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HAITI:
SELECTED TRENDS IN HEALTH AND NUTRITION INDICATORS IN THE 1980s

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TRENDS IN SELECTED HEALTH AND NUTRITION INDICATORS FOR HAITI 1980-1990

Haiti has struggled against political and social instability to create and sustain a health services infrastructure aimed at increasing the odds of survival for its children. The Haitian health community, working against the grain of the oppressive 30-year Duvalier dictatorship and a tenuous, undefined central government in existence from the fall of the regime in 1986 to the recent election of Father Aristide to the presidency, has made notable achievements in helping its children to survive.

This report, prepared at the request of the USAID Bureau for Latin America and the Caribbean and USAID/Haiti, provides a collection of available data from 1980-1990 for key child survival indicators used in monitoring program progress. Data tables for national-level infant mortality rates, vaccination coverage rates, ORS/ORT use rates, undernutrition, access to water and sanitation and cases of malaria, have been assembled from a variety of reporting sources and are attached as Annexes 1-11. Graphs have also been included in this report to aid in visualizing trends as well as to assist in comparing data from different sources. The appendix contains technical information about the collection of child survival indicator data and the merits and shortcomings of various estimation procedures.

MARGINAL ECONOMICS AND CHILD SURVIVAL

The idea that a certain level of economic growth is necessary to generate sustained health improvements in a country has been a focus of U.S. foreign development activities for many decades. However, while activating an economy may be a necessary factor for sustaining desirable health objectives, it may not be essential for stimulating positive changes in health status. Indeed, even strong economic growth does not always translate into high government expenditures for health.

Costa Rica and Sri Lanka are two countries where overall health status has improved despite stagnated or declining economic growth. In its discussion of these two countries, the UNDP 1990 Human Development Report states that, "fairly respectable levels of human development are possible even at modest levels of income." What seems to matter more than blunt economic growth is how that growth is translated into beneficial social policy and programs for the people. For countries like Costa Rica and Sri Lanka, it seems that despite poor economic growth there has been fairly equitable distribution of income and/or a commitment by the central government to keep health and nutrition programs afloat and available to those in need.

Haiti, long characterized as the poorest nation in the Western Hemisphere, has shown a consistent decline in its under

age five mortality rate despite a substantial decline in the average annual change in its gross domestic product (GDP) (see Figure 1). The trend in other economic indicators over the decade of the 80s, such as debt and debt service, provide further evidence of Haiti's precarious economic condition. Long- and short-term debt as well as debts accrued through the use of International Monetary Fund credits, increased from $302 million in 1980 to $802 million in 1989. More disturbing, debt as a percentage of gross national product increased from 21 percent to 32 percent over the same period (see Figure 2).

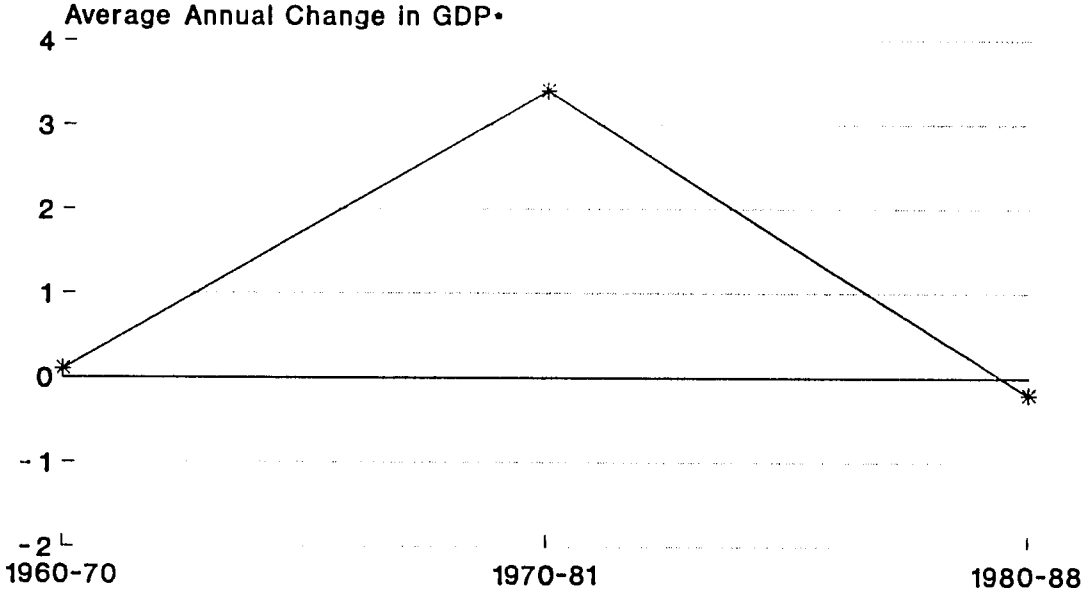
As can be expected with increasing debt, service to those commitments also increased, from principal and interest payments of $26 million in 1980 to $62 million in 1989 (see Figure 3). Increasing service to debts often means that financial resources which could be allocated to improving social services must be substantially reduced or even eliminated. Additionally, the distribution of income is far from equitable. And, while the government did renew its commitment to health and education in 1986 and 1987 by substantially augmenting the budget, there was still little difference on the ground in terms of substantial health programs.

Given this myriad of poor economic indicators, how has Haiti managed continued reductions in the child mortality rate?

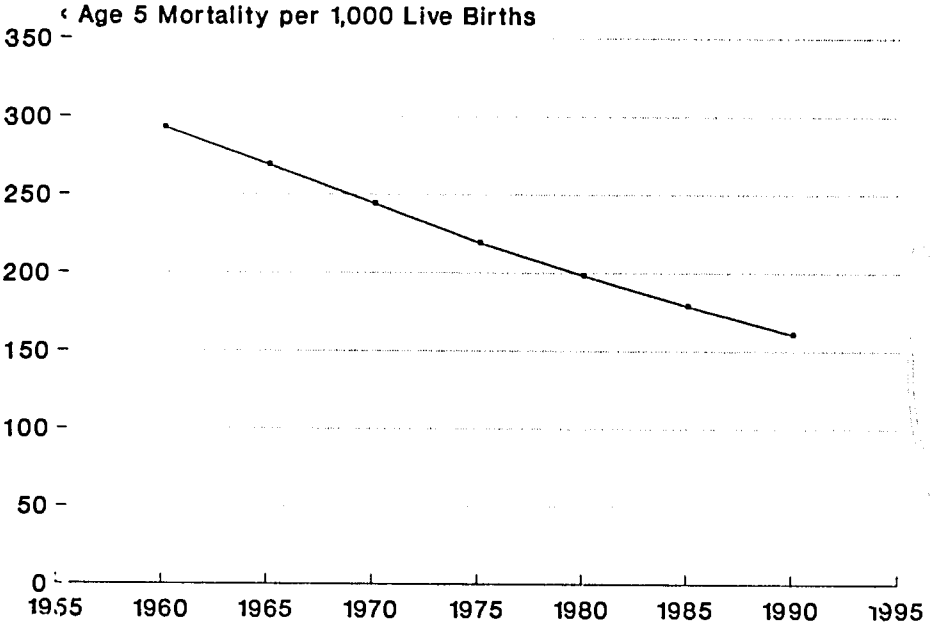
Clearly, key players in sustaining a health infrastructure have been the hundreds of indigenous private voluntary organizations (PVOs) throughout the country, as well as large USAID-funded child survival projects implemented by several US-based PVOs. The wide-scale mobilization of PVOs was part of the health strategy of Haiti's Nouvelle Orientation in 1982. This mobilization, in tandem with focused efforts to address major causes of infant mortality has undoubtedly been central to increasing accessibility to child survival services and sustaining declines in child mortality. The widespread training of traditional birth attendants in clean delivery techniques has been cited by many as a primary contributor to reductions in infant mortality. The clean delivery techniques are key to preventing neonatal tetanus, a major killer of infants under one-month of age.

Reductions in illiteracy among women, though modest, may also account for some of the improvements in child health. From 1971 to 1982 the percentage of illiterate women decreased from 83 percent to 68 percent. Combatting illiteracy has become a primary focus of the new government.

FIGURE 1
POOR ECONOMIC GROWTH AND CHILD MORTALTIY -- HAITI

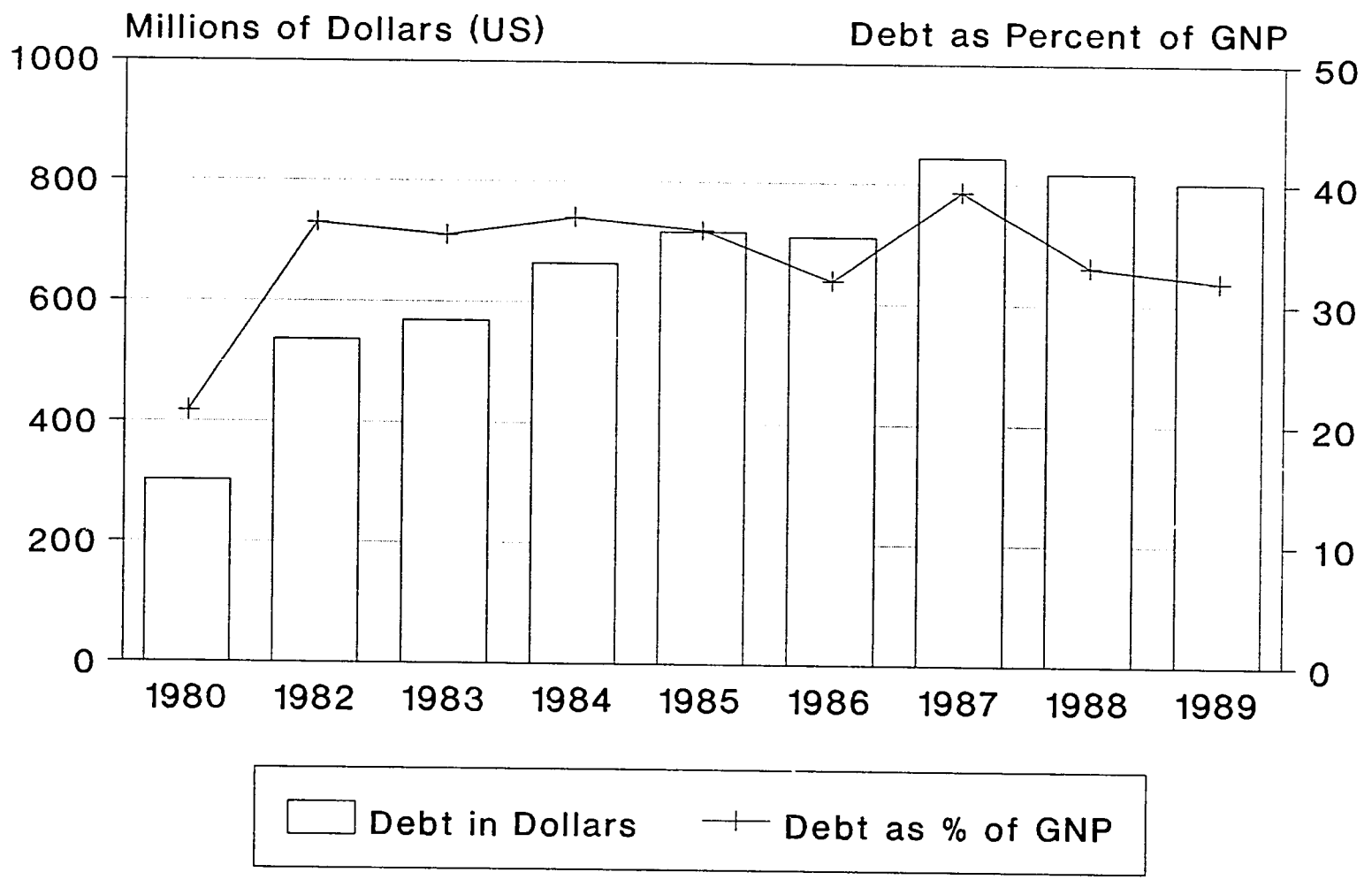


•GDP•Gross Domestic Product
Source: World Bank



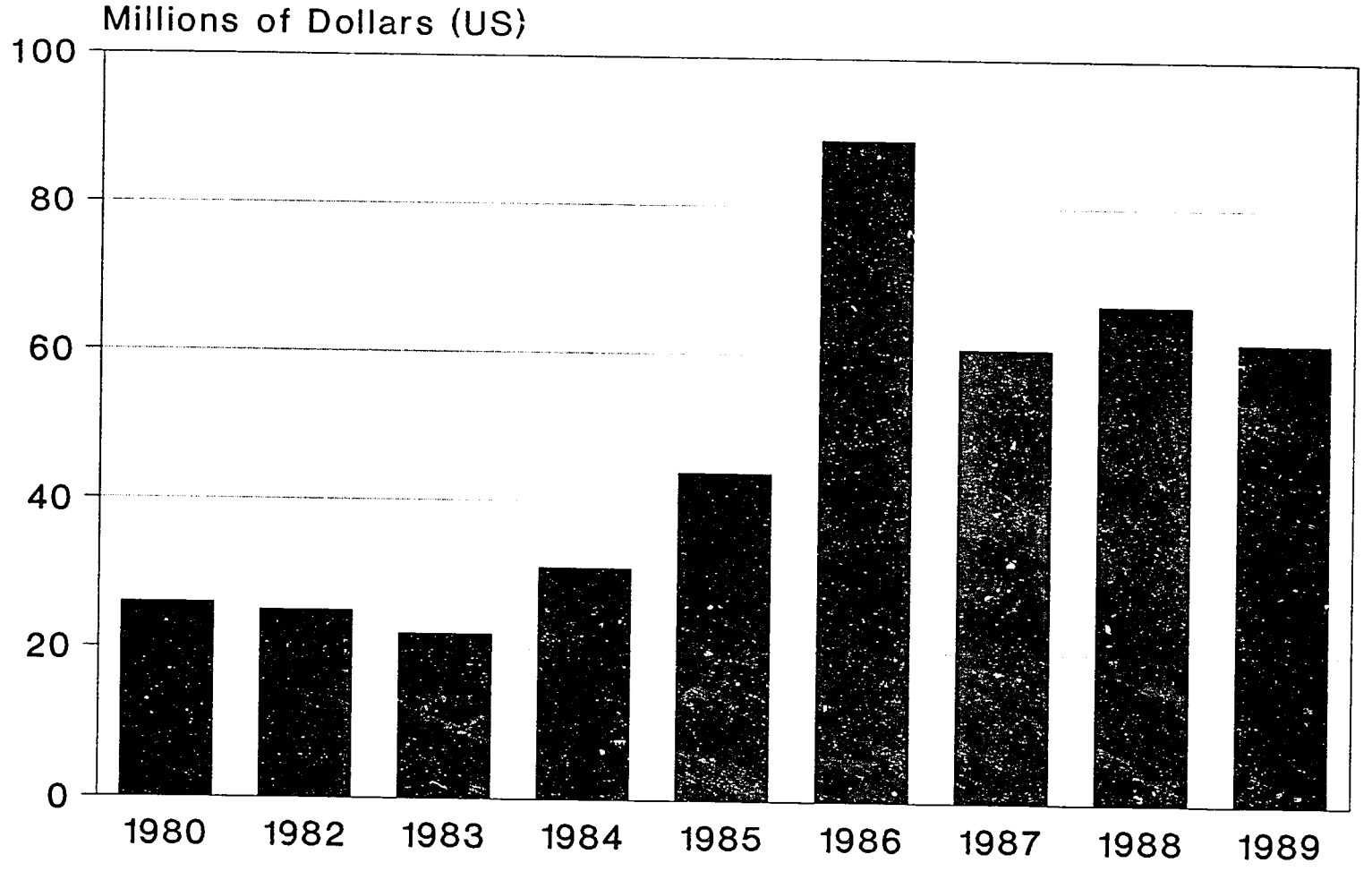
Rates interpolated from UN data

Figure 2
Growth of Debt in Haiti



World Bank, 1989-90 World Debt Tables

Figure 3
Increase in Debt Service in Haiti



World Bank, 1989-90 World Debt Tables

Infant Mortality in Haiti
(Please refer to Annex 1 for data)

Estimates of infant mortality rates (IMR) for particular years vary depending on the source and estimation method used. Figure 4 shows the range of IMRs for 1985 from various sources. The variability is a reflection of several factors, including, but not limited to, the method of estimation (direct or indirect), the use of recent national survey information in developing estimates, and particular management or political needs of the reporting agencies or country. While IMR estimates for Haiti all indicate a downward trend over the study period, they differ regarding the pace of the decline.

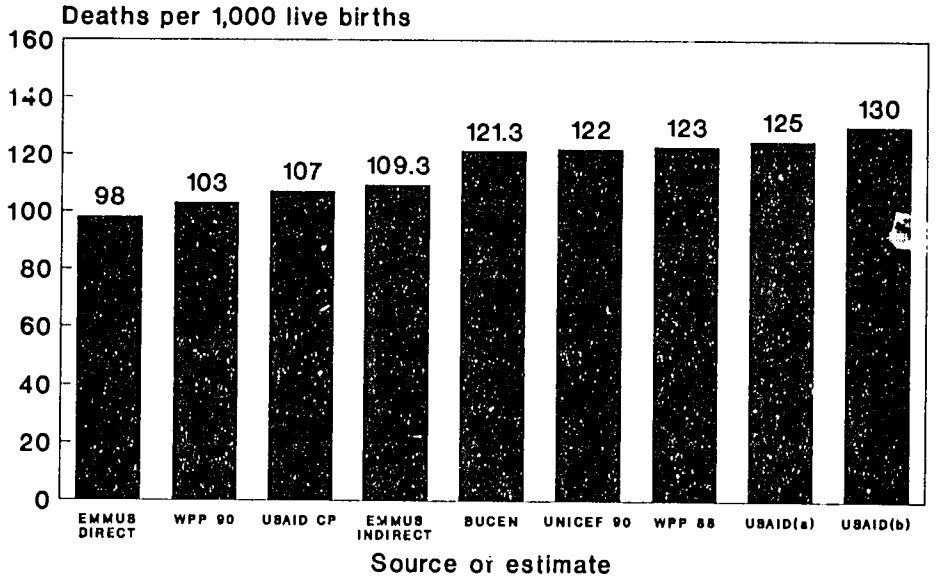
For example, indirect estimates for the period 1982-1990 from the U.S. Bureau of the Census (BUCEN 1990) start at 123.2/1,000 live births and end in 1990 at 107/1,000, as compared with indirect estimates from the United Nations Department of International Economic and Social Affairs (World Pop. Pros.88), which proffer an estimates of 129/1,000 in 1982 and 112/1,000 in 1990.

The sharper decline in BUCEN's IMR is due primarily to their retrospective adjustment of estimates based on the availability of recent survey data, establishing a new benchmark from which to calculate estimates. The estimates for the period 1982-1985 reflect the incorporation of IMR data from the 1987 l'Enquete Mortalite, Morbidite et Utilisation des Services (EMMUS 1987), while the World Pop. Pros.88 data, published before the release of the EMMUS 1987 data, reflect the use of older benchmarks to formulate estimates.

The new estimates recently issued by the UN (World Pop. Pros.90) are substantially lower than either BUCEN 1990 or World Pop. Pros.88, beginning with a 1980 estimate of 115/1,000 live births and ending in 1990 with a rather optimistic 92/1,000. These indirect estimates were calculated by the Institute Haitien de Statistique (a government agency) and the Centro Latinoamerica de Demografia (CELADE) using data from both the 1971 and 1982 national census. These are the current official government estimates (Gov't of Haiti/IHS) and are the most recent numbers reported to the United Nations Population Division.

According to the United Nations, IMR estimates for Haiti slated for publication in the upcoming 1992 World Population Prospects Report will use the EMMUS 1987 indirect estimates as the benchmark for calculating IMRs. A provisional estimate of 130/1,000 for the period 1980-1985 has already been laid down. This estimate is substantially higher than the World Pop Pros.90 estimate of 108/1,000 for the period 1980-1985. Therefore, it may be appropriate to treat the World Pop. Pros.90 estimates as spurious, and rely on other sources for estimates of infant

FIGURE 4
THE RANGE OF INFANT MORTALITY RATE ESTIMATES IN HAITI FOR 1985



NOTES:

1) The United Nations World Population Prospects estimates are based on a linear interpolation between five year estimates for the periods 1980-85 and 1985-1990. The estimate is a mid-year 1985 estimate assuming the five year period estimates refer to 1/1/83 and 1/1/88.

2) The BUCEN estimate was provided by BUCEN as one of a sequence of annual estimates (sequence provided in 1990).

3) EMMUS DIRECT is the direct rate from the 1987 EMMUS Survey; EMMUS INDIRECT is the indirect estimate.

4) The UNICEF estimate is that reported in the 1990 Statistics on Children in UNICEF Assisted Countries.

5) USAID CP refers to estimates published in the Congressional Presentation.

6) USAID(a) and USAID(b) refer to the Action Plans for 1986-87 and 1987-88, respectively.

mortality until publication of the new report.

Figure 5 plots the World Pop. Pros.88, Gov't of Haiti/IHS and BUCEN 1990 data along with the indirect estimates published in the EMMUS 1987 report.

The EMMUS 1987 data indicate a substantial decline in the IMR between 1983 and 1985 and, compared to the BUCEN 1990 and World Pop. Pros.88 data, yield a more optimistic outlook and indicate a sharper downward trend for infant deaths in Haiti.

A considerable number of estimates have been made based on the EMMUS 1987 data set, ranging from direct and indirect estimates for individual years to similar estimates for the five-year period 1982-1987.

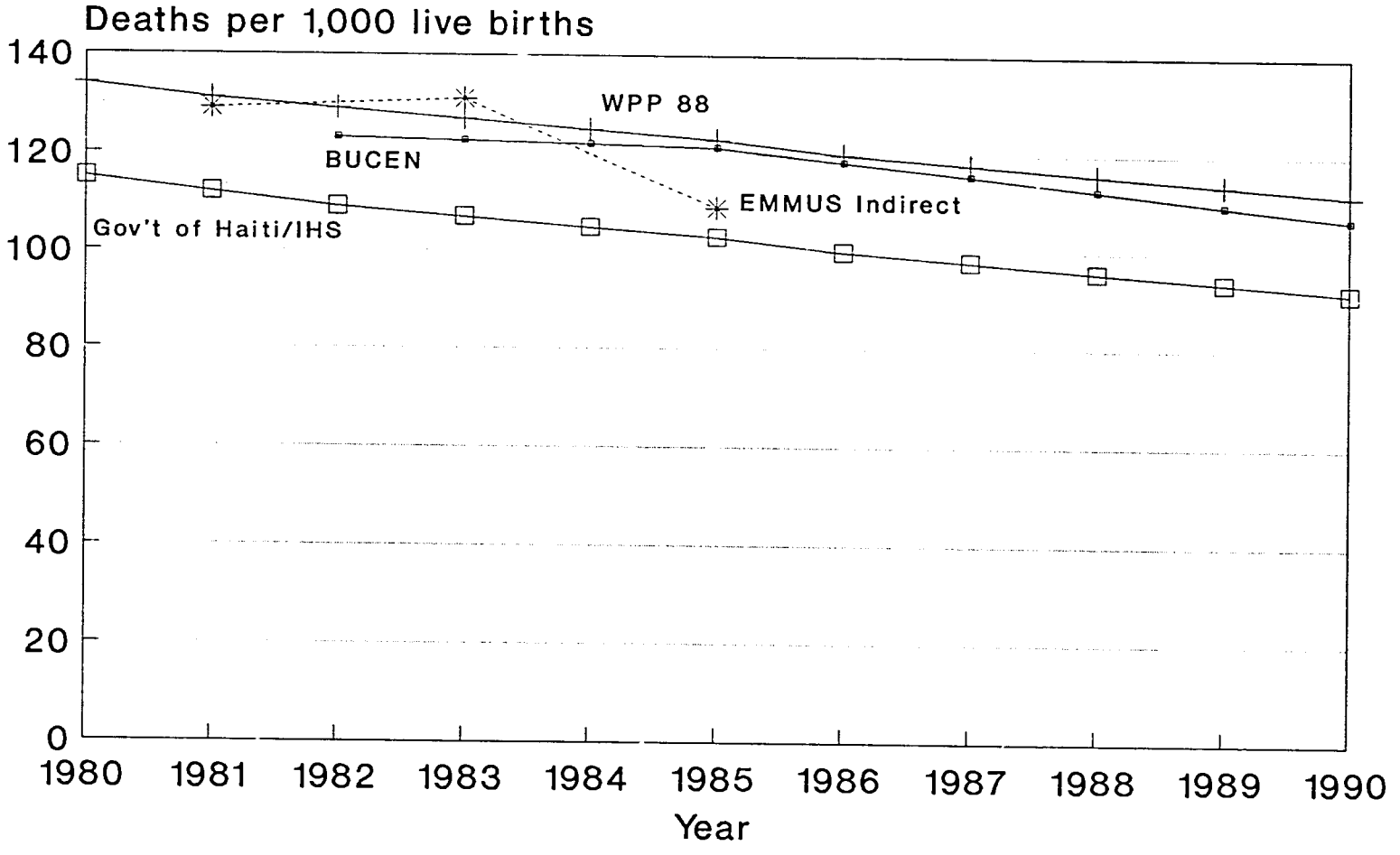
Often, direct estimates, because of difficulties encountered in collecting reliable retrospective birth histories, are considerably lower than corresponding indirect estimates. While this disparity in direct and indirect estimates is consistently evident in the EMMUS 1987 IMRs, the survey instrument was extremely thorough in collecting robust retrospective information. As a result, many regard the direct estimate of 101/1,000 for the period 1982-1987 as an accurate reflection of Haiti's infant mortality rate.

The indirect EMMUS 1987 estimates paint a broad disparity in IMRs between urban and rural areas and Port-au-Prince. However, this disparity goes against expected trends, with rural areas better off than urban areas, excluding Port-au-Prince. The IMR for Port-au-Prince is considerably lower than IMRs for other urban areas and rural areas, possibly reflecting aggressive health initiatives concentrated in the capital's urban slum, Cite Soleil.

Other, though less robust, indirect estimates have been calculated from data collected during the 1989 Haiti Contraceptive Prevalence Survey (CDC/IHE 1989), and are thought to be fairly consistent with the EMMUS 1987 indirect estimates. However, the CDC/IHE 1989 estimate of 105.0/1,000 for 1983 is considerably lower than the EMMUS 1987 estimate of 131/1,000 for the same year. By 1985, the rates do converge more closely, with the CDC/IHE 1989 survey reporting an indirect IMR of 102.3/1,000, compared with the EMMUS 1987 estimate of 109/1,000. The CDC/IHE 1989 survey team has pointed out that developing robust infant mortality rates was not the primary purpose of the survey.

In culling infant mortality rates (and other indicator rates) from various sources, it is usually possible to trace the movement of primary data (such as from a survey) to secondary reporting sources (those that do not traditionally undertake the physical collection of data). While this "trickle down" of data

FIGURE 5
TRENDS IN INFANT MORTALITY RATES IN HAITI FROM FOUR SOURCES



is typical and expected, there are often disparities in what the secondary sources report as data coming from a primary source. While in some cases there are explanations for these disparities (such as the formulation of estimates using the survey data as a benchmark or root), in other cases the reasons are not clear.

For example, the 1987 IMRs reported by Haiti Action Plans (d) and (e) (105/1,000) cite EMMUS 1987 as the source of their estimates. In neither of these cases is it clear how the numbers were derived from the EMMUS 1987 report. The closest EMMUS 1987 match to the Haiti Action Plan estimates is the direct estimate of 106/1,000 given for 1984. IMRs supplied by UNICEF sources (UNICEF State 1986-1991, UNICEF 1990) are basically identical, reflecting the use of primary data from the UN Population Division data (World Pop. Pros.88).

The 1980 estimate from PAHO's 1990 Health Conditions in the Americas (PAHO 1990) is strikingly low and well out of sync compared to the levels and trend in IMR conveyed by the other sources. Indeed, the estimate of 107/1,000, cited as coming from CELADE, is the same as the BUCEN 1990 estimate for 1990, a decade later.

Vaccination Coverage Rates in Haiti
(Please refer to Annexes 2-6 for data)

Descriptions of vaccination coverage in Haiti are given based on two types of estimates -- those derived from the administrative reporting system and those calculated from surveys. It is important to note that comparisons between the two types of estimates are problematic, as each measures a different cohort of children.

The administrative estimates reflect the percentage of children aged 0-11.9 months vaccinated in a given year. The estimates are the ratios of the number of vaccines given to children under age one to estimates of the mid-year under age one populations for specific reporting years. The survey estimates reflect the percentage of fully vaccinated children aged 12-23.9 months. (Please refer to appendix for more information on measuring vaccination coverage).

In reviewing the vaccination coverage rates in the annexes to this report, it is evident that many sources report the same rates. While this is expected, one should be aware that discrepancies occasionally arise in the way different sources define the age group that the coverage rate describes. For example, in Annex 3, the measles rate reported by USAID/Haiti(c) for 1986 states that the rate describes the coverage of children aged 0-59.9 months vaccinated before age two; the same rate reported by USAID/Haiti(d) describes the cohort as children 0-

11.9 months of age. Whenever possible, it is advisable to trace rates back to their primary reporting source (WHO, PAHO, national surveys) for verification of the cohort being measured.

Administrative estimates. Estimates from the World Health Organization Expanded Programme on Immunization (WHO/EPI), show that, except for BCG, coverage rates for all antigens rose slowly but steadily from the early 1980s through 1987. Despite the steady progress, coverage remained low (24% to 30%) until 1988, when rates climbed an average of 50 percent above their 1987 levels. These increases can be attributed in large part to three successful national immunization days conducted during that year.

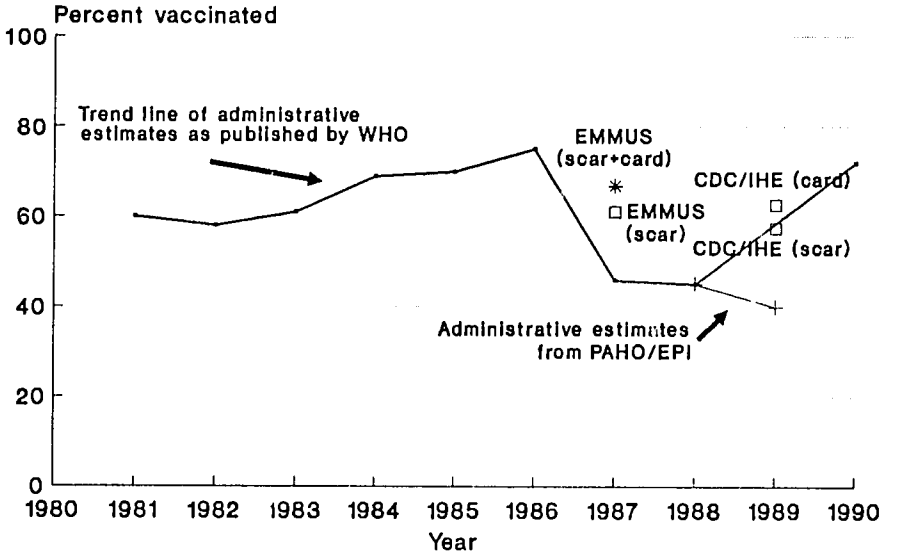
In 1988, WHO/EPI estimated that 54 percent of children under age one were protected against polio and DPT, and 63 percent were protected against measles. For BCG, coverage climbed steadily from 60 percent in 1981 to 75 percent in 1986, but fell to around 45 percent in 1987 and 1988 (see figures 6 through 9). No 1989 estimates were reported by WHO/EPI.

Provisional 1990 estimates from the World Health Organization document substantial declines from 1988 levels for all antigens except BCG. Coverage for measles dropped from 63 percent in 1988 to 31 percent in 1990. Because measles coverage varies greatly between communes, the ministry of public health and population feels that the sampling distribution used to estimate measles coverage may not be representative. Therefore, it is difficult to develop a robust national estimate for this antigen. Conversely, the ministry is confident in its estimate for BCG coverage. Immunization of newborns in the main hospitals is high, and traditional birth attendants have been trained to refer all newborns for vaccination with BCG. In 1990, BCG coverage was restored to nearly the 1988 level, increasing to 72 percent.

Administrative estimates are also available from the Pan American Health Organization Expanded Programme on Immunization (PAHO/EPI) for 1988 and 1989. The PAHO/EPI 1988 rates for all antigens are equal to or lower than those from WHO/EPI, and show little improvement in coverage from 1988 to 1989. This may be due to the use of different population estimates by the agencies in calculating coverage. In the case of measles, PAHO/EPI data show a substantial decrease in measles coverage, from 59 percent in 1988 to 31 percent in 1989. The PAHO/EPI data also suggest a continued drop in BCG coverage, reporting only 40 percent coverage for children under age one.

Survey estimates. Current point estimates are available from two surveys -- EMMUS 1987 and CDC/IHE 1990. For polio3 and DPT3, the EMMUS 1987 data fall approximately seven percent below the WHO/EPI estimates for the same year. For measles coverage, the two sources are closely aligned, with the survey estimate only

FIGURE 6
BCG VACCINATION COVERAGE RATES
ADMINISTRATIVE & SURVEY BASED ESTIMATES

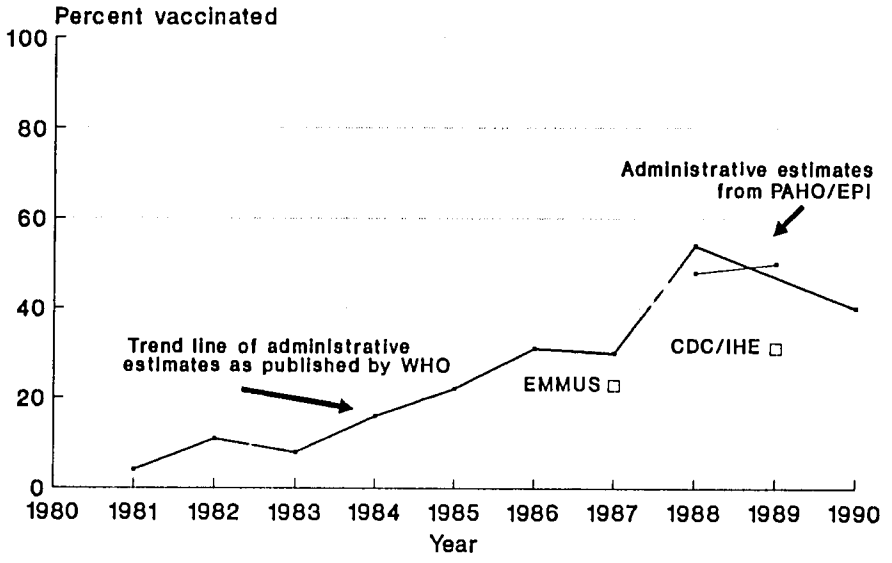


Note:

The administrative estimates reflect the percent of children aged 0-11.9 months vaccinated in a given year. The estimates are the ratios of vaccines given to children under one year of age to estimates of the mid-year populations for the years shown.

Survey estimates reflect the percent of vaccinated children 12-23 months of age.

FIGURE 7
POLIO VACCINATION COVERAGE RATES
ADMINISTRATIVE & SURVEY BASED ESTIMATES

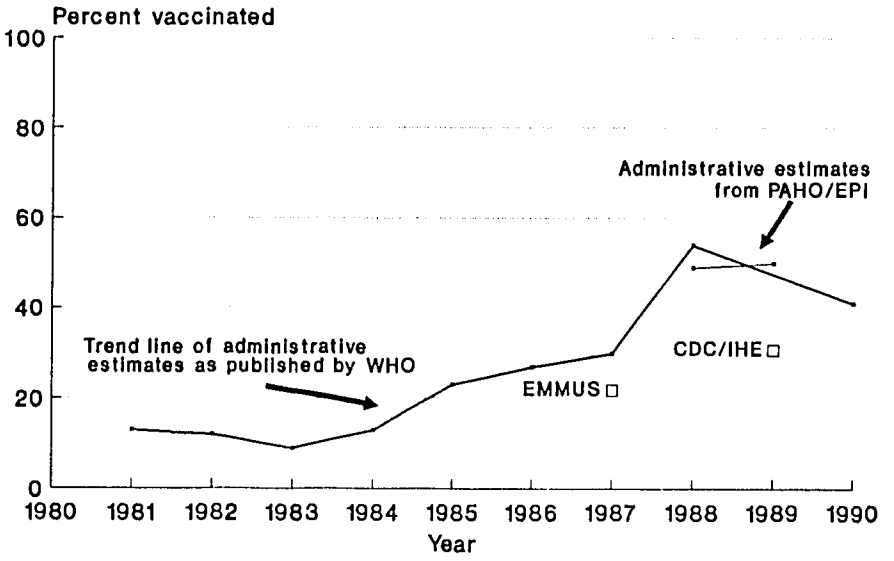


Note:

The administrative estimates reflect the percent of children aged 0-11.9 months vaccinated in a given year. The estimates are the ratios of vaccines given to children under one year of age to estimates of the mid-year populations for the years shown.

Survey estimates reflect the percent of vaccinated children 12-23 months of age.

FIGURE 8
DPT3 VACCINATION COVERAGE RATES
ADMINISTRATIVE & SURVEY BASED ESTIMATES

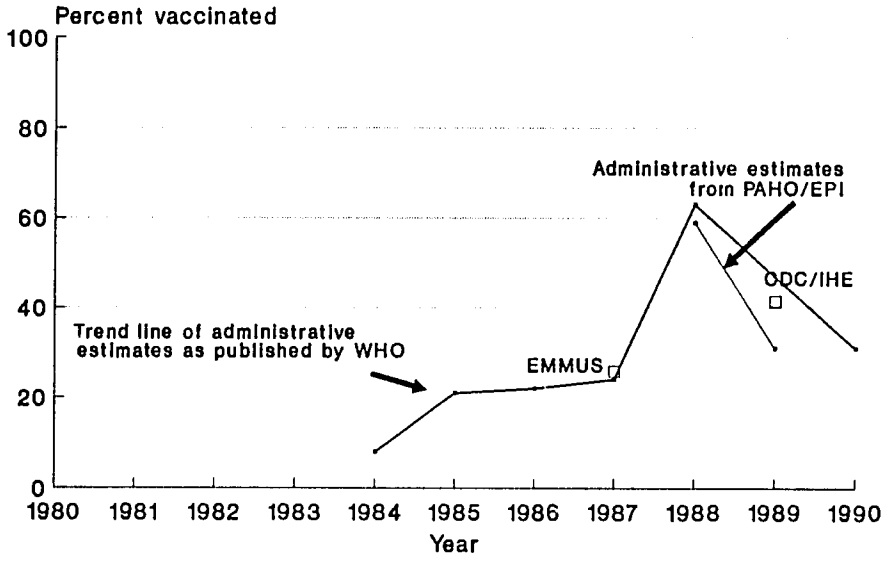


Note:

The administrative estimates reflect the percent of children aged 0-11.9 months vaccinated in a given year. The estimates are the ratios of vaccines given to children under one year of age to estimates of the mid-year populations for the years shown.

Survey estimates reflect the percent of vaccinated children 12-23 months of age.

FIGURE 9
MEASLES VACCINATION COVERAGE RATES
ADMINISTRATIVE & SURVEY BASED ESTIMATES



Note:

The administrative estimates reflect the percent of children aged 0-11.9 months vaccinated in a given year. The estimates are the ratios of vaccines given to children under one year of age to estimates of the mid-year populations for the years shown.

Survey estimates reflect the percent of vaccinated children 12-23 months of age.

slightly higher, while for BCG, EMMUS 1987 data suggest a coverage rate of 61 percent compared with the more conservative WHO/EPI estimate of 46 percent.

A similar pattern is found in comparing the CDC/IHE 1990 survey estimates to the PAHO/EPI 1989 administrative estimates. However the gaps between the sources are considerably larger than those between EMMUS 1987 and WHO/EPI.

The survey estimates for all antigens except BCG imply that coverage is steadily increasing. However, the extent of this increase may be shadowed by the fact that the CDC/IHE 1990 data were collected shortly before two national vaccination days and therefore probably underestimate the true coverage for 1989.

Coverage against tetanus. As with most developing countries, coverage for tetanus toxoid is low, lagging behind coverage for the other antigens. For EMMUS 1987, both the coverage rate for women 15-49 years old and the slightly higher rate for pregnant women only are presented in Figure 10. Both rates are based on having received at least two doses of tetanus toxoid vaccine in the five years preceding the survey. Administrative data from WHO/EPI (percent of women fully immunized against tetanus) were available for only 1987 and 1988. The 1987 WHO/EPI estimate is mid-way between the two EMMUS 1987 estimates (about 30%), but falls off in 1988 to 23 percent. According to the ministry of public health and population, the 1988 stock of tetanus toxoid antigen spoiled and could not be used. Additionally, because of limitations in accurately collecting this indicator (see Appendix), the ministry believes the actual coverage rate to be much higher.

Tetanus toxoid coverage data were not available from the CDC/IHE 1990 survey. Data from UNICEF presented in Annex 6 show rather encouraging coverage rates from 1982 to 1987, ranging from 67 percent for the period 1981-83 to 56 percent for 1987-88. However, the UNICEF rate for 1988-89 suggests a rather substantial decline, reporting only five percent of pregnant women fully immunized against tetanus.

ORS/ORT Use Rates in Haiti
(Please refer to Annex 7 for data)

In Haiti, data are available regarding ORS and ORT (ORS+SSS) use rates from two sources -- surveys and the routine reporting system as published by the World Health Organization Control of Diarrhoeal Diseases Programme (WHO/CDD) and the Pan American Health Organization Control of Diarrhoeal Diseases Programme (PAHO/CDD). The WHO/CDD and PAHO/CDD reports distinguish between the use rate of ORS packets (ORS use rate) and the use rate of both packets and home solutions (ORT use rate).

FIGURE 10
TETANUS II+ VACCINATION COVERAGE RATES
ADMINISTRATIVE & SURVEY BASED ESTIMATES

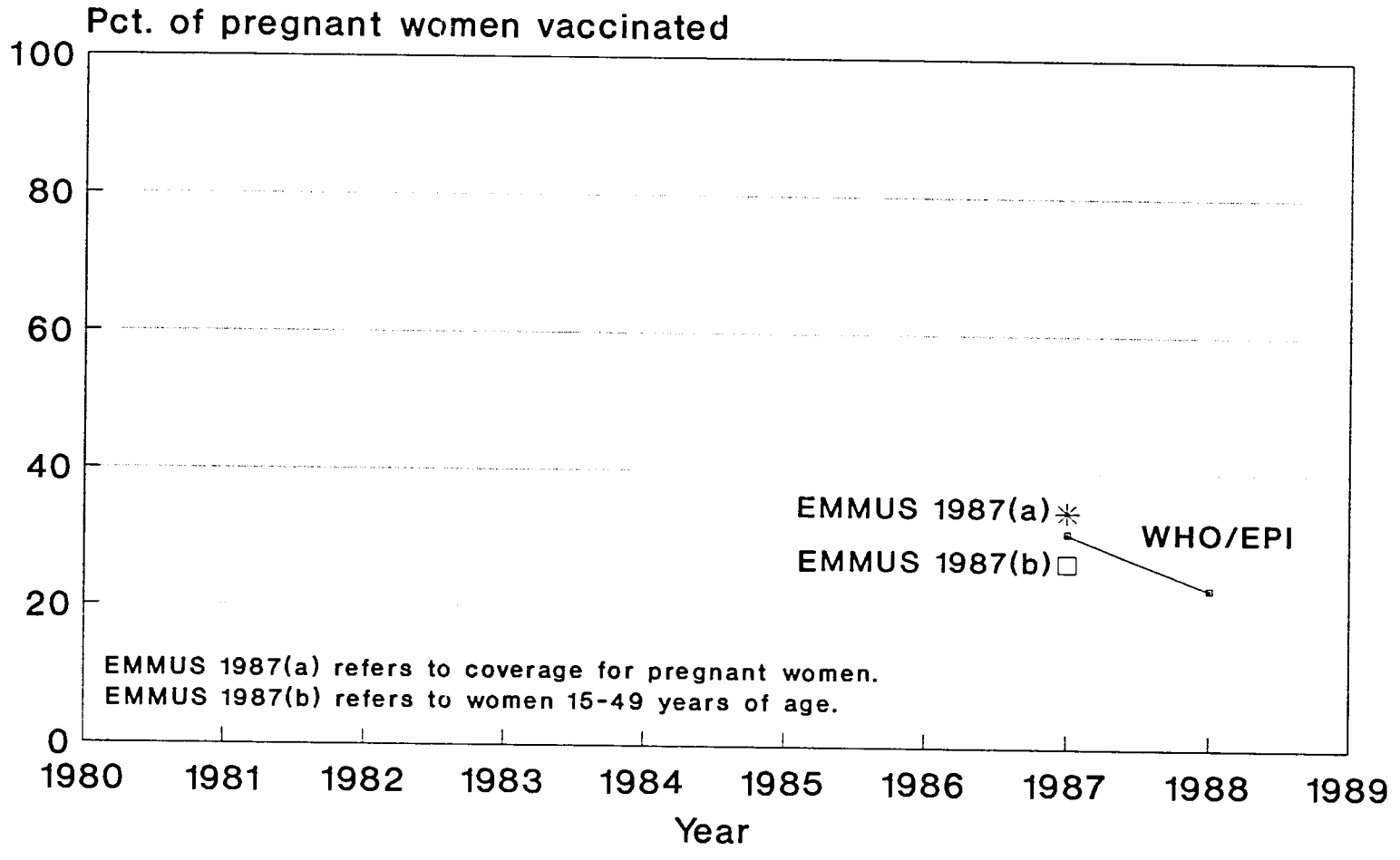


Figure 11 presents trend data from the WHO and PAHO reporting systems and Figure 12 presents point estimates from the 1983 l'Enquete Haitienne sur la Prevalence de la Contraception (EHPC 1983) and EMMUS 1987.

The administrative estimates for ORS and ORT use from PAHO/CDD show a steady increase from 1.7 percent in 1985 to 17 percent in 1988. The WHO/CDD data, while proffering the same rates as PAHO/CDD for 1985-1987, end in 1988 on a more optimistic note, with ORS use and ORT use 25 percent and 35 percent, respectively. The lower rates for 1988 reported by PAHO/CDD were actually reported by WHO/CDD in an interim report. However, after PAHO/CDD published these rates in their own report, WHO/CDD adjusted the rates based on additional information they had received from country officials.

Currently, provisional estimates for 1989 from WHO/CDD indicate a substantial downturn, with the ORS use rate estimated at 18 percent and the ORT use rate estimated at 24 percent.

The reason for WHO's dramatic departure from the PAHO/CDD rates in 1988 may be attributed to different estimates of the number of cases of diarrhea in young children as well as different assessments of the number of ORS packets available in the country to treat those cases. Both the PAHO and WHO data for 1987 reflect the use of the EMMUS 1987 findings.

Judging by the survey estimates, no improvement in use rates occurred from 1983 to 1987, with EHPC 1983 reporting a 1983 ORS use rate of 15 percent and EMMUS 1987 reporting a 1987 ORS use rate of 14.1 percent. The ORT use rate (use of either ORS packets or home solutions in treating diarrhea) was not much higher, estimated by EMMUS 1987 to be only 16.2 percent. Additionally, the survey found that only nine percent of the mothers using ORT actually used it correctly (properly prepared and/or administered).

The majority of other estimates given in Annex 7 seem to rely on the EMMUS 1987 data. Both UNICEF 1990 and UNICEF State 1990 report the EMMUS 1987 ORS use rate; both, however, have attributed the rate to the period 1986-1987. The 1987 ORS estimates from USAID(c), USAID(d) and USAID CSCS 1988 also cite EMMUS 1987 as their source. However, in the case of USAID(c) and (d), the rate given is about one percent higher than the actual EMMUS 1987 estimate. An unpublished, informal ORT use rate from the ministry of public health and population of 20 percent was estimated from a survey of mothers bringing their children to health centers for treatment of diarrhea.

FIGURE 11
ORT and ORS USE RATES--HAITI
ADMINISTRATIVE ESTIMATES

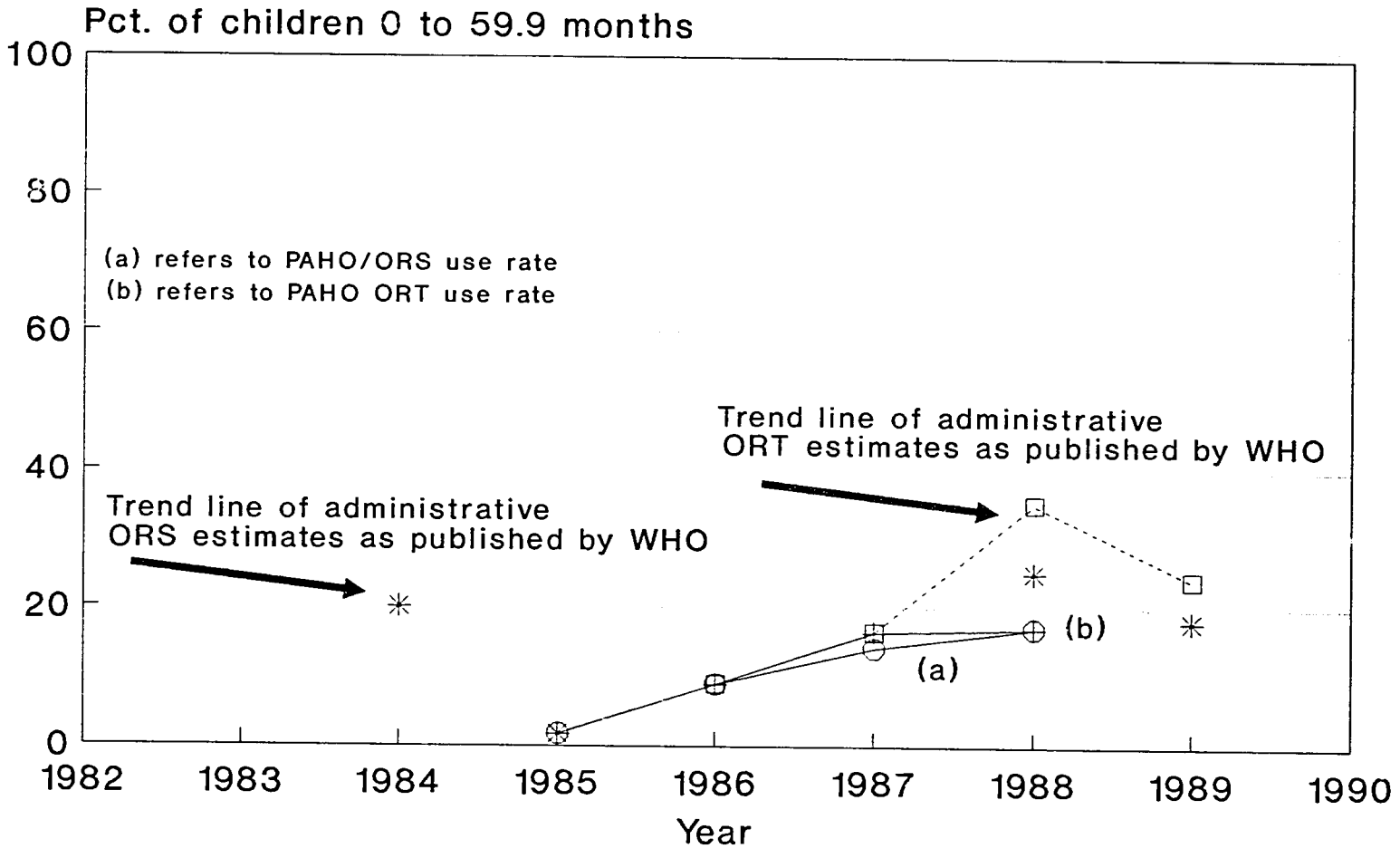
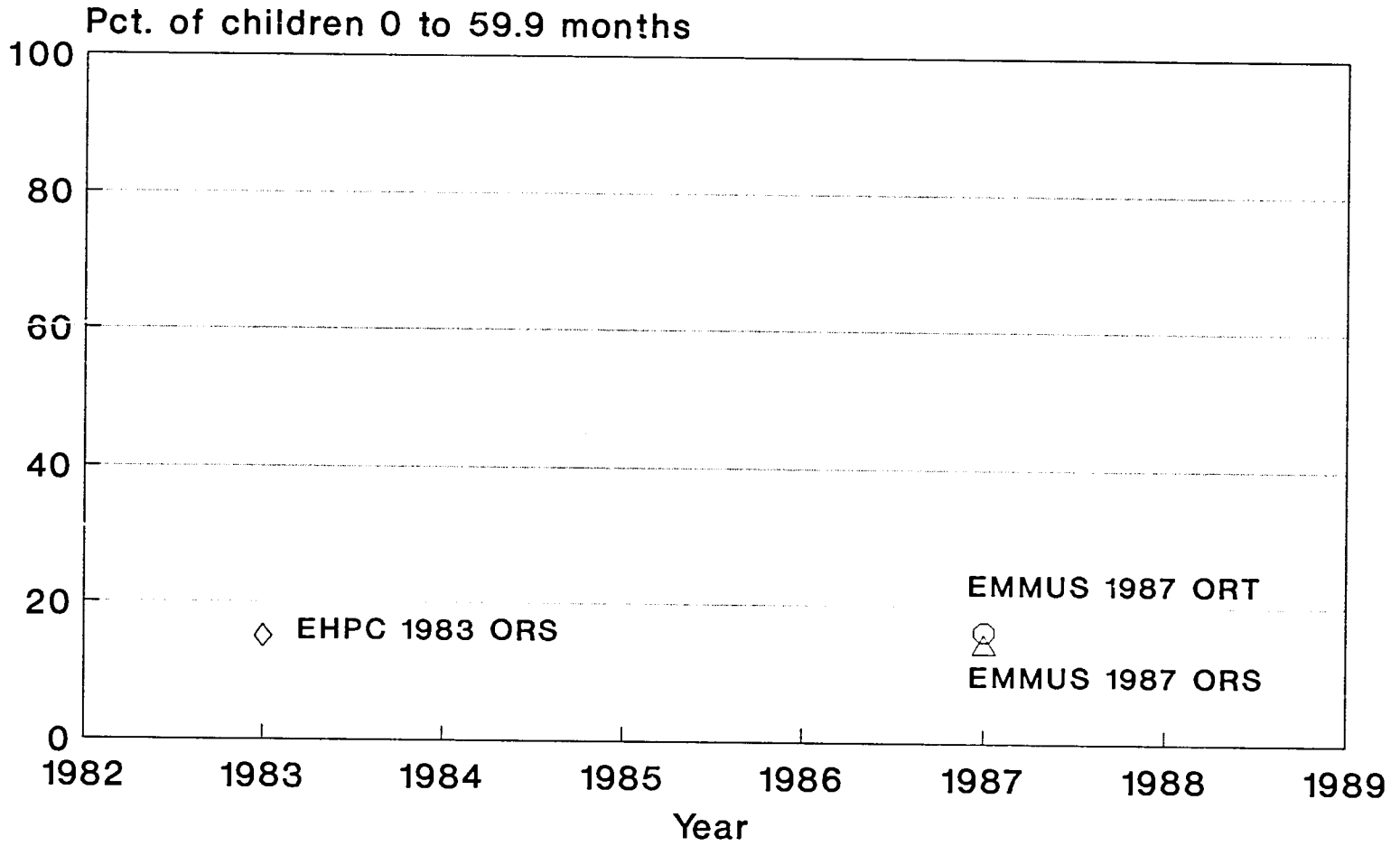


FIGURE 12
ORT and ORS USE RATES--HAITI
SURVEY ESTIMATES



Trends in Undernutrition in Haiti
(Please refer to Annex 8 for data)

Until 1990, no national nutrition surveys had been conducted in Haiti since the 1978 National Nutrition Survey (Nat'l Nut Surv 1978). In 1990, two rapid nutrition assessments, one covering the drought-stricken northern departments (CDC 1990) and the other covering the southern departments (South Survey 1990) were undertaken. The absence of nutritional status data during the 1980s makes an assessment of trends in undernutrition in Haiti over the last decade somewhat problematic.

While the CDC 1990 survey team have calculated rates of undernutrition from the 1978 survey for the northern departments only, they warn against making any comparison with the new data. Despite the fact that the rates of Gomez grade I undernutrition (75.0% to 89.9% of reference median weight-for-age) for children 3-59.9 months of age are nearly identical between the two time periods (46.8 for 1978 and 46.3 for 1990), the intervening 12-year gap in nutritional status information obviates an accurate assessment of nutritional status from being formulated. Did malnutrition improve at all during the intervening period and then worsen again? Or, has the rate of undernourished really remained the same?

The South Survey 1990 found the southern departments to be less malnourished than the northern departments, with 42.6 percent of children 3-59.9 months of age falling into Gomez grade I undernutrition, 15.6 percent in Gomez grade II and 1.4 percent severely undernourished (Gomez grade III). The more severe undernutrition in the northern departments seems to reflect one of the negative health outcomes of the long drought that preceded the nutrition survey there.

Because of the use of both different age groups (0-59.9 months vs. 3-59.9 months) and different classifications of undernourished children (Gomez vs. z-scores vs. Waterlow), a comparison of rates of undernutrition from other sources in Annex 8 is not prudent.

Access to Safe Water and Adequate Sanitation in Haiti
(Please refer to Annexes 9 and 10 for data)

Figures 13 and 14 present trend data from the World Health Organization as reported by the USAID-funded Water and Sanitation for Health (WASH) project. Overall, access to potable water fell from 38 percent in 1985 to 36 in 1989. For urban areas, access over this same period decreased from 59 percent in 1985 to 54 percent in 1989, a troubling trend in light of urban population growth from 1,405,000 in 1985 to 1,600,000 in 1989. For rural areas, population growth was even greater (3,864,000 in 1985 vs.

FIGURE 13
ACCESS TO POTABLE WATER
URBAN AND RURAL POPULATIONS--HAITI

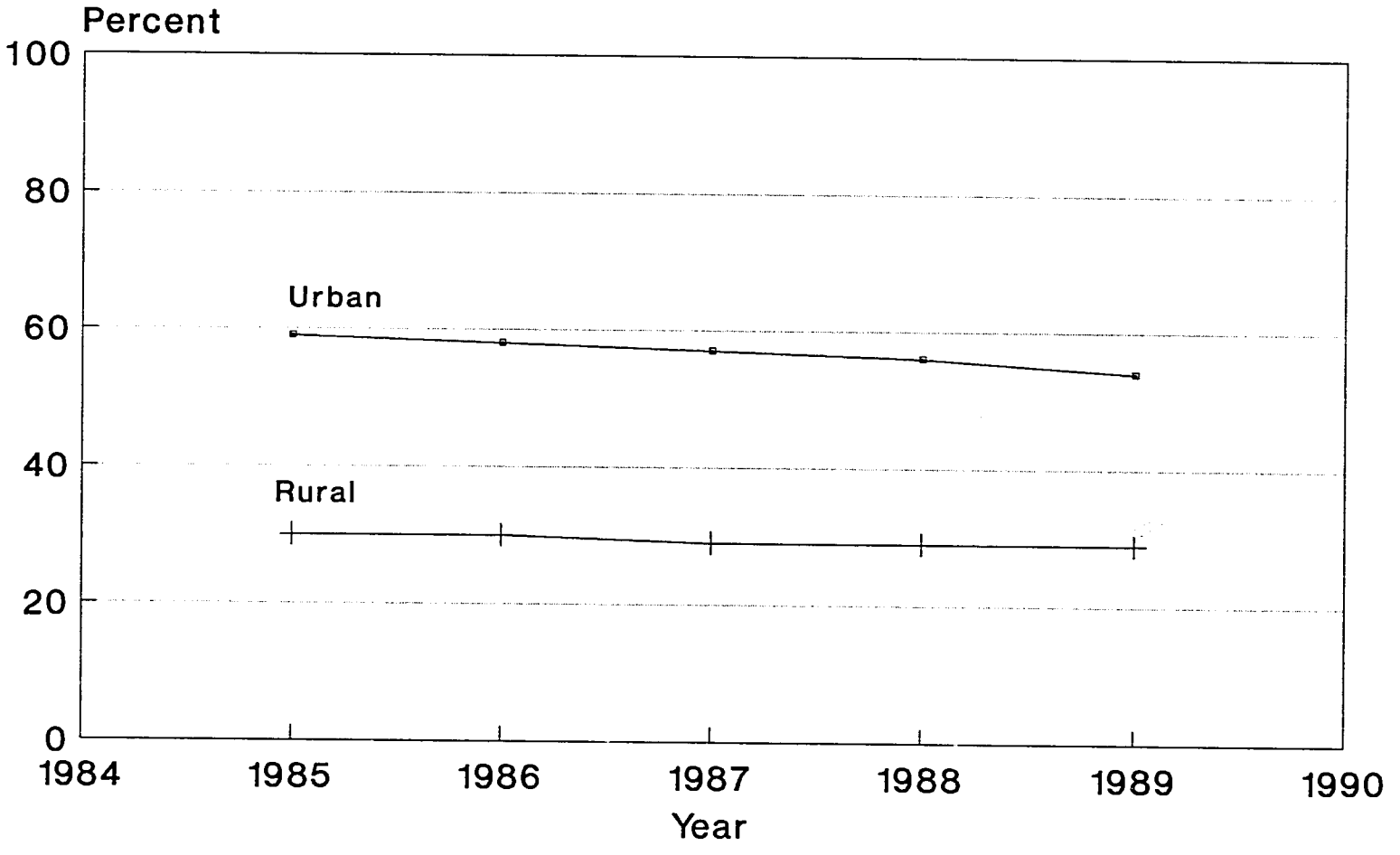
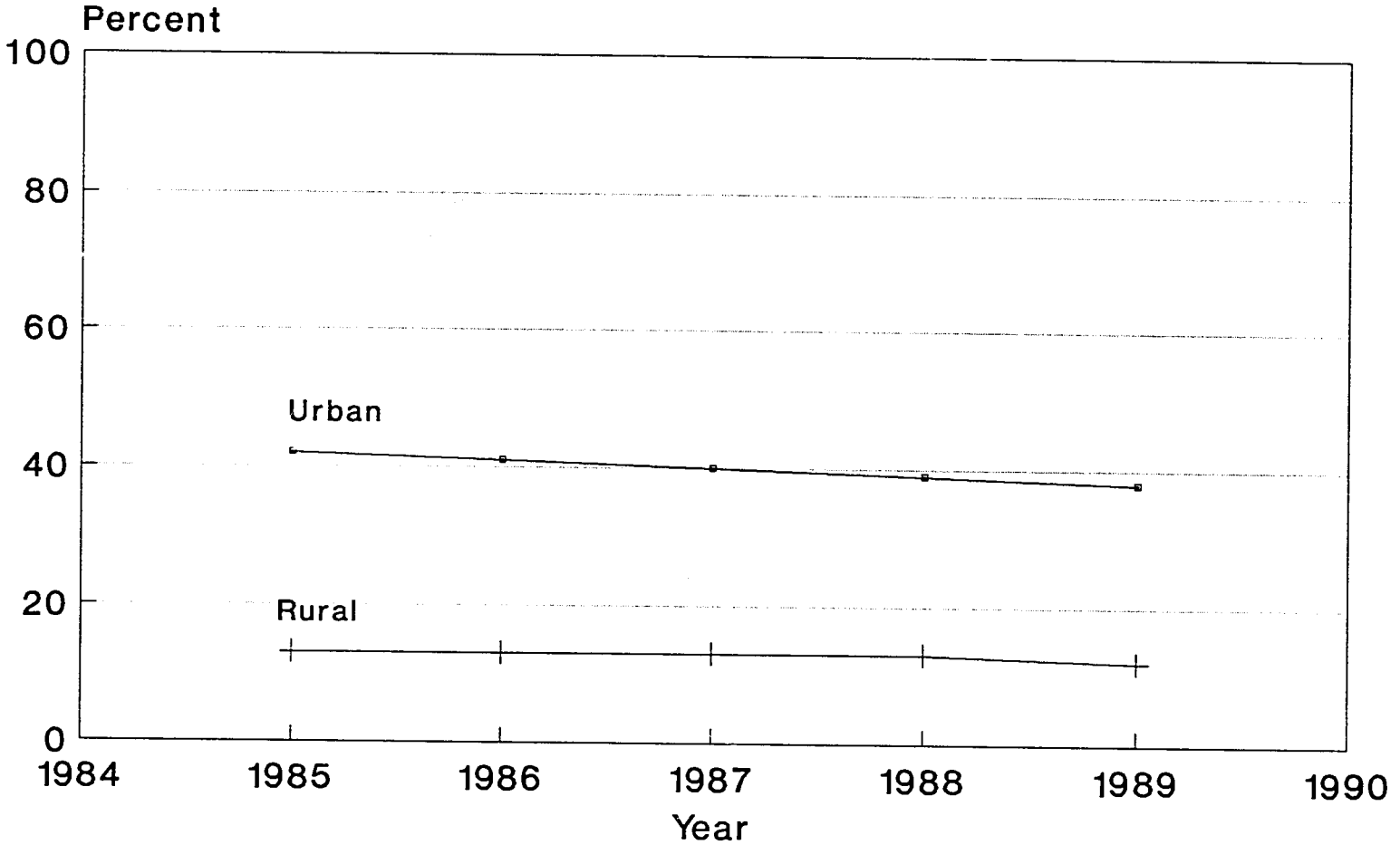


FIGURE 14
ACCESS TO ADEQUATE SANITATION
URBAN AND RURAL POPULATIONS--HAITI



4,266,000 in 1989), while access stagnated since 1987 at 29 percent, down from 30 percent in 1985.

For sanitation, the situation is worse, with national coverage down from 21 percent in 1985 to 19 percent in 1989. The pattern of access for urban and rural areas shows a similar trend as access to potable water. Access to adequate sanitation in urban areas steadily dropped from 42 percent in 1985 to 38 percent in 1989, while access in rural areas declined to 12 percent from 13 percent during the years 1985-1989.

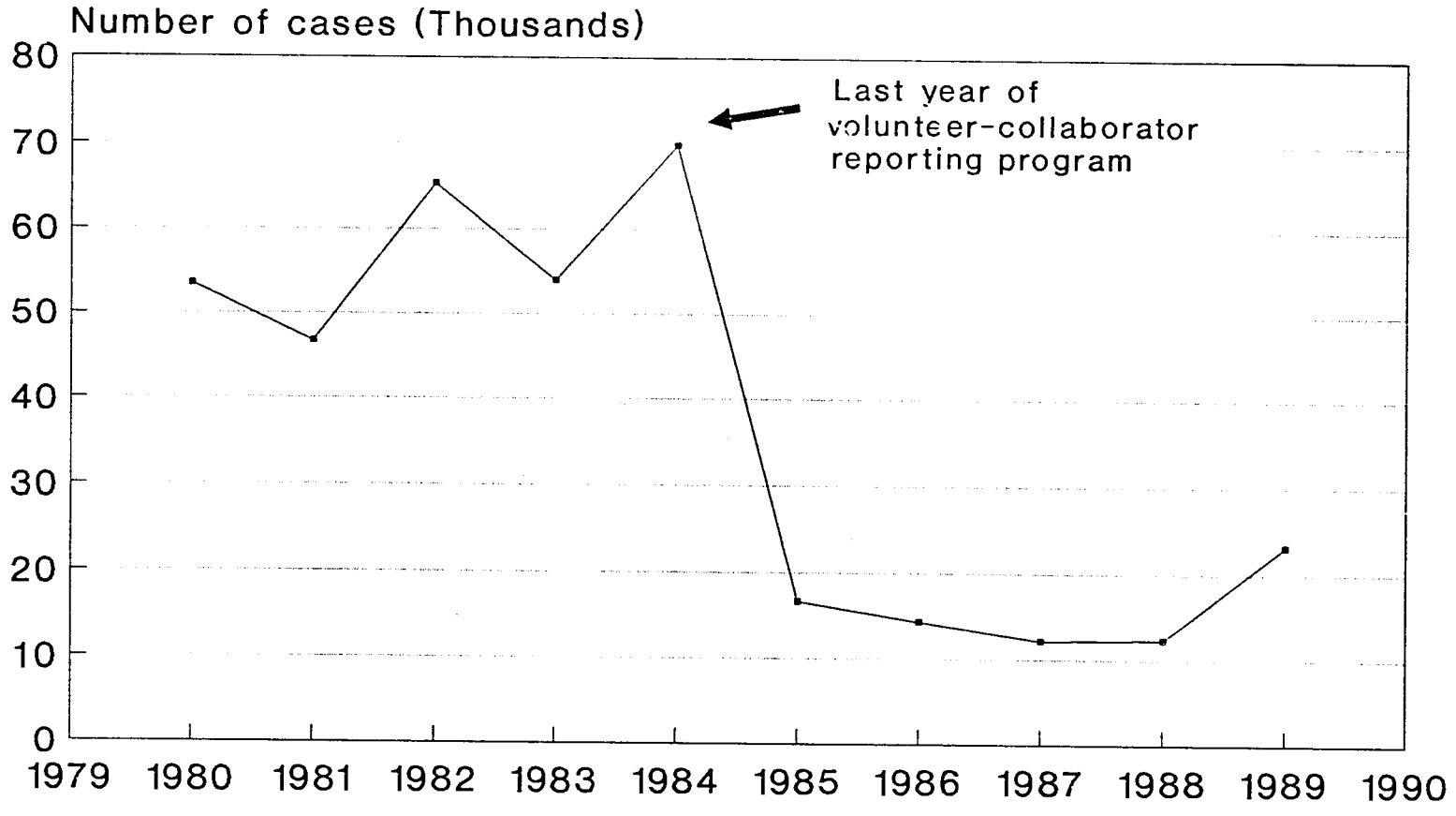
Trends in the Number of Malaria Cases Reported in Haiti
(Please refer to Annex 11 for data)

Figure 14 displays the number of laboratory confirmed cases of malaria reported to the ministry of public health and population from 1980 to 1989. Following a sawtooth pattern of reported cases from 1980 to 1984, the number of cases fell sharply from a high of 69,863 in 1984 to only 16,662 in 1985. However, the decline is spurious and is an artifact of the cancellation of the national volunteer-collaborator program. Participants in this program provided much of the data on malaria cases to the National Malaria Eradication System (NMES). Figure 15 shows the number of reported cases of malaria in neighboring Dominican Republic.

A continued, though slow decline in malaria cases was reported in Haiti through 1987, the last year of a complete official epidemiological report from the NMES. Currently, no complete epidemiological information is available on the status of malaria in Haiti.

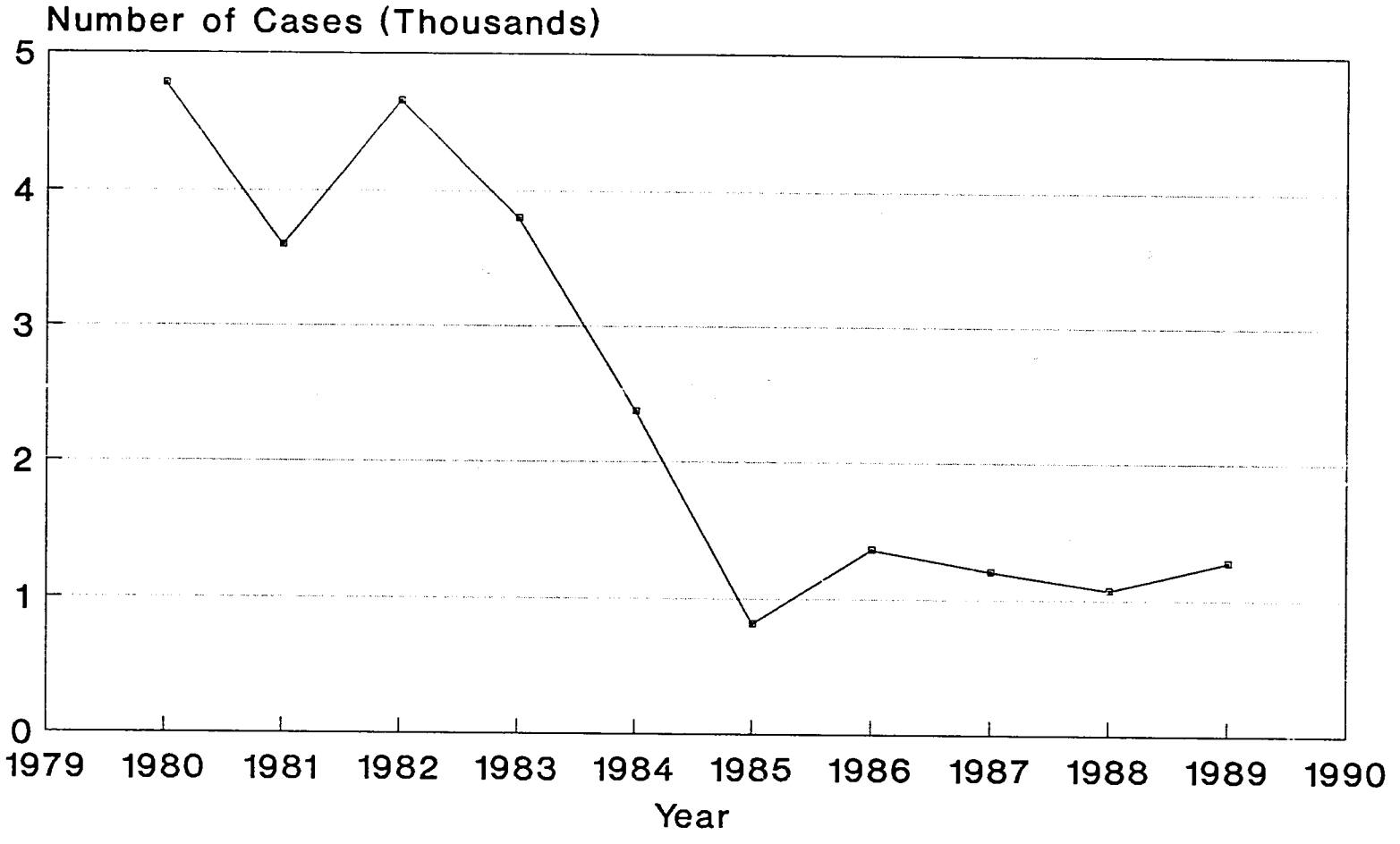
In March 1988, financial crises forced the Government of Haiti to abolish the NMES. Continued financial constraints and political instability have prevented the reorganization of malaria control activities (now under the control of the ministry of public health and population's unit of vector-borne disease control. No systematic campaign against the vectors or parasites has been carried out since 1988. Data for 1988 and 1989 are highly selective, based only on reports from hospitals and clinics which probably test only those patients most likely to be suffering from malaria. These data seriously underestimate the actual number of malaria cases, especially given the lack of vector control measures. According to the ministry of public health and population, the actual number of persons suffering from malaria may be around 300,000.

FIGURE 15
NUMBER OF CASES OF MALARIA--HAITI REGISTERED BY THE MINISTRY OF HEALTH



For 1988, data is provisional and incomplete.
Source: PAHO CSP23/INF/2 Sep 20 1990

FIGURE 16
NUMBER OF CASES OF MALARIA--Dom. Rep.
REGISTERED BY THE MINISTRY OF HEALTH



Source: PAHO CSP23/INF/2 Sep 20 1990

CONCLUSION

While this report makes no specific recommendations for utilizing one reported number over another, readers are encouraged to use the general discussions in the appendix about each of the indicators as guidelines when using and interpreting data from any source.

Bringing together like data from multiple sources provides an intriguing perspective on the range of data collected and its subsequent reporting. While many data sources adequately describe and define their data collection and analysis techniques, a considerable number do not and merely report a number with few, if any, qualifications. And, because there are only a few sources of primary data, the problem is heightened by some secondary reporting sources passing on the unqualified primary data, or even worse, subjecting this unspecified data to a definition that "seems" correct, is appropriate for filling out a trend analysis or provides the right political curve for a report.

More positively, this gathering of data helps to identify relevant and reliable sources of information. In Haiti, the availabilty of such data has been greatly enhanced by various studies undertaken through the Institut Haitien de l'Enfance (Haitian Child Health Institute). Lastly, this report aids in recognizing the complexities inherent in data collection, analysis and reporting, as well as the importance of understanding the derivation of indicator statistics.

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UN MORT <5	Mortality of Children Under Age 5: World Estimates and Projections, 1950-2025. Population Studies No. 105. United Nations Department of International Economic and Social Affairs, 1988.
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World Pop. Pros. 90	World Population Prospects: 1990. United Nations Department of Economic and Social Affairs, October 1990.
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APPENDIX
Collecting Child Survival Indicator Data

Measuring Infant Mortality. The Infant Mortality Rate (IMR) in a specified geographical area is defined as the number of deaths occurring in infants under age one in that area for every 1,000 live births. This definition can also be expressed in terms of probability: the IMR is the probability of a newborn infant dying prior to his/her first birthday. In practice, the IMR is calculated for a specific time period; this period may be as short as a year but, more often, a period of three, or even five years, is used.

In the ideal situation where all births and deaths are registered routinely and there is no migration, one can determine the IMR for any given period by recording the number of births in that period and, one year following the last birth recorded, counting the number of those children registered who died before their first birthday. Because the vital events registration systems in the developing world do not yet approach the ideal and because there is migration, a variety of estimation procedures are used to determine IMRs.

In general, there are two methods of estimating an IMR: a direct method in which births and deaths in a given time period are counted and a ratio formed of deaths per 1,000 live births, and an indirect method in which knowledge about births and deaths, plus additional demographic information, is factored into a mathematical model to generate an estimate. Most models generate estimates in the form of a time trend, not single estimates for individual points in time. The data needed to apply either method -- direct or indirect estimation -- can come from two basic sources -- vital events registries and comprehensive surveys or censuses.

The various estimates of IMR available for Haiti use direct and the indirect methods and rely on either (or both) types of data sources -- vital events registries and surveys. Instances exist where estimates are published where neither the method nor the data source are documented. As one might expect, the range of IMR values is large enough to make it difficult to render a definitive estimate for a particular point in time without a thorough review of available estimates and their source and derivation.

In summary, the variation in published estimates reflects:

a) the method of estimation -- direct or indirect;

b) within indirect methods, the model used and the analyses of the available empirical information; and

c) the time period of the estimate -- one year, three years, five years or some other period.

Although not clearly the case in Haiti, it is possible that the situation is further complicated by poor reporting by different organizations of what is essentially the same data. In particular, once an event such as a survey or a census takes place generating new, primary data, the results of that event trickle into different organizations at varying rates and, moreover, may be erroneously attributed to the time the organization receives the data rather than the time the data were actually collected. The most egregious instance of this phenomenon is citing a rate as of the year of its publication rather than the year in which the data were collected. Another common error is the attribution of a period estimate to a single year.

Finally, because the IMR is used in a political context as well as a technical environment, certain estimates are distorted to emphasize political rather than technical issues. Overestimates may be generated for the donor community as a means of stimulating additional technical and/or financial assistance. Often, underestimates are generated for public consumption at home to convey the image to the populace that conditions are improving.

Measuring Vaccination Coverage in Children. Worldwide, the effort to develop and implement methods for estimating annual vaccination coverage rates[1] has been greater than the effort to estimate any of the other indicators discussed in this paper. One reason for this is the potential for rapid change of a vaccination coverage rate. Every year, a completely new cohort of infants must be vaccinated. As the success in vaccinating each cohort is dependent on a number of short-term factors, coverage rates can, and do, fluctuate dramatically from year to year. Therefore, a new rate <u>must</u> be estimated each year. In general, two methods of estimating vaccination coverage rates have been refined over the years -- routine reporting (generating what are known as administrative estimates) and surveys.

In Central America, where reporting systems are relatively well developed, the emphasis has been on improving the quality of routine reporting. However, special surveys have been carried out periodically providing an alternative view of coverage levels

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[1]A vaccination coverage rate is not synonymous with a rate of immunization. Vaccination does not guarantee protection. Not all vaccinations result in the sero-conversion necessary to assure immunization, especially in situations where frequent breakdowns in the cold-chain render vaccines ineffective.

from the perspective of the beneficiary. Normally, ministries of health report administrative estimates and, in turn, these are reported by the international organizations -- PAHO, WHO and UNICEF. Periodic national surveys offer alternative estimates to those provided by the administrative system.

Administrative estimates are calculated by forming a ratio between the number of doses of a vaccine given to the children in an age group in a particular time period, and the total number of children in that age group during that time period. Standard practice calls for generating annual administrative estimates of vaccination coverage from a count of vaccines administered to children under one year of age throughout a year and an estimate of the size of the cohort of children which should be vaccinated during that year (most often, a mid-year estimate of the size of the 0 through 11.9 month population[2]). Typically, the health sector keeps a count of the vaccines administered. Estimates of the number of children in the designated age group are usually taken from census projections (which may, themselves, be outdated or otherwise inaccurate) or, in cases where vital registration systems are functioning, from counts of the number of live births in the given time period. An administrative estimate is a period estimate; that is, it is the coverage rate achieved over a relatively long period of time, usually a year.

The most frequent error made in calculating administrative estimates of vaccination coverage is the inclusion of vaccines given to children outside of the age group in question. For example, including vaccines given to 18 month old children in a calculation of the coverage achieved in children under age one.

Discrepancies in reported administrative estimates occur (even in the absence of gross error) due to:

a) the use of alternative demographic estimates of the size of the target population; and

---

[2]Much confusion enters into the reporting of age-specific rates as a result of differing conventions regarding the definitions of age groups. In demographic circles, 12 to 23 months is used to denote children from the moment of their first birthday until the moment just preceding their second birthday. In the nutrition community, 12 to 23 months is frequently used as the title for children ranging in age from 11.5 months through 23.5 months -- a difference of 15 days on each end point of the category. Other groups erroneously apply the title 12 to 24 months of age for children in their second year of life. In this paper, we will use a decimal point to indicate the end points of age categories more clearly and employ the word "through" to emphasize inclusion of the end point in the category.

b) delays in the reporting of data from the periphery (frequently, an estimate published six months or even a year after the close of a period is updated upon receipt of raw data from peripheral stations which had not, for whatever reason, submitted timely reports to the central information system).

In contrast to the period estimates generated from routine reporting systems, survey estimates are point estimates; that is, they are estimates of the coverage in a cohort of children at the moment of the survey. A vaccination coverage rate is calculated from survey data by dividing the number of children in the age group in question vaccinated at the time of the survey by the total number of children surveyed in that age group.

Under the direction of the World Health Organization, a standard sampling methodology (the two-stage cluster sampling technique) has evolved for estimating vaccination coverage.

Errors associated with sampling, in general, are also relevant in regard to vaccination coverage surveys:

a) samples may not be truly representative (in part, because of incomplete knowledge of the sample frame and, in part, because limited resources frequently restrict the movement of survey teams to remote places); and

b) the phenomenon surveyed may be seasonal (in the case of vaccination programs, coverage rates generated at a point in time may reflect recent campaigns and/or temporary breakdowns in the cold-chain or even the irregular pace of vaccination programs caused by rainy seasons or natural disasters).

In addition to these "familiar" errors linked to sampling, a number of issues peculiar to vaccination coverage cause discrepancies in the reporting of rates from surveys. These include:

a) the inclusion or exclusion from the numerator (the count of children vaccinated) of undocumented vaccinations supported by mother's recall but no vaccination card; and

b) the degree to which strict application of the procedure to limit the count of children vaccinated to children vaccinated prior to their first birthday.

When surveys are done by teams who do not fully understand the nuances of this last issue -- the dictum to measure rates of vaccination prior to the first birthday -- serious errors in calculating and/or reporting survey results may be made. The emphasis on "prior to the first birthday" often results in

persons sampling or reporting on children under one year of age. However, the recommended survey methodology for estimating vaccination coverage rates "prior to the first birthday" is to survey children 12 through 23.9 months of age (who have already celebrated their first birthday) and recording the vaccination status of those children at the time of that birthday. Rates of children vaccinated prior to their first birthday cannot be computed from a sample of children under one year of age unless adjustments are made to correct for the fact that members of the sample have not yet reached the prescribed age for completing their vaccination series.

Measuring Tetanus Toxoid Coverage. The detection of trends in tetanus toxoid coverage in women or mothers from historical data is particularly challenging due, in part, to changing definitions of the coverage indicator over time and, to the cumulative protective effect of tetanus toxoid vaccination during the course of a lifetime. These two issues are closely related.

Properly spaced, five doses of tetanus toxoid protect a woman from tetanus and all of her newborns from neonatal tetanus throughout her childbearing years. In populations where little or no effort has been made to vaccinate women against tetanus, the strategy adopted by health professionals has been to give two shots during the latter stages of a single pregnancy in order to protect the newborn. The indicator to monitor program progress was defined accordingly -- the proportion of pregnant women receiving two doses during a pregnancy prior to delivery.

However, as the number of women receiving subsequent doses of the vaccine through repeated pregnancies increases and younger women, vaccinated as children as part of the diphtheria-pertussis-tetanus vaccination series, enter childbearing age, the proportion of newborns protected increases, even among mothers who may not have received the prescribed two shots during any single pregnancy.

Thus, the indicator used historically has ceased to measure the underlying phenomenon which one wishes to assess -- the proportion of newborns protected against neonatal tetanus. Worldwide efforts are underway to modify the indicator to one which measures long-term tetanus protection. However, as the rate of adaptation of this new indicator varies, one cannot always discriminate which definition was applied to determine a particular published rate. The new indicator is the proportion of newborns whose mothers had received sufficient tetanus toxoid vaccinations, properly spaced, to guarantee the newborn's protection against neonatal tetanus.

As with the vaccinations against the childhood diseases, estimates of coverage are available from both non-survey and survey sources. The quality of estimates is determined by many

of the same issues which determine the quality of estimates of coverage among children. Administrative estimates are only as good as the ability of the routine reporting system to capture the number of doses given and the accuracy of the estimate of the number of pregnancies in a given time period. Survey estimates are also limited by the ability of a mother to recall her vaccination history. Frequently, where children have vaccination cards, mothers do not, and therefore, mothers' recall is more important to assess tetanus toxoid coverage. Moreover, surveys are frequently incomparable due to the diverse manner in which vaccination histories are sought and/or recorded.

Measuring Trends in ORS/ORT Use Rates. The appropriate technology for treating watery diarrhea is the administration of pre-packaged oral rehydration salts (ORS) or home-made sugar-salt solutions (SSS). During the course of the Child Survival Initiative of the late eighties, a distinction developed between the ORS Use Rate and the Oral Rehydration Therapy (ORT) Use Rate. The former is limited to the use of pre-packaged ORS. According to the USAID Child Survival Program definition, the latter involves three aspects of diarrhea case management -- the administration of either ORS or SSS; continued appropriate feeding during diarrhea; and the referral of severe cases to proper medical treatment facilities. Frequently, in citing primary sources of data, individuals and institutions are sloppy in their efforts to distinguish ORS Use Rates from ORS+SSS Use Rates. Similarly, ORS+SSS Use Rates are often confused or substituted for ORT Use Rates.

Both ORS and ORS+SSS Use Rates are best determined by surveys. The recommended method for inquiring about rehydration practice is to ask mothers whose children (aged 0 through 59.9 months) have had diarrhea in the two weeks prior to the survey what treatment was administered to the children. Variations in the manner in which this question is posed limit the comparability of survey results. Additionally, large sample sizes must be employed to guarantee that enough mothers are found whose children have had diarrhea in the two weeks preceding the survey. Errors and/or inconsistencies arise in survey rates due to:

a) sample composition differences arising from seasonal variation in the distribution of diarrhea cases;

b) inaccurate responses from mothers who have learned how to answer the questions to please the authorities but have not changed the way they treat episodes of diarrhea; and

c) loose handling of the distinctions between packets, proper home solutions and other home solutions in determining use rates.

WHO has developed procedures to estimate ORS and ORS+SSS usage from data on the number of packets available in a country during a year. First, an estimate in the number of episodes of diarrhea must be made, often from old surveys and, where surveys do not exist, from regional averages in the number of cases per child per year derived from existing surveys. An algebraic algorithm is then applied to estimate how many of those cases might have been treated given what is known about ORS packet availability. In the absence of other empirical data, these estimates are reasonable; however, issues such as the existence of backlogs of packet supplies and/or non-usage following distribution do not enter into the estimation procedure.

As the use of some form of rehydration as a treatment for diarrhea has grown, increasing attention has been given to the proper or correct application of the technology. Studies have shown that, all too often, mothers use packets but mix the solution incorrectly or fail to give adequate amounts to their children. Similarly, mothers do not always mix home solutions in proper proportions and, again, they do not always give adequate quantities to their children. In years to come, indicators of ORS and ORT Use may well be changed to distinguish proper administration of the treatment from faulty applications.

Ordinarily, data are available regarding ORS and ORS+SSS Use Rates from two sources -- surveys and the routine reporting system as published by WHO/PAHO. The WHO/PAHO reports distinguish between the use rate of ORS packets and the use rate of both packets and home solutions. The use of both packets and home solutions is referred to as the ORT Use Rate in WHO/PAHO reports. WHO/PAHO does not attempt to measure the proportion of diarrheal cases for which the three steps comprising ORT as defined by the USAID Child Survival Program, above, are carried out.

Similarly, questionnaires generally seek from each mother what treatment was given to her child during his/her child's most recent bout of diarrhea (sometimes limited to bouts within the two-week period prior to the survey) but do not explore the complete application of the three actions required according to the USAID ORT definition. The full course of case management suggested by the concept of ORT is so difficult to quantify in either surveys or routine reporting systems that data regarding its application is virtually non-existent. (One can be reasonably confident in a mother's ability to report on what special treatment was given to a child with diarrhea -- it is less reasonable to determine the quantity and types of food eaten by the child and virtually impossible to determine retrospectively whether referral was indicated).

The rates published by WHO/PAHO are computed by a variety of means depending on the data available. Ordinarily, some explanation of the method of computation is given. In the case of ORS Use Rates, the most frequent method involves a computational algorithm estimating the number of cases of diarrhea which one would expect in the target age group, while considering the amount of ORS available in country to treat those cases. When surveys are done, WHO/PAHO frequently reports the survey results.

Measuring Undernutrition. The nutritional status of the children of a community or country is generally considered to be one of the best indicators of the overall well-being of that community or country. It is measured using anthropometry, as the growth of children tends to reflect their nutritional condition.

Specifically, a child of a given age is considered to be malnourished if his/her weight is more than two standard deviations (or Z-scores) below the standard reference weight for children of that given age. The ratio of the child's weight to the reference is often referred to as his/her weight-for-age score. Although a number of references have been used during the last decade, in recent years the growth reference set by the United States National Center For Health Statistics (NCHS) has been adopted by most scientists and field practitioners.

The Gomez classification is an alternative method to Z-scores for interpreting anthropometric data. Gomez describes three levels, or degrees, of malnutrition. Children with a weight-for-age of less than 60 percent of the reference median are considered to have third degree malnutrition. A weight-for-age between 60 and 74.9 percent of the median indicates second degree malnutrition. First degree malnutrition is between 75 and 89.9 percent of the median.

Occasionally, other anthropometric measurements are used to quantify malnutrition. A comparison of a child's height to a standard height for children of the same age as the child in question (height-for-age) measures chronic malnutrition as manifested by stunting. Similarly, a comparison of a child's weight to the standard weight for children of the same height as the child in question (weight-for-height) measures acute malnutrition in the form of wasting. The weight-for-age measure presented in this report is a composite of the two measures -- a child can be deficient in weight-for-age due to either chronic or acute malnutrition, or both. It is the indicator of choice for infants and very young children as stunting manifests itself only after prolonged nutritional deprivation while wasting is, typically, a transitory phenomenon. Also, until children can stand tall, the measurement of height is highly inaccurate. Finally, weight-for-age is collected most frequently and,

therefore, is the most available indicator of nutritional status.

Whereas individual projects may establish procedures to estimate the nutritional status of a population in a limited geographic area on a routine basis, national estimates are usually derived through surveys.

Comparisons among surveys are often inappropriate for a number of reasons, including:

a) measurements are taken among children of different age groups in different surveys;

b) different standards are used to determine the normal weight or height for a child of a given age (or height); and

c) the degree of deficiency (determined by a point in the distribution of the anthropometric measurement in question) required to classify a child as malnourished varies across surveys.

Regarding nutritional status measurement, the issue of age groups (issue "a" above), requires special attention. In most child populations, the prevalence of malnutrition at a point in time in various age groups is invariably different. Typically, in Latin America, the prevalence is highest in children late in the second year of life. Therefore, comparisons over time must be made on population groups with similar if not identical age distributions. Otherwise, differences in prevalence may be nothing more than an artifact of the different age distributions of the groups under scrutiny. <u>It is not acceptable to compare children 0 to 35.9 months of age to children 0 to 59.9 months of age.</u>

Measuring Malaria Cases. Throughout much of Central America, the only data on malaria are those reported routinely by the ministry of health on the number of cases registered annually. Because it is extremely difficult to distinguish fever due to malaria from other fevers in a retrospective survey, there are no survey-based data on malaria. Moreover, many peripheral health units lack the equipment and/or know-how to test whether a fever is due to malaria. Health workers in such peripheral units are advised to treat all fevers as if they were malaria and, therefore, the routine reporting system may overestimate the number of actual cases.

Measuring Water and Sanitation. As with many of the other health indicators, estimates of access to water and sanitation services may be made from survey data or from administrative records kept at the national level. Access to water supply and sanitation in

urban areas is often defined differently from that in rural areas. Consequently, comparisons between rural and urban access are not strictly valid. For example, in Central America, the WASH project uses the following definitions:

> Urban Water Supply Coverage is defined as service provided through either a direct connection to a residence or a residence within 200 meters of a public standpipe or fountain.
>
> Rural Water Supply Coverage is defined as service provided either through direct connection to a residence or from a water supply source at a distance from the home which would not cause family members to spend a disproportionate amount of time fetching water.
>
> Urban Sanitation Coverage is defined as service provided through sewer systems or in-house or in-compound facilities (latrines, septic tanks, etc.).
>
> Rural Sanitation Coverage is defined as service provided through in-house or in-compound excreta disposal facilities (latrines).

Furthermore, the definition of the key terms "access", "urban", and "quality of coverage" (potable water or adequate sanitation) are not universally established. WASH defines an urban area to be a population center of over 2,000 persons, with all other areas designated as rural. Thus, in different surveys, varying interpretations of the meaning of these terms are possible. Regarding administrative records, it is common to find countries which do not update the operating status of older water and sanitation systems. Once in place, all systems are typically assumed to be operable.

In this report, data are primarily from two sources: PAHO and WASH. The WASH figures were calculated by dividing an estimate of persons with access (obtained from International Drinking Water Supply and Sanitation Decade progress reports augmented by reports from specific projects and USAID Mission estimates) by the urban and rural populations. Judging from the similarity of the estimates from different sources, it would appear that a single estimate of access is shared by organizations reporting this type of information.

ANNEX 1

Infant Mortality Rates in Haiti Reported by Various Sources

Source	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1. BUCEN 1990			123.2	122.6	122	121.3	118.5	115.7	112.8	109.9	107
2. BUCEN 1989										92	
3. CDC/IHE 1989		134.7		105.0		102.3		102.2			
4. EHPC 1983		116									
5. EMMUS 1987					--122.7--(i) --122.9--(ri) --137.3--(ui) --112.6--(mi) --101--(d) --100--(rd) --100--(ud) --102.8--(md)						
6. EMMUS 1987		129(i)		131(i)		109(i)					
7. EMMUS 1987			115(d)	112(d)	106(d)	98(d)	82(d)				
8. Gov't of Haiti/IHS	115	112	109	107	105	103	100	98	96	94	92
9. PAHO 1990	107 77(u) 123(r)							--97--			
10. UNICEF State 1986				130							
11. " " 1987						123					
12. " " 1988							119				
13. " " 1989								118			
14. " " 1990									116		
15. " " 1991										94	
16. UNICEF 1990		133				122			116		
17. UN Mort of <5			--128--					--117--			--106--
18. World Pop. Pros.88	134	131	129	127	125	123	120	118	116	114	112
19. World Pop. Pros.90	115	112	109	107	105	103	100	98	96	94	92
20. USAID CPs 86-91					108	107	97	95	101/101		
21. Haiti Action Plan(a)						125					
22. Haiti Action Plan(b)						125					
23. Haiti Action Plan(c)					130	130					
24. Haiti Action Plan(d)						130	125	105			
25. Haiti Action Plan(e)							125	105	100		
26. USAID CSCS 1988								101			
27. WHO/EPI 1990										97	
28. World Bank 1988								--113.7--			

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ANNEX 1

Notes for Infant Mortality Rates in Haiti Reported by Various Sources

1. Indirect estimates for 1980-85 interpolated based on IMRs from tables 6.2 and 6.3 of the 1987 EMMUS report. Indirect estimates for 1986-90 based on change in life expectancies.

2. Table 8, p 60.

3. Indirect estimates using Trussel "west" variant. Personal communication with Paul Stupp, Phd, Div. of Reproductive Health, CDC.

4. Indirect estimate of 116 copied from table 6.5, p 57 of 1987 EMMUS report.

5. All estimates for 1982-1987; p 50 and table 6.3 p 52. "i" is indirect, "d" is direct. "r" refers to rural as defined by the 1982 census, with the exception of the rural zones of Port-au-Prince and Petionville. "u" refers to urban, defined as the population living in all urban areas defined by the census with the exception of Port-au-Prince, but including the rural sections of Petionville. "m" refers to metropolitan, defined as the 1982 census population of Port-au-Prince.

6. Indirect estimates. Table 6.5 p 57.
7. Direct estimates. Table 6.6 p 59.

8. Indirect estimates from 1971 and 1982 national census data. Provisional data.

9. Estimates for 1980 from V1, table 26, p 48; estimate of 97 is for 1985-1990, table 1, p 53.

10. Table 5, page 140.
11. Table 1, page 90.
12. Table 1, page 64.
13. Table 1, page 94.
14. Table 1, page 76.
15. Table 1, page 102.

16. Haiti table, no page. Source: United Nations Population Division.

17. Table A.2, pp 36-37; figures are for 5 year periods: 80-85,85-90,90-95.

18. Interpolations calculated from data in Table 16, pages 121-122; medium variant.

19. Interpolations calculated from medium variant data.

20. Each annual CP typically reports an IMR in the second preceding year, e.g. 1984 data in the 1986 CP. 91 CP reported the IMR for 1988. For CP 88-91, source is BUCEN; for CP 86-87, source listed as both AID Population Division and BUCEN..

21. Page 57. USAID/Haiti estimate.
22. Page 3. USAID/Haiti estimate.
23. Page 48. Source: UNICEF State of the World's Children.
24. Page 43. For 1985-86 source is UNICEF; for 1987 source is 1987 EMMUS.
25. Page 61. For 1986, source is UNICEF; for 1987, EMMUS; no source given for 1988 estimate.

26. Page 8. Source: 1987 EMMUS.

27. Table 1.2.2, p 5. Source not specified.

28. Page 150; figure is for 5 year period 85-90.

ANNEX 2

Polio 3 Vaccination Coverage Rates in Haiti

Source	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1. CDC/IHE 1989										31.0/c	
2. EHPC 1983				37/c							
3. EMMUS 1987								8.7/a 22.7/c 17.0/d			
4. PAHO/EPI									48/b	50/b	
5. PAHO 1982	3/b										
6. PAHO 1986		5/b	6/b	6/b	13/b						
7. PAHO 1990			6.3/b	6.6/b	11.0/b	18.5/b	25.2/b	29.5/b	54.0/b	50/b	
8. UNICEF State 1986			--13--/f								
9. " " 1987	--2--/f					--24--/f					
10. " " 1988		3/f					--19--/f				
11. " " 1989		3/f						--28--/f			
12. " " 1990		3/f							--48--/f		
13. " " 1991		3/f								--50--/f	
14. UNICEF 1990		3/f				19/f		28/f	48/f		
15. USAID CPs 89-91						19/c			47/c		
16. USAID CSCS						22.2/b	30.72/b	29.51/b	54/b		
17. WHO/EPI		4/b	11/b	8/b	16/b	22/b	31/b	30/b	54/b		40/b

KEY: a = percentage of infants aged 0-11.9 months who were vaccinated by the time of the survey.
b = percentage of children vaccinated while under one year of age (0-11.9 months).
c = percentage of children aged 12-23.9 months who were vaccinated by the time of the survey.
d = percentage of children aged 0-59.9 months who were vaccinated by the time of the survey.
e = percentage of children aged 12-23.9 months who were vaccinated, timing uncertain.
f = percentage of children aged one year who were vaccinated, timing uncertain.

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ANNEX 2

Notes for Polio 3 Coverage Rates in Haiti Reported by Various Sources

1. Based on cards only.

2. Table 9.11, p 128. Based on recall. Information on the specific dose (Polio1, 2 or 3) was not obtained during the survey.

3. Table 11.2, p 98. Based on cards.

4. Facsimile dated 5/8/90 from Jean-Marc Olive, PAHO/HPM/EPI. Based on administrative data. From PAHO document CE105/13 p 2.

5. Annex V 11, Table V 11, p 375.

6. Vol. 1, Annex IV-6, p 407.

7. For 1989 rate, Vol. 1, Table 20, p 81; For 1982-88 rates, Vol. 2, Table 4, p 171.

8. Table 3, p 136; for period 1981-1983 (UNICEF field office source).
9. Table 3, p 94; 2 for period 1980-1981; 24 for period 1984-1985 (UNICEF field office source).
10. Table 3, p 68; 3 for 1981; 19 for period 1985-1986.
11. Table 3, p 98; 3 for 1981; 28 for period 1986-1987.
12. Table 3, p 80; 3 for 1981; 48 for period 1987-1988.
13. Table 3, p 106; 3 for 1981; 50 for period 1988-1989.

14. Haiti table, no page. Source not specified. Either World Health Organization or UNICEF.

15. Rate of 19 for 1985 reported in both 89 and 90 CPs. Source: CIHI vaccination coverage database, compiled from WHO/EPI reports.

16. Table V-1. Source: Ministry of Public Health and Population.

17. WHO published figures from MOH via PAHO, as reported in WHO/EPI/CEIS 90.1, January 1990.
For 1989, no rate issued by WHO/EPI. For 1990, rate is provisional.

ANNEX 3

Measles Vaccination Coverage Rates in Haiti

Source	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1. CDC/IHE 1989										41.4/c	
2. EHPC 1983				2/c							
3. EMMUS 1987								6.7/a 25.8/c 19.3/d			
4. Haiti EPI 1990										16.40/b	
5. PAHO/EPI									59/b	31/b	
6. PAHO 1986					8/b						
7. PAHO 1990									62.8/b	31/b	
8. UNICEF State 1986			--8--/b								
9. " " 1987						--26--/b					
10. " " 1988							--21--/b				
11. " " 1989								--23--/b			
12. " " 1990									--59--/b		
13. " " 1991										--31--/b	
14. UNICEF 1990						21/b		23/b	59/b		
15. USAID CPs 89-91						21/e 25/e			59/e		
16. USAID/Haiti(c)									40/g		
17. USAID/Haiti(d)						25/f	20/f	16/f			
18. USAID/Haiti(e)							20/b	16/b	30/b		
19. USAID CSCS							21.74/b	23.93/b	62/b		
20. WHO/EPI					8/b	21/b	22/b	24/b	63/b		31/b

KEY: a = percentage of infants aged 0-11.9 months who were vaccinated by the time of the survey. 5/28/91

b = percentage of children vaccinated while under one year of age (0-11.9 months).

c = percentage of children aged 12-23.9 months who were vaccinated by the time of the survey.

d = percentage of children aged 0-59.9 months who were vaccinated by the time of the survey.

e = percentage of children aged 12-23.9 months who were vaccinated, timing uncertain.

f = percentage of children aged 0-59.9 months who were vaccinated before age two.

g = percentage of children vaccinated by 12 months of age.

ANNEX 3

Notes for Measles Coverage Rates in Haiti Reported by Various Sources

1. Based on cards only.

2. Table 9.11, p 128. Based on recall. Information on the specific dose (DPT 1,2 or 3) was not obtained during the survey.

3. Table 11.2, p 98. Based on cards.

4. Rates for six-month period January-July 1990.

5. Facsimile dated 5/8/90 from Jean-Marc Olive, PAHO/HPM/EPI. Based on administrative data. From PAHO document CE105/13 p 2.

6. Vol. 1, Annex IV-6, p 407.

7. For 1989 rate, Vol. 1, Table 20, p 81; For 1982-88 rates, Vol. 2, Table 4, p 171.

8. Table 3, p 136; for period 1981-1983 (UNICEF field office source).
9. Table 3, p 94; for period 1984-1985 (UNICEF field office source).
10. Table 3, p 68; for period 1985-1986.
11. Table 3, p 98; 20 for period 1986-1987.
12. Table 3, p 80; for period 1987-1988.
13. Table 3, p 106; for period 1988-1989.

14. Haiti table, no page. Source not specified. Either World Health Organization or UNICEF.

15. Rate of 21 for 1985 reported in 89 CP; rate of 25 reported in 90 CP. Source: CIHI vaccination coverage database, compiled from WHO/EPI reports.

16. Page 51. Source: Unspecified survey from the Haitian Child Health Institute.
17. Page 44. Source for 1985 and 1986 is UNICEF; source for 1987 is EMMUS 1987.
18. Page 62. Sources: 1986--UNICEF; 1987--EMMUS; 1988--Ministry of Public Health and Population.

19. Table V-1. Source: Ministry of Public Health and Population.

20. WHO published figures from MOH via PAHO, as reported in WHO/EPI/CEIS 90.1, January 1990.
For 1989, no rate reported by WHO/EPI. For 1990, rate is provisional.

ANNEX 4

DPT 3 Vaccination Coverage Rates in Haiti

Source	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1. CDC/IHE 1989										30.7/c	
2. EHPC 1983				51/c							
3. EMMUS 1987								8.8/a 21.7/c 16.7/d			
4. Haiti EPI 1990										27.02/b	
5. PAHO/EPI									49/b	50/b	
6. PAHO 1982	6/b										
7. PAHO 1986		14/b	13/b	9/b	14/b						
8. PAHO 1990			12.6/b	8.8/b	12.8/b	19.4/b	21.8/b	29.6/b	54.5/b	50/b	
9. UNICEF State 1986			--13--/f								
10. " " 1987	--5--/f					--24--/f					
11. " " 1988		14/f					--19--/f				
12. " " 1989		14/f						--20--/f			
13. " " 1990		14/f							--49--/f		
14. " " 1991		14/f								--50--/f	
15. UNICEF 1990		14/f				19/f		28/f	49/f		
16. USAID CPs 89-91						19/e			48/e		
17. USAID/Haiti(c)										50/g	
18. USAID CSCS						23.2/b	26.53/b	29.59/b	54/b		
19. WHO/EPI		13/b	12/b	9/b	13/b	23/b	27/b	30/b	54/b		41/b

KEY: a = percentage of infants aged 0-11.9 months who were vaccinated by the time of the survey.
b = percentage of children vaccinated while under one year of age (0-11.9 months).
c = percentage of children aged 12-23.9 months who were vaccinated by the time of the survey.
d = percentage of children aged 0-59.9 months who were vaccinated by the time of the survey.
e = percentage of children aged 12-23.9 months who were vaccinated, timing uncertain.
f = percentage of children aged one year who were vaccinated, timing uncertain.
g = percentage of children vaccinated by 12 months of age.

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ANNEX 4

Notes for DPT 3 Coverage Rates in Haiti Reported by Various Sources

1. Based on cards only.

2. Table 9.11, p 128. Based on recall. Information on the specific dose (DPT 1, 2 or 3) was not obtained during the survey.

3. Table 11.2, p 98. Based on cards.

4. Rates for six-month period January-July 1990.

4. Facsimile dated 5/8/90 from Jean-Marc Olive, PAHO/HPM/EPI. Based on administrative data. From PAHO document CE105/13 p 2.

6. Annex V 11, Table V 11, p 375.

7. Vol. 1, Annex IV-6, p 407.

8. For 1989 rate, Vol. 1, Table 20, p 81; For 1982-88 rates, Vol. 2, Table 4, p 171.

9. Table 3, p 136; for period 1981-1983 (UNICEF field office source).
10. Table 3, p 94; 5 for period 1980-1981; 24 for period 1984-1985 (UNICEF field office source).
11. Table 3, p 68; 14 for 1981; 19 for period 1985-1986.
12. Table 3, p 98; 14 for 1981; 20 for period 1986-1987.
13. Table 3, p 80; 14 for 1981; 49 for period 1987-1988.
14. Table 3, p 106; 14 for 1981; 50 for period 1988-1989.

15. Haiti table, no page. Source not specified. Either World Health Organization or UNICEF.

16. Rate of 19 for 1985 reported in both 89 and 90 CPs. Source: CIHI vaccination coverage database, compiled from WHO/EPI reports.

17. Page 51. Source: Unspecified survey from the Haitian Child Health Institute.

18. Table V-1. Source: Ministry of Public Health and Population.

19. WHO published figures from MOH via PAHO, as reported in WHO/EPI/CEIS 90.1, January 1990.
For 1989, no rate reported by WHO/EPI. For 1990, rate is provisional.

ANNEX 5

BCG Vaccination Coverage Rates in Haiti

Source	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1. CDC/IHE 1989										62.7/c 57.5/c	
2. EHPC 1983				85/c							
3. EMMUS 1987								45.4/a 61.0/c 57.9/d 50.1/a 66.8/c 62.6/d			
4. Haiti EPI 1990										35.69/b	
5. PAHO/EPI									45/b	40/b	
6. PAHO 1982	21/b										
7. PAHO 1986		60/b	58/b	62/b	71/b						
8. PAHO 1990			57.5/b	61.1	67.0	74.8/b	62.3/b	39.6/b	48.5/b	40/b	
9. UNICEF State 1986			--65--/f								
10. " " 1987	--19--/f				--61--/f						
11. " " 1988		60/f					--57--/f				
12. " " 1989		60/f						--45--/f			
13. " " 1990		60/f							--45--/f		
14. " " 1991		60/f								--40--/f	
15. UNICEF 1990		60/f				57/f		45/f	45/f		
16. USAID CPs 89-91						57/e			45/e		
17. USAID CSCS						70/b	74.93/b	46.3/b	48/b		
18. WHO/EPI		60/b	58/b	61/b	69/b	70/b	75/b	46/b	45/b		72.[illegible]

KEY: a = percentage of infants aged 0-11.9 months who were vaccinated by the time of the survey.
b = percentage of children vaccinated while under one year of age (0-11.9 months).
c = percentage of children aged 12-23.9 months who were vaccinated by the time of the survey.
d = percentage of children aged 0-59.9 months who were vaccinated by the time of the survey.
e = percentage of children aged 12-23.9 months who were vaccinated, timing uncertain.
f = percentage of children aged one year who were vaccinated, timing uncertain.

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ANNEX 5

Notes for BCG Coverage Rates in Haiti Reported by Various Sources

1. 62.7 based on cards only; 57.5 based on scar only.

2. Table 9.11, p 128. Based on recall.

3. Table 11.2, p 98. 45.4, 61.0 and 57.9 based on scar only; 50.1, 66.8 and 62.6 based on scar and card.

4. Rate for six-month period January-June 1990.

5. Facsimile dated 5/8/90 from Jean-Marc Olive, PAHO/HPM/EPI. Based on administrative data. From PAHO document CE105/13 p 2.

6. Annex V 11, Table V 11, p 375.

7. Vol. 1, Annex IV-6, p 407.

8. For 1989 rate, Vol. 1, Table 20, p 81; For 1982-88 rates, Vol. 2, Table 4, p 171.

9. Table 3, p 136; for period 1981-1983 (UNICEF field office source).
10. Table 3, p 94; 19 for period 1980-1981; 61 for period 1984-1985 (UNICEF field office source).
11. Table 3, p 68; 60 for 1981; 57 for period 1985-1986.
12. Table 3, p 98; 60 for 1981; 45 for period 1986-1987.
13. Table 3, p 80; 60 for 1981; 45 for period 1987-1988.
14. Table 3, p 106; 60 for 1981; 40 for period1988-89.

15. Haiti table, no page. Source not specified. Either World Health Organization or UNICEF.

16. Rate of 57 for 1985 reported in both 89 and 90 CPs. Source: CIHI vaccination coverage database, compiled from WHO/EPI reports.

17. Table V-1. Source: Ministry of Public Health and Population.

18. WHO published figures from MOH via PAHO, as reported in WHO/EPI/CEIS 90.1, January 1990.
For 1989, no rate reported by WHO/EPI. For 1990, rate is provisional.

ANNEX 6

Tetanus Vaccination Coverage Rates in Haiti

Source	19xx	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1. EMMUS 1987									25.7 27.1(r) 29.1(u) 23.5(m) 34.2(a) 44.2(b) 37.5(c) 25.7(d)		
2. UNICEF State 1986				--67--							
3. " " 1987			--16--				--61--				
4. " " 1988								--56--			
5. " " 1989							56				
6. " " 1990										--56--	
7. " " 1991											--5--
8. USAID/Haiti (d)									24		
9. USAID/Haiti(e)								21	26	23	
10. UNICEF 1990							56	56	56		
11. WHO/EPI									31	23	

Notes for Tetanus Coverage Rates in Honduras Reported by Various Sources

1. Page 91. Percent of women 15-49 vaccinated with two doses of tetanus toxoid vaccine during the five years preceding the survey. Based on recall. (u) refers to urban areas excluding Port-au-Prince; (m) refers to Port-au-Prince only.
(a): Table 10.12, pp 93-94: Percent of pregnant women who received two doses of tetanus toxoid in the five years preceding the survey.
(b): Table 11.7, p 100: Women 15-49 pregnant at the time of the survey who received either two doses of tetanus toxoid during the five years preceding the survey, or one dose during the actual pregnancy.
(c): Page 93: Women who had at least one live birth during the five years preceding the survey who also received two doses of tetanus toxoid during that period.
(d): Page 93: Pregnant women who did not have a live birth in the last five years stating they received two doses of tetanus toxoid in the five years preceding the survey.

2. Table 3, p 136; for period 1981-1983 (UNICEF field office source). Fully immunized pregnant women.
3. Table 3, p 94; 16 for period 1980-1981; 61 for period 1984-1985 (UNICEF field office source). Fully immunized pregnant women.
4. Table 3, p 68. For period 1985-1986. Fully immunized pregnant women.
5. Table 3, p 98. (UNICEF field office source). Fully immunized pregnant women.
6. Table 3, p 80; for period 1987-1988. Fully immunized pregnant women.
7. Table 3, p 106; for period 1988-89. Fully immunized pregnant women.
8. Haiti table, no page. Data for 1985 and 1987 from UNICEF Field Office Source; for 1988, source is World Health Organization.

9. USAID/Haiti(d) Percent of women receiving two doses of tetanus toxoid vaccine during pregnancy. Source: EMMUS 1987.
10. USAID/Haiti(e) Percent of women 15-49 receiving two doses of tetanus toxoid vaccine. Source: for 1986, UNICEF; for 1987, EMMUS 1987; for 1988, Ministry of Public Health and Population.

11. Table 1.2.2. WHO published figure from MOH via PAHO, as reported in WHO/EPI/CEIS 90.1, January 1990. Percent of pregnant women immunized against tetanus.

1/3/90

ANNEX 7

ORT Coverage Rates in Haiti Reported by Various Sources
(Children aged 0-59.9 months treated with salts [ORS] or home-based solution [ORT])

Source	19xx	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1. EHPC 1983					15 7						
2. EMMUS 1987									16		
3. PAHO 1990 ORS Use							1.7	8.9	14.1	17.0	
4. PAHO 1990 ORT Use							1.7	8.9	16.4	17.0	
5. UN. [illegible] 1990								--14--			
6. UNICEF State 1990								--14.1--			
7. UNICEF State 1991									--35--		
8. USAID/Haiti(c)									35(r)	40(r)	50(r)
9. USAID/Haiti(d)							30	30	15		
10. USAID/Haiti(e)								30	15	21	
11. USAID CSCS 1988									14		
12. WHO/CDD ORS Use						20.0	1.7			25	18
13. WHO/CDD ORT Use								8.9	16.4	35	24

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1. Table 9.9, p 125. Treatment of children under age five who had diarrhea in the two weeks preceding the survey. 15% is for ORS; 7% is for sugar-salt solution. Multiple responses were included in the analysis.

2. Table 11.4, p 99. ORS use rate for children under age five that had diarrhea in the 24 hours preceding the survey (n=561).

3. Table 7, p 47, English language section. ORS use rates. 14.1% is a national CDD program estimate; 17.0% was obtained from a report, survey or evaluation from various sources/agencies.

4. Table 7, p 47, English language section. ORT use rates. 16.4% is a national CDD program estimate.

5. Haiti table, no page. Source: World Health Organization.

6. Table 3, p 80. ORS use rate for period 1986-1987. Source: WHO.

7. Table 3, p 106. ORT use rate for period 1987-1988. Source: WHO.

8. Page 51. ORS use rate. Child Health Institute surveys of rural mothers whose children had diarrhea on the day of the survey.

9. Page 44. Percent of cases of diarrhea in children under age five treated with ORT. Data for 1985 and 1986 from UNICEF; Data for 1987 from EMMUS 1987.

10. Page 62. Percent of cases of diarrhea in children under age five treated with ORT. Data for 1986 from UNICEF; data for 1987 from EMMUS 1987; data for 1988 from Ministry of Public Health and Population (MSPP).

11. Page 24. Source: EMMUS 1987.

12. Data for 1984 and 1985 from WHO/CDD facsimile dated 21 January 1987. Data for 1988 from WHO/CDD facsimile dated 3/27/90. Data for 1989 provisional data from WHO/CDD facsimile dated 2/21/91

13. Data from WHO/CDD facsimile dated March 27, 1990, except 1986 and 1987. 1986 data from WHO/CDD/88.28; 1987 data from WHO/CDD/89, source: national CDD program estimate. 1989 data from WHO/CDD facsimile dated 2/21/91.

ANNEX 8

Percent of Children Weight-for-Age Undernourished in Haiti

Source	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
1. Nat'l Nut Surv 1978	3.2/c 24.1/b 46.0/a [1978]										
2. CDC 1990											2.7/c 18.4/b 46.3/a
3. CDC 1990											30.5/i
4. CDC 1990	3.7/c 26.5/b 46.8/a [1978]										
5. South Survey 1990											1.4/c 15.6/b 42.6/c
6. South Survey 1990											25.1/i
7. UNICEF State 1986	--70--/d --3--/e										
8. " " 1987				--65--/d --5--/e							
9. " " 1988					--65--/d --5--/e						
10. " " 1989					--5--/e						
11. " " 1990						--27--/f --3--/c					
12. " " 1991							--37--/f --3--/c				
13. UNICEF 1990	27/g 3/h				5/h						

KEY: a=Children aged 3-59.9 months; Gomex grade I undernourished.
b=Children aged 3-59.9 months; Gomez grade II undernourished.
c=Children 3-59.9 months; Gomez grade III undernourished
d=Children aged 0-59.9 months; between 60% and 80% of the desirable weight-for-age.
e=Children aged 0-59.9 months; under 60% of the desirable weight-for-age.
f=Children aged 3-59.9 months; Gomez grades I and II undernourished.
g=Children aged 0-59.9 months; WHO definition of -2 std. dev. below median of reference population.
h=Children aged 0-59.9 months; WHO definition of -3 std. dev. below median of reference population.
i=Children aged 3-59.9 months; WHO definition of -2 std. dev. below median of reference population.

ANNEX 8

Notes for Percent of Children Weight-for-Age Undernourished in Haiti

1. Table 7, p 33. Data are for 1978.

2. Table 3, p 17.

3. Table 2, p 16.

4. Table 6.2, p 46. Analysis of 1978 National Nutrition Survey data for northern departments only.

5. Table 2b bis.

6. Table 2b.

7. Table 2, p 134; for period 1975-1983. Source: UNICEF field office.

8. Table 2, p 92; for period 1980-1984. Source: UNICEF field office.

9. Table 2, p 66; for period 1980-1986. Source: UNICEF field office.

10. Table 2, p 96; for period 1980-1986. Source: UNICEF field office.

11. Table 2, p 78; for period 1980-1987. Data from 1978 National Nutrition Survey.

12. Table 2, p 104; for period 1980-1989; Data from 1978 National Nutrition Survey.

13. Honduras table, no page. Source: UNICEF field office.

ANNEX 9

Percent of Population with Access to Drinking Water in Haiti

Source	19xx	1980	1981	1982	1983	1984	1985	1986	1987	1988	19xx
1. PAHO 1990		48(c) 47(u) 8(r)					54(c) 65(u) 35(r)		51(c) 66(u) 35(r)	41.80 55.47(u) 36.37(r)	
2. UNICEF State 1986		--14-- --40(u)-- --5(r)--									
3. UNICEF State 1987					33 58(u) 25(r)						
4. UNICEF State 1988						--32-- --50(u)-- --25(r)--					
5. UNICEF State 1989					--35-- --50(u)-- --25(r)--						
6. UNICEF State 1990								--38--			
7. UNICEF State 1991								--38-- --59(u)-- --30(r)--			
								--59(u)-- --30(r)--			
8. UNICEF 1990		14 40(u) 5(r)					38 59(u) 30(u)				
9. USAID CPs 86-91	14 [1976]	12			33						
10. WASH 90							38 59(u) 30(r)	58(u) 30(r)	57(u) 29(r)	56(u) 29(r)	36 54(u) 29(r)

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ANNEX 9

Notes for Access to Drinking Water in Haiti Reported by Various Sources

1. Data for 1988: Vol. 1, table 109, p 216-217. Specific source not given. For 1980, 1985 and 1987, data are from Vol. 2, table 7, p 174. Source is PAHO/WHO. Rates followed by a (c) indicate Port-au-Prince only. (u) refers to rates in urban areas other than Port-au-Prince.

2. Table 3, p 136; for period 1975-1983. Source: UNICEF Field Office.

3. Table 3, p 94. Source: WHO.

4. Table 3, p 68; for period 1983-1986. Source: UNICEF Field Office.

5. Table 3, p 98; for period 1980-1987. Source: UNICEF Field Office.

6. Table 3, p 80; for period 1985-1987. Source: WHO.

7. Table 3, p 106. Source: WHO.

8. Haiti table, no page. Source is WHO.

9. Source of all data is the World Bank's Social Indicator Database. Rate of 12% reported in both the 1988 and 1989 CPs; 1983 rate reported in both the 90 and 91 CP.

10. Table D-1 and Figure D-1, Haiti section. No page.

ANNEX 10

Percent of Population with Access to Adequate Sanitation in Haiti

Source	19xx	1980	1981	1982	1983	1984	1985	1986	1987	1988	19xx
1. PAHO 1990						19(u) 12(r)			42(u) 14(r)	22.08 41.11(u) 14.52(r)	
2. UNICEF 1990		19 42(u) 10(r)					21 42(u) 13(u)				
3. WASH 90							21 42(u) 13(r)	41(u) 13(r)	40(u) 13(r)	39(u) 13(r)	19 38(u) 12(r)

Notes for Access to Adequate Sanitation in Haiti Reported by Various Sources

1. Data for 1984 and 1987 from Vol. 2, p 174; data for 1988 from Vol. 1, table 109, p 217. Specific sources not given for any years.

2. Haiti table, no page. Source is WHO.

3. Table D-2 and Figure D-2, Haiti section. No page.

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ANNEX 11

Number of Registered Cases of Malaria in Haiti

Source	19xx	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1. PAHO Malaria		53,478	46,703	65,354	53,954	69,863	16,662	14,363	12,134	12,306	23231

Notes for Number of Registered Cases of Malaria in Haiti Reported by Various Sources

1. Page 52. Data for 1988 is provisional and incomplete. Source: Ministry of Health.

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