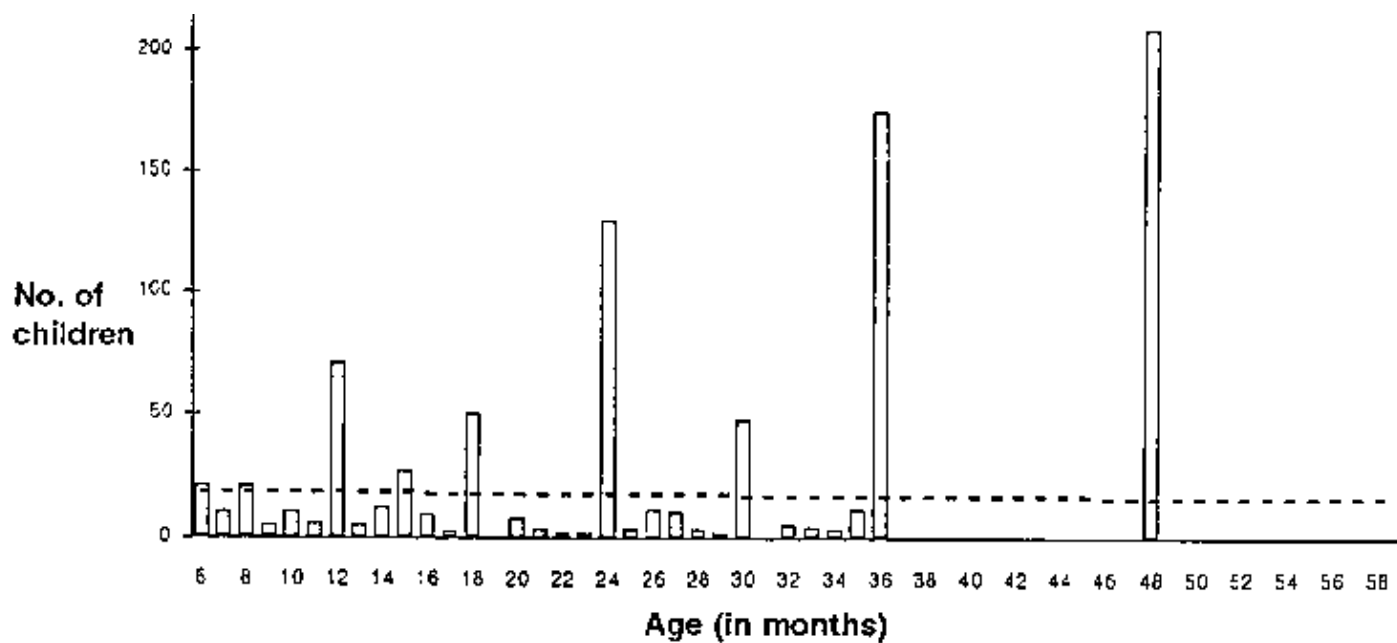
Fig. 2.5 Pakistan 1977 survey: Age distribution
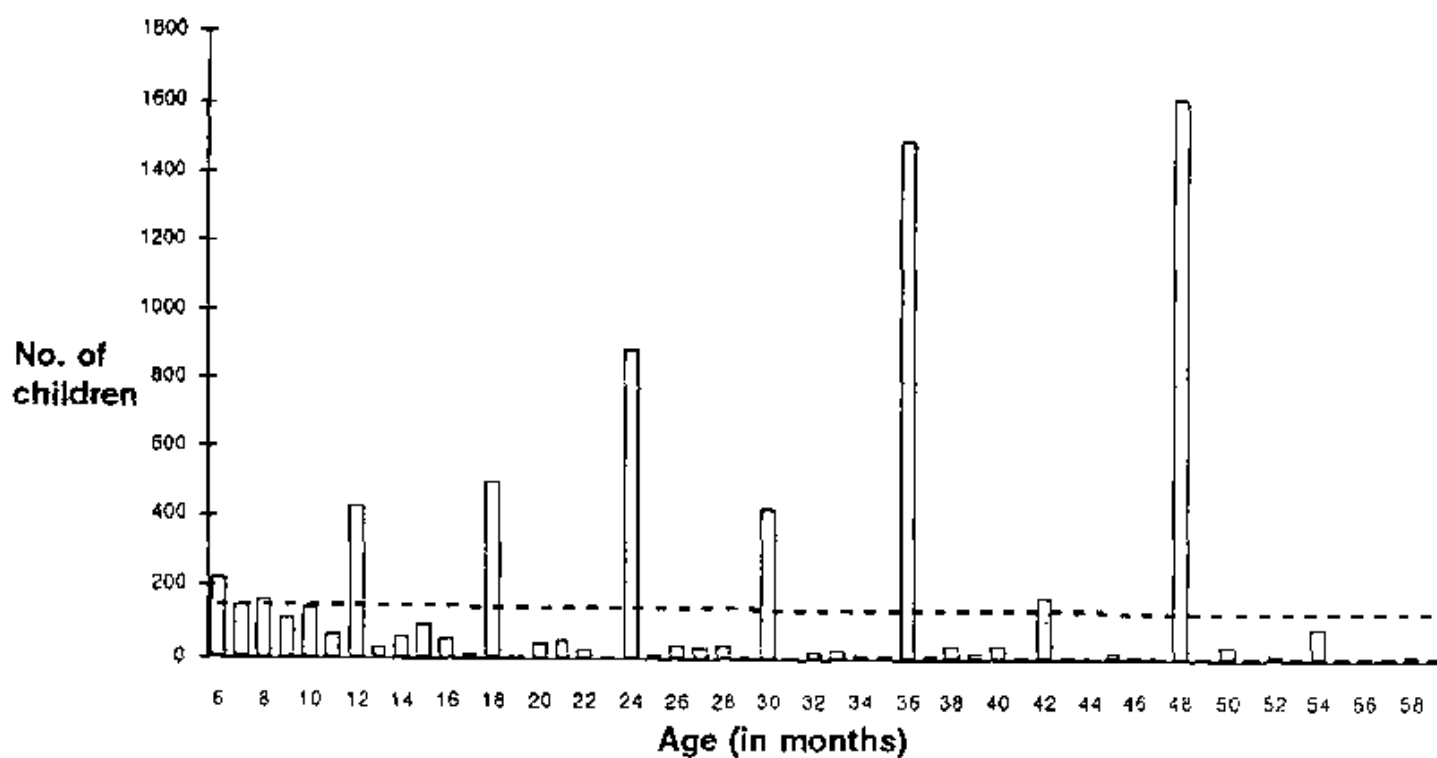
Fig. 2.6 Pakistan 1985–87 survey: Age distribution
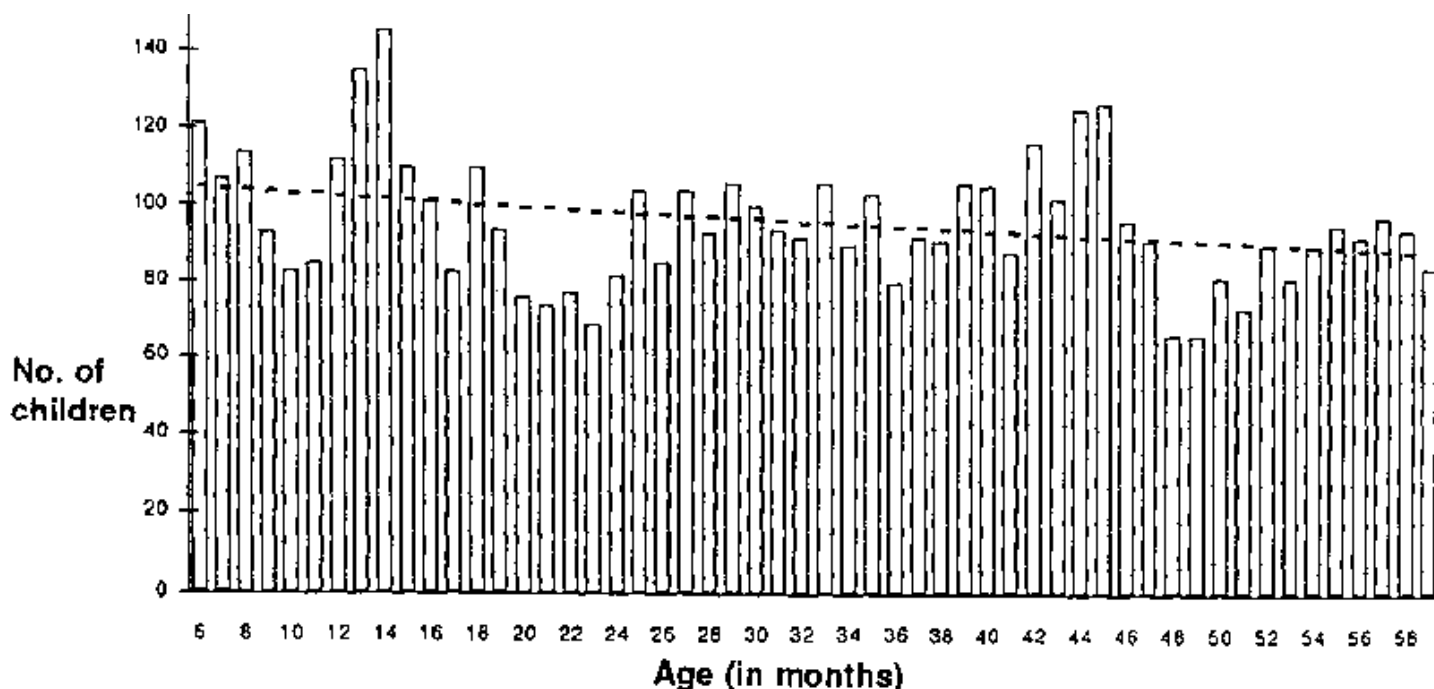
Fig. 2.7 Pakistan 1990 survey: Age distribution

A DIAGNOSTIC MODEL. In identifying the bias in age reporting, a diagnostic model is used. The observed age distribution *obs* (with monthly age categories *1... k... K)* can be partitioned as follows:

$$Obs_k = exp_k + rnd_k + seas_k + sys_k + err_k \qquad (1)$$

In this equation, *exp* represents the expected age distribution for the survey population, *rnd* the effects of rounding, *seas* the joint effects of seasonably on births and mortality, *sys* the effect of systematic sampling errors such as under sampling of older age groups, and, finally, *err* represents all remaining random (uncorrelated) effects. This last variable will include true (non–systematic) sampling errors, the effect of epidemics, and the like. Ordinary measurement errors will also belong in this category, but as long as such ordinary measurement errors are systematically distributed about their true values, the influence on *err* will be very small. The different components distinguished consist of three types: *exp* and *sys* typically are smooth graduated components, while *rnd* and *seas* are cyclical, and *err* consists of random fluctuations about the sum of the other four components.

Obviously, it is impossible to solve for the components of *obs* without further assumptions or additional data beyond the age distribution at hand. The *seas* component, however, can often be assumed to be small, especially when the cyclical effect increases with age or when the cyclic pattern exhibits pronounced peaks, meaning that most regular cyclical variation can be attributed to rounding. Usually, the size of the *sys* component can also be assumed to be negligible. The one exception, however, is that when there is a large number of missing ages in the data, the observed age distribution may show systematic under–representation in the older age groups. Equation (1) reduces to

$$obs_k = exp_k + rnd_k + err_k, \qquad (2)$$

assuming that both the *seas* and the *sys* component are negligible, an assumption that can be tested statistically.

There are different ways to arrive at an estimate of the rounding effect. For instance, one can use smoothing techniques similar to those employed to separate trend, seasonal, and error components for time series data. A more precise method is presented below.

ASSESSMENT OF THE ROUNDING EFFECT. The assessment problem can be subdivided into two separate steps: first, the estimation of the expected distribution, and, second, the mapping of the observed distribution onto this estimate. Each of these steps, in turn, can be split into a number of smaller tasks, like estimating the basic demographic parameters and the true sample size in the case of constructing the expected distribution, and filtering out minor random fluctuations as part of the mapping procedure. Some of these smaller tasks are indispensable, while others may be left in favour of a quick assessment.

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The first step is to obtain an estimate of the underlying age distribution *(e):* the expected distribution given the demographic circumstances prevalent during the lifetime of the surveyed children. In practice, this means that one needs the birthrate and child mortality of the period immediately preceding the survey and the extent to which these have been changing during the lifetime of the oldest children covered by the survey. The following is largely based on Edmonston (1991).

In a stable population, we have

$c(a) = b e^{-ra} p(a),$ (3)

where *c(a)* is the proportion of the population at age *a, b* is the intrinsic birth rate, r is the intrinsic rate of population growth, *and p(a)* is the probability of surviving from birth to age *a.* Empirical investigations using World Fertility Survey data have shown that a two–parameter Weibull function provides a good approximation of the survival function *p(a)* for young children (Edmonston, 1982):

$p(a) = e^{-a}$ (4)

with $= e^{1.48-.070eo}$, and $= e^{.87-.041eo}$

To simplify the use of equation (3) for estimation purposes, Edmonston (1991) further calculated an approximation for r based on the Coale–Demeny Model West life table system:

$r = -.0542 + 1.0856 b + .000664 eo$

Using equations (3), (4), and (5), the expected age distributions of many countries in the developing world can be estimated with only two basic demographic parameters, the birth rate, *b,* the life expectancy at birth, *eo,* and estimation of the true sample size.

If rounding takes place, some children in the sample, may have been wrongly included because of rounding down into the eligible age group (in other words, the true sample size is smaller than the number counted in the sample). In other cases, rounding up may have caused some children to be classified as outside the age group included in the survey, and the true sample size is larger than the number counted. In most populations, rounding will not have affected the number of children who are 6 to 11 months of age. The number sampled in this age 107 group can, therefore, serve to complete the solution for the expected age distribution. If this does not lead to a significant difference between the observed sample size and the estimated sample size, the observed sample size may be used instead.

This solution above is based on the assumption of a stable population. Many surveys, however, evaluate populations undergoing demographic change, making it necessary to adapt the equations to cover populations with decreasing mortality rates and declining birth rates, for instance. This is accomplished by using them repeatedly, assuming that each month age group has its own birth rate and mortality conditions to approximate the expected age distribution for all children covered during a survey. Characteristically, only four parameters are needed: the birth rate and the life expectancy at birth during the survey, and the same figures as they existed at the time the oldest children covered in the survey were born. It is then assumed that during the intermediate period, change was gradual and linear.

The second step is to map the observed distribution onto the expected distribution. The usual method of cumulative distribution fitting assumes that all observations have the same precision. In that case, transformed scale values are calculated by comparison with the corresponding proportions under the curve of the expected distribution. This method is not applicable when rounding effects are present and allowance has to be made for differences in precision between scale values. In particular, a distinction should be made between observations that can be taken as precise (no rounding involved beyond the unit of measurement, i.e., precise to the nearest month) and observations that have been estimated with lesser precision. This can be accompanied by applying distribution fitting, after first subtracting the common element from each distribution:

$ok' = ok - \min(ek, ok)$ (6)

$ek' = ek - \min(ek, ok)$

After performing these subtractions, the two resulting distributions can be fitted as usual. The adjusted scale values are calculated as weighted averages of the part that was taken as precise (the subtracted quantities) and the transformed values stemming from the distribution fitting procedure.

The technique outlined here does not take the effect of sampling and other random errors into account. The precision of the estimates, obtained by the adjustment procedure, can be greatly improved by removing these effects first. For this purpose, a variety of methods can be adopted, depending on the type of observed age distribution. The application of these methods, however, is not essential. If the fluctuations concerned are truly random, they will have relatively little effect on the end result.

Examples: Pakistan and Egypt data

To demonstrate the correction procedure, examples from three surveys in Pakistan and two in Egypt are used. The five examples provide a representative range of the type of data encountered in comparative nutritional evaluations. Some of the surveys show evidence of serious age heaping, while others appear more regularly distributed.

For Pakistan, we consider three different surveys: 1977, 1985–87, and 1990. To estimate the expected age distributions for these data sets, we need approximations of birth rate and child mortality during the period from 1970 to 1990. Most sources agree that in Pakistan, life expectancy at birth is estimated at 55 years for the period concerned, increasing at about a 0.5 per year. Estimates of the IMR during the same period also agree with this outcome. The trends suggested in Table 2.8 are close to the values suggested by Keyfitz & Flieger (1990).

Reliable estimates of the birth rate for the same period are less easy to obtain. On the basis of Keyfitz & Flieger (1990), it may be concluded that birthrates are high and steady (close to 46 per 1000, with a slow yearly decrease). Other sources, like the Demographic Yearbook 1990 (UN, 1992a), mention much lower figures of close to 30 per thousand in 1990 with a fast yearly decrease over the past 30 years. A test showed that the first alternative, the series based on Keyfitz & Flieger, fits the data well for all three surveys. With the extreme peaks in the age distributions as present in the surveys of 1977 and 1987, the correct estimates of the sample sizes are particularly important.

As shown in Table 2.8, the expected sample sizes calculated by extrapolation from the youngest age groups included in the surveys, were not very different from the actual sample sizes obtained during the surveys. The dotted lines in Figures 2.5, 2.6, and 2.7 present the expected age distributions as calculated with the parameters.

In all three surveys, rounding is slightly biased. It is, for example, estimated that the 209 children coded as 48 months old in the Pakistan 1977 survey (see Figure 2.5) on the average are 51.1 months old. Some of the children in this age group were probably younger than 48 months, while a somewhat larger group was probably older. A similar bias is estimated from the corresponding age group in the 1985–87 survey. Here, the 1612 children that were coded as 48 months old are estimated as being 52.1 months old (see Figure 2.6). The bias seems larger here, but since more children are coded into precise age groups, the total bias in the 1985–87 survey is smaller.

Table 2.8. Parameters used in age misreporting diagnosis: Pakistan Surveys of 1977, 1985–87 and 1990

Pakistan	*Age group covered: 6–59*	*1977*	*1985–87*	*1990*
Demographic parameters	Estimated birthrate at time of survey	47.2	46.6	46.4
	Yearly decrease, prior to survey	0.07	0.07	0.07
	Life expectancy at birth at time of survey	51.1	55.7	57.9
	Yearly increase of life expectancy, prior to survey	0.49	0.49	0.41
	Expected sample size	913	7258	5175
	Actual sample size	875	7235	5175
	Range used for estimation of sample size	1–8 mos.	0–10 mos.	0–11 mos.

	Approximate fit of demographic parameters	−0.06	−0.04	0.02
Correction of age	Observed age (months)	30.3	31.0	31.4
	Corrected age (months)	31.5	31.8	31.1
	Estimated error (months)	−1.2	−0.8	0.3
Correction of anthropometry	% under−weight before correction	51.8	48.5	44.9
	% under−weight after correction	54.7	48.8	44.5

The effect of age correction on the estimated proportion of underweights is also larger in the 1977 survey. The corrected prevalence for 1977 was estimated at a rate of 54.7%. This compares to 51.8% before the age corrections were applied. For the 1985–87 survey, the corrected prevalence of 48.8% was close to the estimate prior to correction of 48.5%. The analysis, therefore, indicates that the previous conclusion of no change between the survey periods is incorrect. If at all, there is a slight improvement in the prevalence of underweight preschool children.

The estimated bias is smallest in the 1990 survey. Altogether, the results of the correction confirm the difference between the figures from the late 1970s and those of the late 1980s. There is no indication that this difference may result from the irregularities in the age distributions. The apparent difference between the 1985–87 and the 1990 surveys, however, may well be an artifact of biased age estimates.

Results for Egypt are presented in Table 2.9. The two available surveys took place in 1978 and 1988. The first of these surveys was held towards the end of a short period of rising birthrates. Although birthrates had been declining after 1960 (as also shown in Keyfitz & Flieger, 1990), this trend was reversed during the period between 1972–1978 because of the after–effect of the post–war baby boom (Bucht & El–Brady, 1986). At the same time, there was a process of falling infant and child mortality rates. This trend, however, was still quite slow during the interval covered by the 1978 survey. A further complication is that rounding effects may be considerable already in the youngest age group, as can be seen in Figure 2.8. After approximation of the birthrates by taking a series closely following Bucht & El–Brady (1986), while extrapolating the sample size with the age range of 36–59 months, the fit seems satisfactory.

Table 2.9. Parameters used in age misreporting diagnosis: Egypt surveys 1978, 1988

Egypt	*Age group covered: 6–36*	*1978*	7988
Demographic parameters	Estimated birthrate at time of survey	37.7	38.0
	Yearly increase, prior to survey	1.0	0.00
	Life expectancy at birth at time of survey	43	55
	Yearly increase of life expectancy, prior to survey	0.45	0.5
	Expected sample size	5211	1953
	Actual sample size	5216	1851
	Range used for estimation of sample size	36–59 mos.	1–11 mos.
	Approximate fit of demographic parameters	−0.04	−0.14
Correction of age	Observed age (months)	20.0	21.5
	Corrected age (months)	19.8	20.7
	Estimated error (months)	0.2	0.8
Correction of anthropometry	% under−weight before correction	21.1	16.4
	% under−weight after correction	19.7	15.2
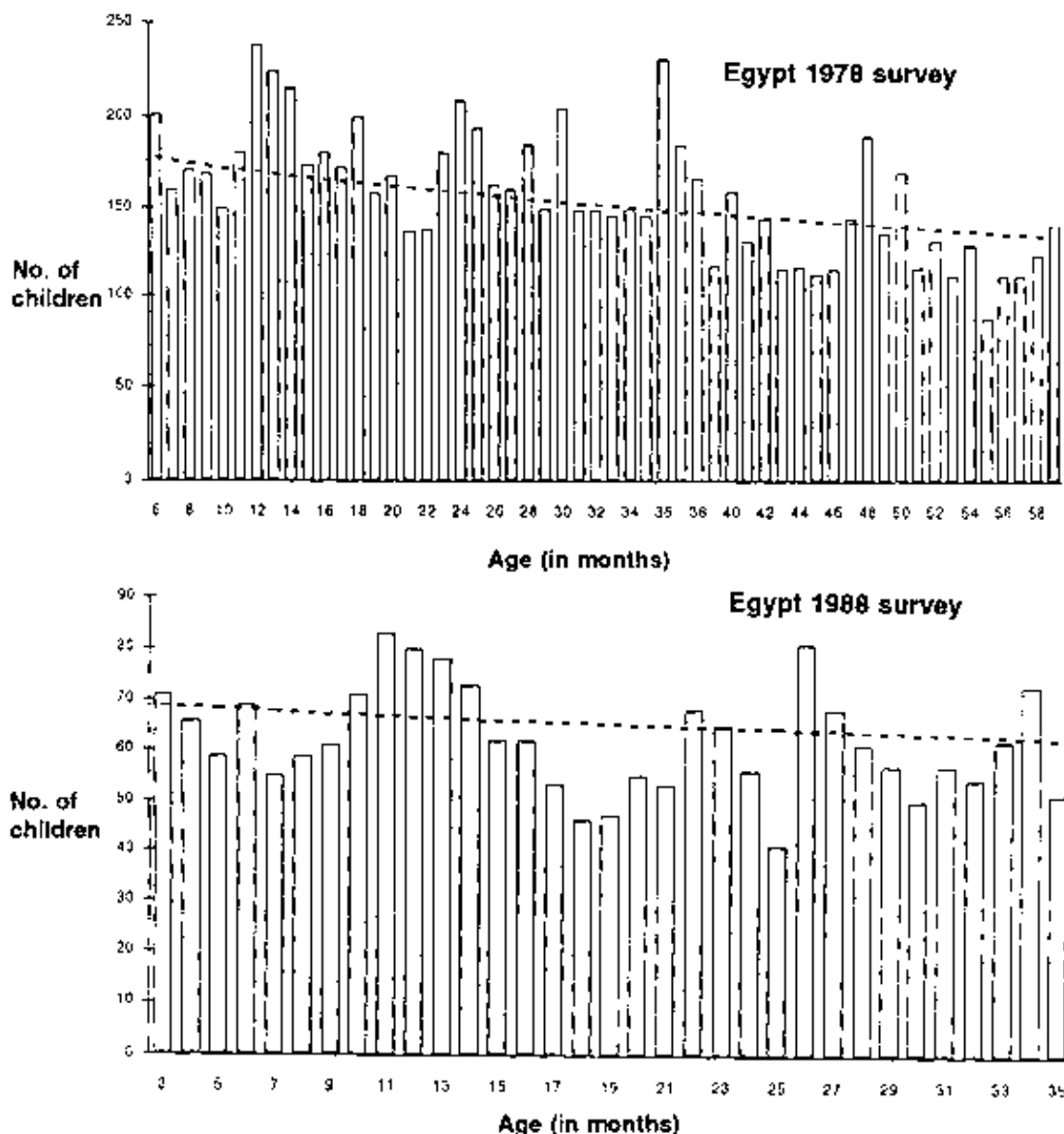
Fig. 2.8 Egypt 1978 and 1988 surveys: Age distribution

The amount of bias in the 1978 proportion of under–weights appears to be small. In contrast to the 1978 survey, the 1988 survey data concern a period of almost stable birthrates and a rapidly falling infant and child mortality. This latter process resulted in a much higher estimate of the life expectancy at birth for the children in the survey. The fit is not as close as one might want, this may due to the fact that children for which the birthdate could not be obtained were excluded from the data (Sayed, Osman, El–Zanaty, & Way, 1989), possibly resulting in some under–sampling of older children. The corrected estimate of the proportion of under–weights is slightly under the original proportion. Since both surveys appear to have bias tendencies in the same direction, the original conclusion of a downward trend of nutritional problems during the eighties still stands.

GNP and prevalence of underweight children

The regression model used to derive the regression line in Box 1–2 of Volume I is given in Table 2.10 (Model I). A quadratic income specification is used. The results show strong non–linear relationships between GNP per capita and prevalence of underweight children. Model II explores the possible determinants of underweight prevalence after controlling for GNP. The effect of government social expenditures (health and social security) is significant and negative, which implies that at the same levels of GNP per capita, countries that spend higher proportion of budgets for social security and health are likely to lower the problem of malnutrition. Female education seems to have a strong effect on reducing the prevalence of underweight, after controlling for GNP per capita. The dummy for South Asia shows that countries in that region have higher levels of underweight prevalence than most of the developing world.

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Table 2.10. The effect of GNP and public expenditures on underweight prevalence in children: weighted least squares model

Independent variable	Model I		Mode II	
Constant	43.194	(16.46)**	30.131	(18.18)**
GNP per capita	−0.0316	(−7.24)**	−0.0082	(−2.48)**
GNP per capita squared	0.00005	(5.07)**	0.00001	(1.92)**
Percent government budget on health and social security			−0.163	(−1.85)*
Female secondary education			−0.128	(−2.88)**
Dummy South Asia			37.822	(16.23)**
R−squared adjusted	0.41		0.85	
Number of countries	100		100	

    * Significant at 0.05.
    ** Significant at 0.01.

Estimates of dietary energy deficient (underfed) population

    [1] This section was prepared in collaboration with L. Naiken of FAO's Statistics Division.

The estimates that refer to the proportion and number of people with inadequate food, were calculated by FAO, and are the same as those used in the documentation for the International Conference on Nutrition (FAO/WHO, 1992b).

The present estimate updates those given in the Fifth World Food Survey published in 1987. In addition to reflecting recent data, the new estimates incorporate certain conceptual modifications in the parameters involved in the calculation. Also, a number of large countries not previously covered are now included in the global and regional estimates. These include China, Mongolia, Cambodia, Democratic Republic of Korea, and Vietnam.

In estimating the proportion of the population with inadequate energy consumption, the main calculation steps used in the Fifth World Food Survey (FAO, 1987a) were followed. These are: (1) take the estimated national per caput dietary energy supply as the mean of the distribution of household per caput calorie consumption which is assumed to be log−normal; (2) estimate the coefficient of variation (cv) of household per caput calorie consumption which is generally imputed for the country based on national household surveys; (3) establish the minimum per caput calorie consumption level or cut−off point; (4) calculate from the distribution, derived on the basis of the mean and cv, the proportion of households with food consumption level below the established cut−off point; and (6) multiply the calculated proportion with the population size to derive the total number of people considered to be energy deficient.

The estimates of the national per caput dietary energy supply obtained from FAO's Food Balance Sheets, are themselves based on country reports of the production and utilization of food commodities, and are calculated through a supply−utilization account described in FAO (1984). These data, expressed on a kcals/caput/day basis for a given calendar year, are calculated for each country. Averaging across countries within a region by year gives the data shown in the panels (Section G in Chapter 2 of Volume I). The per caput dietary energy supply in step (1) is estimated by using a three−year average.

The conceptual changes mentioned above refer to the cv (step 2) and the definition of the cut−off point (step 3). These changes and their implications, which are discussed in detail in an FAO report (FAO, 1992b), are briefly summarized below.

COEFFICIENT OF VARIATION (cv). Estimates of the cv used are calculated from national household income and expenditure surveys and in other cases, on food consumption surveys. There are three main problems in

using this cv estimate: (1) the variation obtained tends to overestimate the true between–household variation because it includes the within year random and seasonal variations in household food consumption; (2) the reference period of food consumption varies considerably across different national surveys; some refer to consumption in the previous week, others to previous day, or previous month; (3) food purchases reported by households may include food given to guests or visitors, as well as wastage – which would overstate the true consumption; on the other hand, food eaten away from home may not have been included which biases food consumption downward. The implication from these is that the cvs contain certain random and seasonal variations that are not comparable between countries.

To address these problems, an adjustment of the cv was made in the new estimates. These adjustments were made on the basis of data corresponding to repeated measurements of household food consumption over a period of one year, available from surveys carried out by IFPRI in five countries. The objective of the analysis was to isolate and then remove the effects of within–year random and seasonal variations. The analysis was done by ACC/SCN and IFPRI, initially on behalf of FAO.

After considering these adjustments, the cv of the household per caput calorie consumption is now defined to exclude the within–year random and seasonal variations, and is intended to refer to the between–household variation in average food availability during the course of the year. This means that the reference period of household per caput consumption is now standardized to a period of one year. Individual country estimates of the cv are made, as far a possible, on the basis of existing information from those countries, including household budget surveys where available. The expected cv, however, was allowed an upper bound of 0.35 and a lower bound of 0.20. The range was estimated from the analysis based on the five surveys carried out by IFPRI. In estimating changes over time, the cv was assumed to remain constant.

CUT–OFF CONSUMPTION LEVEL. The cut–off point, or threshold consumption level, is derived as a weighted average of sex–age specific minimum energy requirements. Energy requirement for each of the sex–age groups is based on two main factors, i.e., body–weight and activity, and is calculated according to the method recommended by the FAO/WHO/UNU Expert Consultation on Energy and Protein Requirements in 1981.

For adults and adolescents, body–weight is used to estimate the basic metabolic rate, i.e., the energy expenditure of an individual while in a fasting state and lying at complete rest, and then an allowance is made for activity, expressed as a multiplier of the basal metabolic rate (BMR). For children, the energy requirements are obtained directly on the basis of body–weight.

There are three main considerations in the calculation of the modified minimum requirement levels:

First, for adults and adolescents, the reference body–weights are now taken to correspond to a body mass index of 18.5 – which has been suggested in recent studies (James, Ferro–Luzzi, and Waterlow, 1988) to be the lower limit for health and function. In previous estimates, the body–weights used to correspond to the lower limit of the range of the reference weight–for–height tables provided by the New York Society of Actuaries. This reference table is not directly applicable to the adult populations of the developing countries.

In the case of children, the reference body–weights adopted for the present estimate correspond to the median weight–for–height of the NCHS standards. Previous estimates used the lower limit of acceptable body–weights, which is considered to be too conservative.

Second, the activity allowance for adults and adolescents, which previously corresponded to 1.40 X BMR, was adjusted to 1.54 X BMR. This corresponds to light activity that excludes productive manual labour. The value of 1.54 X BMR was calculated as typical, based on estimates in James and Schofield (1990).

Third, under the new estimates, individual variations in energy requirement, arising from differences in the efficiency of energy utilization, were not considered to be important in defining the cut–off point. This is partly due to the conservative approach with respect to body–weight and activity for adults and adolescents, and partly due to the fact that the unit of assessment is household per caput consumption referring to one year.

INTAKES COMPARED WITH CUT–OFFS. A complicated issue, often raised in connection with estimating the prevalence of inadequate energy consumption, concerns the significance of the cut–off point and, hence, counting the individuals with intakes below it. The issue originates, in part, from the variation in body–size and occupational characteristics of individuals (of given age and sex) in a population, which means that the individual's energy requirement varies within a certain range. In this context, the use of a single requirement level for the population, corresponding to fixed body–weight and activity, as the cut–off point is bound to lead

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to some errors of misclassification. Some of those individuals with intakes below the cut−off point may not actually be in the inadequate category − because with lower than average body−weight and/or activity, they have lower requirements. Conversely, some of those with intakes above the cut−off point may actually be in the inadequate category, because their higher body−weight and/or activity leads to higher requirements.

In the context of the present estimates, the cut−off point based on relatively low body−weight and activity specifications for adults and adolescents is intended to represent a minimum requirement level. Any intake below this level is then, by definition, considered to be inadequate. (Certain individual intakes above this level, but below their own requirement, may also be inadequate, but the degree of deficiency is likely to be relatively low). However, since the cut−off point reflects the requirements of adults and adolescents corresponding to conservatively set body−weights and light activity, the group estimated is defined as those people whose average food consumption during a year was inadequate to maintain body−weight and support more than light activity.

It must be stressed that the numbers of people with inadequate consumption are an estimate, for which the methods are dictated in pan by the availability of data. Another way of visualizing the calculations involved can be seen from Figure 2.9, which uses hypothetical data. Here, each data point represents an individual, showing the relation between average yearly intake of kcals, expressed as factor x BMR on the vertical axis, and average yearly kcal requirement, in the same units, on the horizontal axis. An individual, meeting the requirement on average over the year, would fall on the 45 degree line. Ideally, we would like to count those people falling below the 45 degree line − this would be the underfed population. In practice, we only have an estimate of the distribution of intake alone, as illustrated by the vertical distribution on the right of the figure; and can only estimate the numbers ("U") below the cut−off in this distribution. This is consistent with the definition given above − but it should be stressed that the definition refers to an estimate below an intake cut−off, and it is not the more intuitive estimate of those with inadequate intake with respect to their own requirement.

The different groups can be labelled (A through F) as shown in Figure 2.9. These can be envisaged as follows:

A requirement less than 1.54 BMR, getting more than requirement; misclassified as deficient, examples would be sedentary workers.

B requirement less than 1.54 BMR, but intake also less than requirement; example would be sedentary workers, not getting enough kcals.

C requirement greater than 1.54 BMR, intake than less than 1.54 BMR.

D requirement greater than 1.54 BMR, but intake also greater than 1.54 BMR but less than requirement − misclassified as adequate; example would be poor manual labourers.

E requirement greater than 1.54 BMR but intake both greater than 1.54 BMR and greater than requirement − this group is doing fine, except maybe getting obese.

F requirement less than 1.54 BMR, getting more than requirement − this may be a group of emerging concern, as eating too much.
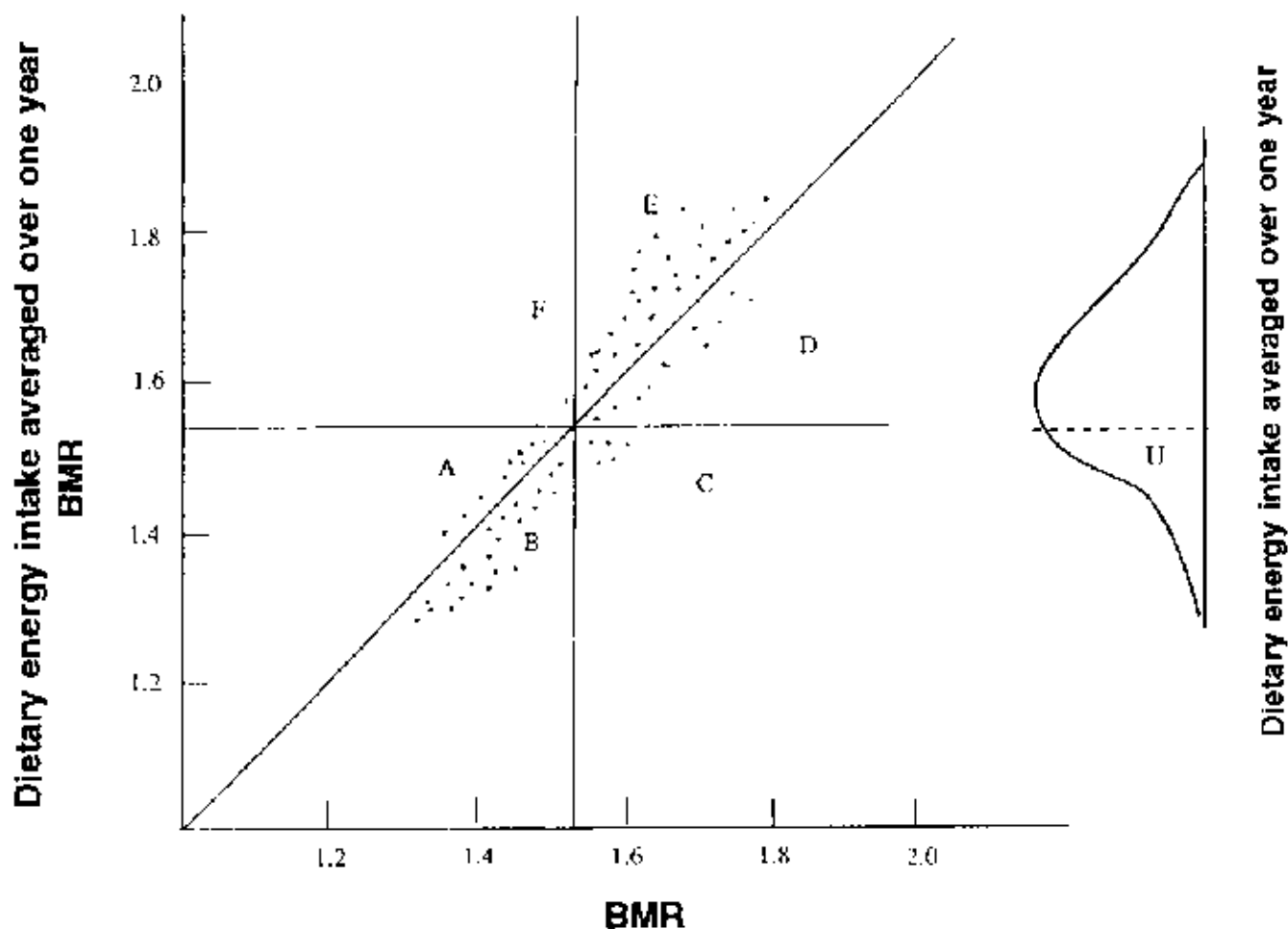
Fig. 2.9 Hypothetical illustration of the relationships between energy intake and requirement averaged over one year

Truly energy deficient?

		Yes	No	
Diagnosed as energy deficient?	Yes	B + C	A	A + B + C
	No	D	E + F	D + E + F
		B + C + D	A + E + F	

Table 2.11 Dietary energy deficiency: A hypothetical illustration

The classification of these groups is shown in Table 2.11. In summary, we would like to estimate B + C + D; we can only estimate A + B + C. This means, among other matters, that a potentially important group, D, is not included in the present definition.

A second crucial way in which the estimate is conservative is that it cannot include seasonal hunger. If an individual reduces labour and loses weight during, say, a pre–harvest season – which is probably quite common – and then regains weight after the harvest, this will not be included in the present estimate. This

emphasizes the issue of requirement for what?, and the meaning of an individual being above or below the 45 degree line in Figure 2.9.

Of the various possible concepts of requirement, we could consider two:

  • R1 – meaning energy intake adequate for all desired activity;
  • R2 – energy intake meets productive activity only.

The meanings of greater than or less than these requirements are as follows:

  • greater than requirement R1, means to gain weight;

  • greater than requirement R2, means to allow for desired discretionary activity, and possibly to gain weight;

  • less than requirement R1, means reduce desired activity and maintain weight; or continue desired activity and lose weight;

  • less than requirement R2, means reduce productive activity and maintain weight, or continue productive activity and lose weight, or both.

The group that should, if possible, be counted is the last of these (B + C + D), and the current estimates (A + B + C) are intended to approximately reflect these numbers.

IMPACT OF THE MODIFIED CV AND CONSUMPTION CUTOFF. The actual impact of the above–mentioned conceptual changes was a decrease in the size of the cvs from an average of 0.37 to 0.29 and an increase in the cut–off point from an average of 1622 to 1874 kcals/caput/day.

The decline in the cv implies a reduction in the proportion below the cut–off point, but at the same time the increase in the cut–off point tends to increase the proportion below it. Since *the* cut–off point is in the lower tail of the distribution and the reduction in the cv reduces this tail, the net effect of these changes is generally affected by the movement in mean calories in relation to the cut–off point. If the mean is low, the effect of the cv and the cut–off point are likely to be equally important such that the net effect could either be positive or negative depending on the size of the decline in cv and the rise in the cut–off point.

Women's nutritional status indicators

The analysis of trends in women's nutrition was based on a database compiled from the literature of published studies where women's outcome indicators were recorded. In selecting cases from the database, two important criteria were followed: (1) the studies must have at least 100 subjects (2) the studies must have a publication date of 1980 or later (which means that some of the studies had taken place in the 1970s.)

The women's nutrition database comprises of approximately 1500 records, from 340 studies. Five indicators were included in this report: anaemia, and four indicators of PEM of adult women – height, weight, BMI, and arm circumference. Each study was coded by five different sub–groupings that included the following: physiological status (pregnant, non–pregnant, lactating), age (usually reproductive age women, although adolescents and elderly women were also reported), location (urban, rural), country group/region (Sub–Saharan Africa, South Asia... etc.), parity (primiparous, multiparous, nulliparous), income group (low, middle, high).

The main problem related to the analysis of each outcome indicator is the varying cut–offs used in different surveys. For example, to indicate anaemia, the most commonly reported cut–offs were: 8 g/dl, 11 g/dl, and 12 g/dl; to indicate underweight problems, cut–offs were 48 kg., 45 kg., or 38 kg. For purposes of the present analysis, survey results were recalculated into uniform cut–offs. The following cut–offs were chosen for the analysis.

Indicator	*Cut–off to indicate problems*

Anaemia	Haemoglobin < 11 g/dl for pregnant women
	Haemoglobin < 12 g/dl for non– pregnant women
Height	<145 cm.
Weight	<45 kg.
Body mass index	<18.5
Mid–upper arm circumference	<22.5 cm.

In about half of the studies, the prevalence below these cut–offs were not given, although the means and s.d.'s were reported. On the basis of the mean values and their corresponding s.d.'s, it was possible to estimate the prevalences below a specified cut–off, assuming normal distribution, which may not be the case for all the studies.

Results are given aggregated to the level of the region. In contrast to other data, however, such as child anthropometry, almost all the observations are not from nationally representative surveys. Thus, weighting presents problems. Various methods of weighting for aggregation can be considered, for example, using population of the country from which the surveys were taken. This method gives particular importance to surveys that happen to come from large population countries, and little weight to those from small population countries. Thus, for example, if one study came from one district in Nigeria, and another from a similar size district in nearby Ghana, population weighting would nonetheless essentially swamp the Ghana results. The alternative here was to treat each study result as a sample from the *region,* thus to aggregate without population weighting. In any event, since the representativeness is not known, the aggregated results have to be treated with more caution than from surveys with defined sample, e.g., child anthropometric surveys.

Trends through time could not be obtained for most of the indicators because of inadequate numbers of observations. The important exception was for anaemia in non–pregnant women, when it was considered that sufficient results were just available to estimate trends (mid–70s through mid–80s) for South Asia and Sub–Saharan Africa. The numbers of observations aggregated to show the data points in Figure 4.6 in Volume I are as follows, for years respectively before 1980, 1981–84, and 1985 and later: South Asia 13, 12, 6; Sub–Saharan Africa 10, 11, 10. In fact, a similar conclusion on possible trends was reached independently by the WHO Safe Motherhood Programme (WHO, 1992), which lent weight to the conclusion that there was a possible deterioration in anaemia in these regions.

The results at the regional level are given in the Figures 4.1 to 4.5 in Chapter 4, Volume I. The data for these are given in Table 2.12 for prevalences of underweight (< 45 kg), stunting (< 145 cm), wasting (< 18.5 body mass index), low arm circumference (< 22.5 cm) and anaemia (11 g/dl for pregnant women, and 12 g/dl for non–pregnant women). The age group analysed covered women between 15 to 49 years old only. The mean weight, height, BMI, arm circumference, and haemoglobin levels are also given.

Chronic and infectious diseases

In Chapter 5 of Volume I on non–communicable chronic diseases, comparability of data on mortality amongst countries and between the early years (1960s and 1970s) and the later years (1980s) was one of the issues in the analysis of trends. The problem emanates in part from the periodic changes in the International Classification of Diseases (WHO, 1980). In general, the categories for the 1970s are usually reasonably comparable with those in the 1980s. In contrast, the classification in the 1960s were less easy to compare, and thus were excluded.

The categories grouped into chronic and infectious diseases used in Figure 5.1 of Volume I, for the Netherlands (1984), Egypt (1987) and Guatemala (1984) are given in Table 2.13. For the analysis of age and cause specific mortality rates in Mexico – given in Figure 5.2 of Volume I, the classification used for the earlier year (1976) is given in Table 2.14, based on the 8th Revision of the International Classification of Diseases (WHO, 1980); whereas the classification of diseases for the later year (1986), based on the 9th revision is given in Table 2.15. For data shown in Figure 5.3 of Volume I, the mortality rates which compared the 1970s with the 1980s in Colombia, Mexico, Chile and Costa Rica, the classification of diseases are also provided in Tables 2.14 and 2.15. The differences are due to the new sub–classifications in the 9th revision.

Description of other data used in this report

POPULATION DATA. The estimates of the total population, child population, and infant mortality rates used in the Report were taken from the UN Population Division (UN 1991) statistics. For the child population estimates, various expressions such as under 5, 0 through 4 years, or 0 through 59 months were used in several parts of this Report. For purposes of estimating the numbers of underweight children, the child population is understood to include children 0 through 59 months of age.

TOTAL FERTILITY RATE (TFR). The TFR expressed in terms of total births per woman, represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children at each age in accordance with prevailing age–specific fertility rates. TFR data for this report were obtained from the Population Reference Bureau (1992).

Table 2.12. Women's nutritional status indicators by country group, 1980s (women 15–49 years old)

Country group	Height			Weight			Body mass index (BMI)			Arm circumference			Anaemia			
														Pregnant		
	N	Mean, cm	% <145 cm	N	Mean in kg	% <45 kg	N	Mean	% <18.5	N	Mean cm	% < 22.5cm	N	Mean Hb g/dl	%< 11g/dl	N
Sub–Saharan Africa	33	157.9	2.3	12	51.4	*20.6*	8	*20.5*	22.4	12	25.9	13.3	35	10.9	49.6	31
Near East/N. Africa	4	157.0	4.7	4	59.2	6.2	2	27.0	3.7	2	23.7	39.0	9	11.6	44.4	11
South Asia	32	151.0	15.7	19	42.9	61.8	11	19.2	41.1	17	22.4	54.3	27	10.3	64.0	31
South East Asia	13	149.8	17.1	8	46.2	44.0	4	19.8	40.5	6	22.9	35.5	19	10.5	56.4	20
Middle America	14	153.6	15.3	8	53.0	20.1	8	22.4	14.6	2	25.4	12.2	14	11.4	34.4	16
South America	8	152.4	11.1	2	57.5	10.3	2	24.7	7.2	2	26.1	10.1	16	11.9	30.5	18
China	8	157.6	1.5	6	51.2	18.5	1	21.0	18.7	–	–	–	3	11.8	33.5	4
Total	112			59			36			41			123			131

Source: ACC–SCN, Database on women's nutrition (1992).
Note: N = number of studies.

Table 2.13. Classification of diseases used in Volume 1 report, Figure 5.1, Chapter 5 (non–communicable) chronic diseases)

Cause of death[a]		
Country	Infectious diseases	Chronic diseases
Netherlands (1988)	Infectious and parasitic diseases (01–07)	Malignant neoplasms (08–14)
Egypt (1987)	Meningitis (220)	Disease of the circulatory system (25–30 excluding 250)
	Acute rheumatic fever (250)	
Guatemala (1984)	Acute upper respiratory infection(310–312)	Diabetes (181)

	Acute bronchitis (320)	Chronic liver disease and cirrhosis (347)
	Pneumonia (321)	
	Influenza (322)	
	Infections of the kidney (351)	

Sources: WHO, 1991; World Health Statistics Annual 1990, WHO, Geneva; WHO, 1988; World Health Statistics Annual 1987, WHO, Geneva.

Note: Figures in parentheses are ICD codes.

a. Based on ICD9 (International Classification of Diseases, Ninth Revision).

Table 2.14. Classification of diseases used in Volume 1 Report, Figure 5.3, Chapter 5 (non–communicable chronic diseases)

Cause of death[a]					
Country	*Infections diseases*	*Diseases of the circulatory system*	*Malignant neoplasm (08–14)*	*Diabetes*	*Cirrhosis*
Costa Rica (1988)	Infectious and parasitic(01–07)	Chronic rheumatic heart disease (251)	Lip, oral cavity, pharynx(08)	(181)	(347)
Mexico (1986)	Meningitis (220)	Hypertensive disease (26)	Oesophagus(090)		
Chile (1987)	Acute rheumatic fever(250)	Acute myocardial infarctions (270)	Stomach (091)		
Netherlands (1988)	Acute upper respiratory infection (310–312)	Other ishemic diseases(279)	Colon (093)		
	Acute bronchitis (320)	Diseases of the pulmonary system (28)	Rectum (094)		
	Pneumonia (321)	Cerebrovascular disease(29)	Liver (095)		
	Influenza (322)	Atherosclerosis (300)	Larynx (100)		
	Infections of the kidney(351)	Embolism/thrombosis(301,302)	Trachea, bronchus, lung(101)		
		Phlebitis (303)	Breast (113)		
		Other diseases of the circulatory system(304,305,309)	Cervix, uteri (120)		
			Uterus (122)		
			Prostate (124)		
			Bladder (126)		
			Leukemia (141)		
			Other malignant neoplasms(140,149)		

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Table 2.15. Classification of diseases used in Volume 1 Report, Figure 5.3, Chapter 5 (non–communicable chronic diseases)

Cause of death[a]					
Country	*Infections diseases*	*Diseases of the circulatory system (A80–A88 excluding A80)*	*Malignant neoplasm (A45–A60)*	*Diabetes*	*Cirrhosis*
Colombia (1972)	Infectious and parasitic diseases (A1–A44)	Chronic rheumatic fever(A81)	Buccal cavity, pharynx(A45)	(A64)	(A102)
Costa Rica (1971)	Meningitis (A72)	Hypertensive disease(A82)	Oesophagus (A46)		
Mexico (1976)	Acute rheumatic fever(A80)	Ischaemic heart disease(A83)	Stomach (A47)		
Chile (1970)	Acute respiratory infection(A89)	Other forms of heart disease (A84)	Intestine (A48)		
	Influenza (A90)	Cerebrovascular disease(A85)	Rectum (A49)		
	Pneumonia (A91–A92)	Disease of the arteries, capillaries (A86)	Larynx (A50)		
	Infections of the kidney (A107)	Venous thrombosis(A87)	Trachea, lung (A51)		
		Other diseases of the circulatory system(A88)	Bone (A52)		
			Skin (A53)		
			Breast (A54)		
			Cervix (A55)		
			Uterus (A56)		
			Prostate (A57)		
			Other (A58)		
			Leukemia (A59)		
			Other lymphatic (A60)		

GNP PER CAPITA. The source of this data is the World Bank's World Indicators retrieved from the database computer files. The GNP per capita figures in US dollars are calculated according to the World Bank Atlas method (World Bank, 1992b). The World Bank's *World Development Report* (1992b) defined GNP as the measure of total domestic and foreign value added claimed by residents of the country. It comprises of the gross domestic product (GDP) plus net factor income from abroad, which is the income residents receive from abroad for factor services (labour and capital) less similar payments made to nonresidents who contributed to the economy... The Bank recognizes that perfect cross–country comparability of GNP per capita estimates cannot be achieved. The Atlas methodology adopted by the World Bank systematically assesses the appropriateness of official exchange rates as conversion factors. The Atlas conversion factor for any given year is the average of the exchange rate for that year and the exchange rates for the two preceding years, after adjusting them for differences in relative inflation between the country and the United States. This three–year average smooth fluctuations in prices and exchange rates for each country. The resulting GNP in US dollars is divided by the midyear population for the latest three years to derive GNP per capita.

DEBT SERVICE RATIO. This is defined as total debt service payments as a percentage of the exports of goods and services for a given year. Debt service payments include the sum of principal repayments and interest payments on total external debt. The total external debt includes public, publicly guaranteed, private non–guaranteed long–term debt, use of IMF credit, and private nonguaranteed debt. The basic data come from IMF International Financial Statistics (IMF, 1991b) and were retrieved from a database called World Bank's Debt Tables in computer files.

PUBLIC EXPENDITURES ON HEALTH, EDUCATION AND SOCIAL SECURITY. Data on national government expenditures by sector were obtained from IMF Government Financial Statistics (1992), which is a compilation of IMF member governments fiscal data. There are two variables calculated from this data set – one is the absolute US dollar values per caput expenditures and another in terms of the proportion of the health, education and social security expenditures to the total government budget for a given year. The basic data which are given in local currency are expressed in US dollar terms using the IMF exchange rate tables. Data for some countries may not be strictly comparable because the line budgets reported are based on federal/national expenditures and may not include government expenditures at the state or provincial level.

FOOD PRODUCTION INDEX. The index numbers of food production compare the volume of agricultural production for a given year with the base period in 1979–81 The indices are extracted from FAO's AGROSTAT (1992a) and are expressed in *per caput* terms. FAO (1987a) defines this index as the sum of price–weighted quantities of different agricultural commodities produced after deductions of quantities used as seed and feed weighted in a similar manner. The commodities included are considered edible and contain nutrients (e.g. coffee and tea are excluded). The country indices are calculated by the Laspeyres formula. Production quantities of each commodity are weighted by the 1979–81 average national producer prices and summed for each year. To obtain the index number, the aggregate for a given year is divided by the average aggregate for the base period 1979–81. The national producer prices are expressed as international commodity prices derived from the Geary–Khamis formula.. This method assigns a single price to each commodity (e.g. one ton of wheat has the same price in whatever country it was produced). The annual indices of food production are plotted in the page one graphics page of each of the country cases in Chapter 1 for the period from 1975 to 1990.

DIETARY ENERGY SUPPLY. Estimates of per caput dietary energy supply are based on Food Balance Sheets, calculated by FAO by country. The amount of food potentially available for human consumption is derived after considering the sources of supply, and their utilization. The supply component considers the amount of food produced in a country, imports, and adjustments for changes in stocks. Utilization accounts for food exported, fed to livestock, used for seed, manufacturing for food and non–food uses, and losses during storage and manufacturing (FAO, 1984). Although the food balance sheet method provides estimates for the quantities of food reaching the customer, the amount of food *actually consumed* maybe lower than the quantity shown in the food balance sheet, because losses of edible food and nutrients in the household (e.g., during storage or in preparation and cooking, etc.) are not considered. The dietary energy supply is, thus, an estimate of food availability at the national level. It is derived by applying the factors to all food commodities available for human consumption.

Only total calories for consumption was of interest. It is expressed on a per caput basis by dividing the total calories available by an estimate of the total population, then per day by dividing by 365, to give the unit kcals/caput/day (FAO, 1984). The question of accuracy of food balance sheets is addressed thus by FAO (1984), page ix: The accuracy of food balance sheets, which are in essence derived statistics, is of course dependent on the reliability of the underlying basic statistics of population, supply and utilization of foods and of their nutritive value. These vary a great deal between countries, both in terms of coverage as well as

accuracy. In fact, there are many gaps particularly in the statistics of utilization for non–food purposes, such as feed, seed and manufacture, as well as those of farm, commercial and even government stocks. To overcome the former difficulty, estimates were prepared in FAO while the effect of absence of statistics on stocks is considered to be reduced by preparing the food balance sheets as an *average for a three–year period.* It would appear, however, that experience in compilation assures consistency and this permits assessment of trends.

CONSUMER PRICE INDEX (CPI) AND FOOD PRICE INDEX (FPI). Data on CPI and FPI are derived from ILO's monthly publication Bulletin of Labour Statistics. The CPI is an index number of prices of goods which measures the relative changes in the prices of a specified set of consumer goods bought by an average household on a regular basis. The index, thus, measures changes in the cost of living, and is one factor that determines household purchasing power. The FPI is the food component of the CPI. The weights of specific items in the household budget are based on information from the government's surveys of family expenditures. The base year for all of the CPI data used in this report is 1980.

FPI/CPI RATIO. This ratio is used as one of the food security indicators in the present report. It reflects the trends in relative prices of food compared to non–food items in household budgets. A ratio above one implies that food prices are increasing faster than the overall cost of living. A strong relationship between the FPI/CPI ratio to nutrition has been observed in Ghana, Togo, Burundi, Botswana, and Madagascar based on an analysis of data from national nutrition monitoring programmes (Tabatabai, 1989 and SCN News No. 8, 1992). The conclusion from this analysis is that food prices can provide early indicators of nutritional problems at national level, but the relationship appears more complex at the local level.

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(Note: The case studies are published in respective countries. Individual copies may be obtained from the first author and addresses are listed below).

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National Institute of Nutrition
Indian Council of Medical Research
Jamai–Osmania PO
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Institute of Nutrition at Mahidol University, Salaya
Phuttamonthon, Nakhon Pathom 73170
Thailand

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Jakarta, Indonesia

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Cairo, Egypt

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Tanzania Food and Nutrition Centre
PO Box 977,
Dar es Salaam, Tanzania

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PO Box 8204
Causeway, Harare, Zimbabwe

Nigeria

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Victoria Island, Lagos
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Av. Dr. Arnaldo, Sao Paulo
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Sources of Data

A. General Data

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Economics	GNP Per Capita	World Bank, (1992). *World Tables, Fall 1992 Update.* Washington, D.C. (Computer Disk)
	Poverty	Tabatabai, H and Fouad (1993). *The Incidence of Poverty in Developing Countries: An ILO Compendium of Data.* ILO: Geneva.
	Consumer Price Index	ILO, (1992). *Bulletin of Labor Statistics,* Geneva
	Food Price Index	ILO, (1992). *Bulletin of Labor Statistics,* Geneva.
	Health Expenditure	IMF, (1993). *Government Financial Statistics,* Washington, D.C.
	Education Expenditure	IMF, (1993). *Government Financial Statistics,* Washington, D.C.
	Debt Service Ratio	World Bank, (1992). *World Debt Tables, 1990–91.* Washington, D.C. (Computer Disk)
Food, Agriculture	Food Production Index	FAO, *(1992).AGROSTAT–PC: FBS Domain.* FAO: Rome. (Computer Disk)
	Dietary Energy Supply	FAO, (1992). *AGROSTAT–PC: FBS Domain.* FAO: Rome. (Computer Disk)
	Vitamin A Supply	FAO, (1990). *Food Production Yearbook.* FAO: Rome
	Iron Supply	FAO, (1990). *Food Production Yearbook.* FAO: Rome
Health	Immunization	WHO, (1992). *Health for All Database.* WHO: Geneva. (Computer Disk)
	Access to Health Services	WHO, (1992). *Health for All Database.* WHO: Geneva. (Computer Disk)
	Access to Potable Water and Sanitation	WHO, (1992). *Health for All Database.* WHO: Geneva. (Computer Disk)

	Access to Antenatal Care	WHO, (1992). *Health for All Database.* WHO: Geneva. (Computer Disk)
	Maternal Mortality Rate	WHO, (1992). *Maternal Mortality Rates and Ratios.* Maternal Health and Safe Motherhood Programme. Third Edition. WHO/MCH/MSM/91.6 WHO: Geneva.
	Low Birth Weight	WHO/UNICEF, (1992). *Estimates of Low Birth Weight: As of 1990.* Geneva.
	Prevalence of Anaemia	WHO, (1992). *The Prevalence of Anaemia in Women: A Tabulation of Available Information.* Second Edition, WHO/MCH/MSM/92.2 WHO: Geneva,
		ACC/SCN, (1992). *Database on Women's Nutritional Status.* Geneva.
Women & Education	Secondary Schooling	UNESCO, (1992). *Statistical Yearbook.* UNESCO: Paris.
	Breastfeeding	*DHS Surveys* for the 1980s Data and *World Fertility Survey* for the 1970s Data.
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Burundi	DHS avec la Ministère de l'Intérieur/Department de la Population, (1988). *Enquête Démographique et de la Santé du Burundi, 1987.*
Cameroon	The Government of Cameroon, (1978). *United Republic of Cameroon National Nutrition Survey.* USAID, Washington, DC.
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Congo	ORSTOM with CARE–Congo (Programme NUTED), (1987). Prévalance de l'émaciation et du Retard de Croissance en Function des Strates. *Enquête Nutritionelle National, 1987.*
Cote d'Ivoire	World Bank, (1989). *Living Standards Survey, Cote D'Ivoire. 1986.* World Bank, Washington, D.C.
Ethiopia	Ethiopian Nutrition Institute, (1984). *Anthropometric Measurements of Preschool Children.* Unpublished data.
Ghana	World Bank, (1989). *Living Standards Survey, Ghana –1987–88.* World Bank, Washington, D.C.

Guinea–Bissau	Aaby, P., (1980). *Child Mortality in Guinea–Bissau: Malnutrition and Overcrowding.* Report of a MISAC/SAREC Team of Project of Child Health and Nutrition in Guinea–Bissau, Institute of Anthropology, Denmark.
Kenya	Central Bureau of Statistics, (1991). *Fourth Child Survey of 1987.* Ministry of Planning and National Development. Nairobi, Kenya.
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Lesotho	The Government of Lesotho, (1976). *Lesotho National Nutrition Survey, 1977.* USAID, Washington, DC. (1977)
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Malawi	National Statistics Office, Zomba, (1984). *National Sample Survey of Agriculture, 1980181,* vol. II.
Mali	DHS avec Centre d'Etudes et de Recherches sur la Population pour la Dévelopment/Institut du Sahel, (1988). *Enquête Démographique et de Santé au Mali,* 1987.
Mauritania	Kreysler, J., (1981). *Projet de Programme de Surveillance Nutritionelle–national pour la Mauritanie.*
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Nigeria	DHS/Nigeria Federal Office of Statistics, (1992). *Nigeria Demographic and Health Survey of 1990.* IRD/Macro Systems, Inc., Columbia, MD.
Rwanda	Ministère de la Santé, Publique, (1986). *Résultats de l'Enquête sur l'Etat Nutritionnel des enfants de 0 à 5 ans au Rwanda.* (1984/1985) Kigali.
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Senegal	DHS with Ministère de l'Economie et des Finances (Division des Enquêtes et de la Démographie), (1987). *Enquête Démographique et de Santé au Sénégal, 1986.*
Sierra Leone	Sierra Leone Ministry of Health in collaboration with WHO Global Epidemiological Surveys and Health Situation Assessment Unit, (1975). Unpublished data,
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Tanzania	Kavishe, F., (1992). *Nutrition–Relevant Actions in Tanzania.* TFNC. Dar es Salaam. Data calculated from Tanzania Household Budget Survey of 1991–1992.
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India	National Nutrition Monitoring Bureau, (1991). *Report of Repeat Nutrition Surveys (1988–90).* National Institute of Nutrition. Hyderabad.
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Indonesia	Central Bureau of Statistics, (1991). *National Survey of 1987.* Data calculated into standard deviations of NCHS by Jahari (Cornell University).
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Laos	Kripps, R., (1984). Assignment Report, 23 December 1983 – 28 March 1984, WHO/NUT/LAO/NUT/001.
Malaysia	Family Health Division, MOH, (1989). *Programme Review of the 5th Malaysian Plan Towards the Preparation of the 6th Malaysian Plan.* Sec. 2, p. 40–41. Kuala Lumpur, Malaysia.
Myanmar	National Nutrition Centre, (1991). *Nutrition Situation of Myanmar Children: Report of 1990.* Ministry of Health. Myanmar.
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Papua New Guinea	This data was from the *1984 National Survey* and the results provided to ACC/SCN by Peter Heywood.
Philippines	Food and Nutrition Research Institute, (1978). *First National Nutrition Survey, Philippines, 1978.* FNRI Publication No. GP–11 2nd Revision, April 1980.
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Thailand	Institute of Population Studies, Chulalongkorn University. DHS/IRD, (1988). *Thailand Demographic and Health Survey, 1987.* Columbia, MD.
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Vietnam	Swaminathan, M.C., (1986). *Assignment Report on a Visit to the Socialist Republic of Vietnam,* WP/NUT/ICP/NUT/001–E, 1986.
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Middle America and Caribbean

Costa Rica	Sistema de Informacion en Nutricion/Ministerior de Salud, San Jose, (1978). Aspectos Socioeco–nomics de la Nutricion. Encuesta Nacional de Nutricion, 1978.
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	DHS/Profamilia – Oficina Nacional de Planificacion, (1992). *Encuesta Demografica y de Salud 1991.* Macro International. Columbia, MD.
El Salvador	Trowbridge, F. L., (1975). Nutritional status surveillance in El Salvador. *Bulletin of the World Health Organization (1982)* 58 (2), 327–332, with unpublished data from Trowbridge.
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Guatemala	INCAP (Dr. L. O. Angel), (1979). Data from Longitudinal Study of Rural Villages in Eastern Guatemala, with additional analysis.
	DHS/Instituto de Nutricion de Centre America y Panama, (1989). *Encuesta Nacional de Salud Materno Infantil 1987.* Columbia, MD.
Haiti	Department of Public Health and Population, Republic of Haiti, (1979). *Republic of Haiti National Nutrition Survey, 1978,* with additional analysis by WHO. USAID, Washington, DC.
Honduras	Ministerio de Salud Publica, Republica de Honduras, (1988). *Encuesta Nacional de Nutricion, Honduras, 1987, Cuadros de Frecuencias por Regiones de Salud y Nacionales,* Tegucigalpa.
Jamaica	Ministry of Health/World Bank, (1990). *Survey of Living Conditions,* Jamaica.
	Ministry of Health, (1991). *National Survey of 1985,* Jamaica.
	Nutrition Unit, Ministry of Health and Environmental Control, (1978). Unpublished data with additional analysis by WHO.
Mexico	Secretaria de Salud, (1989). *Encuesta Nacional de Nutricion.* SSA–DGE, Mexico.
Nicaragua	Ministry of Health. Unpublished data *of National Nutritional Status Survey, 1980–82.* Managua.
Panama	Franklin, D. L. *et al.,* (1982). *Nutrition Evaluation Project: Second Annual Report.*
Trinidad & Tobago	Gueri, M. *et al.,* (1976). Nutritional Status of Young Children in Trinidad and Tobago. *Journal of Tropical Pediatrics (1980)* 26,11–15, with additional analysis by WHO.
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South America

Bolivia	DHS/Instituto Nacional de Estadistica, (1990). *Encuesta Nacional de Demografia y Salud 1989.* IRD/Macro Systems, Columbia, MD.
	The National Institute of Food and Nutrition, Government of Bolivia, (1981). *Bolivia National Nutritional Status Survey, 1981: Summary Report,* with additional analysis by CDC. USAID, Washington, DC.
Brazil	Monteiro, C. and R. Iunes, (1992). *Nutritional Status in Brazilian Children: Trends from 1975–1989.* ACC–SCN, Geneva.

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Chile

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Ecuador

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Guyana

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Paraguay

DHS/Centro Paraguayano de Estudios de Poblacion, (1991). *Encuesta Nacional de Demografia y Salud.* DHS/IRD. Macro Systems International. Columbia, MD.

Peru

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Uruguay

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