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BACKGROUND INFORMATION

FOR THE

FORMULATION OF A POLICY TO COMBAT CHILDHOOD COMMUNICABLE DISEASES IN SUB-SAHARAN AFRICA

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SUMMARY

The goal of this report is to provide answers, primarily highly tentative, to questions of economics that may arise in the formulation of a program to combat communicable childhood diseases in sub-Saharan Africa. In an attempt to ascertain if a sufficient economic base exists to finance the domestic recurrent costs of a large scale program it is estimated that feasible increases in central government commitments to health together with potential growth in the national output of African countries will be adequate to finance the programs under consideration. It is also observed that there is considerable bilateral and multilateral donor interest in health programs in Africa and any African-wide program would involve the coordinated technical and financial effort on the part of international agencies.

The communicable diseases that are demonstrably the most significant[1] in determining the high level of morbidity and mortality among African children are the childhood diseases, for which vaccines exist, and diarrhea. Based on alternative estimates of population growth and time horizons to achieve 100 percent

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1 See A.S. McCook, Report on Child Health in Sub-Saharan Africa, With Particular Reference to EPI and Diarrheal Diseases, for USAID (contract AID/SOD/PDC-C-0201), November 1979.

program access, cost estimates are made for potential immunization and diarrheal control programs. Using the medium population growth variant and assuming WHO's 1990 target date for full access, the projected total cost for the first five years of a sub-Saharan immunization program covering the six EPI target diseases is $84.9 million. Of this total $43.7 million is for recurrent domestic costs and $41.2 million is for imported capital equipment, supplies and technical assistance. Rough cost projections are also made for a diarrheal control (oral rehydration) program delivered as an integrated service with an immunization program. The cost for the first five years is estimated to be $39.8 million of which approximately 40 percent would require foreign exchange.

It is noted that the estimates in the report are highly approximate and subject to revision based on the actual costing of individual program components in specific countries. It is also important to note that increasing costs may be encountered as the program is extended to increasingly less accessible populations. For this reason the cost estimates should be regarded as a minimum.

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INTRODUCTION

This report provides economic information to be used in the formulation of a proposed program to reduce morbidity and mortality from childhood communicable diseases in sub-Saharan Africa. The first section gives demographic projections, for the years 1980 through 1994, to be used in estimating the scales of the program. The second section presents information on the extent of current health sector resources. This section discusses the capacity of sub-Saharan countries to finance the domestic costs of expanded health activities. This section also discusses the proportion of population having access to the present health delivery systems. The third section approximates the cost of a potential program of immunization against childhood diseases based on available information. The fourth section discusses a program of oral rehydration to reduce childhood mortality from diarrhea. Finally, an appendix presents information on health sector activities by foreign donors.

It is noted that a general survey of health-related data for sub-Saharan Africa is of only limited usefulness. Data are fragmentary and inconsistent from country to country; as a result, it is extremely difficult to compare health budgets, health system access and services among countries. The tremendous geographic, political and social diversity among the countries also precludes

cursory generalizations. For these reasons, although several tables giving available numerical information are presented in the body of the report, the conclusions drawn are qualitative and tentative.

I. POPULATION PROJECTIONS

The projection of births to be expected in sub-Saharan Africa between 1980 and 1994 (See Table I-A) were generated under alternative variants of low, medium and high population growth. These in turn are based on assumptions, outlined in a United Nations document,[1] concerning the course that fertility and mortality are likely to take in Africa in the event that the region parallels the earlier experience of other countries. (See Table I-B).

II. PRESENT HEALTH SECTOR RESOURCES

A. Central Government Health Expenditures

1. Capacity versus commitment

As would be expected from the scarcity of economic resources in Africa, the per capita level of government expenditures on health is low. Tables II-A and II-B provide

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1 United Nations. 1977. World Population Prospects as Assessed in 1973. Population Studies No. 60.

approximations of central government expenditures for all sub-Saharan countries.[1] Estimated for 1975, the per capita health expenditures of the average sub-Saharan country is $3.30; weighted by population size, the average per capita government health expenditure is $2.21. Approximately one-third of sub-Saharan countries have a per capita expenditure of less than $1.50. Both capacity, measures in terms of aggregate national product per person, and commitment determine the extent of government resources used for health services. The considerable variation in expenditures per capita (column 1) among countries is largely attributable to variation in per capita GNP (column 4), but differences in national commitment or effort in the health sector also play a role. Variations in effort are reflected in the data for government health expenditures as a percent of GNP, which range from .3 percent to 2.9 percent and have a mean value of .9 percent.

Greater per capita GNP makes it possible to allocate a larger share of GNP to health; thus in this sense "effort" or "commitment" is related to capacity; however, an estimate of the relationship between percent of GNP allocated to

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1 The data were obtained from several different sources, and in some cases missing ovservations were estimated by extrapolation from previous years. For this reason the table is sufficient to provide an overall description of the extent of government resources used for health; the table should, however, be applied cautiously to an analysis of individual countries.

health (column 2) and GNP per capita (column 4) shows that the relationship is not close.[1] If a country behaves as the average for Table II-A, a $100 increase in income will lead to an increase of .1 in the percent of GNP devoted to central government health expenditures. But this estimate is not very precise, and would be expected to vary greatly over countries.

A stronger relationship exists between income and per capita health expenditures. The relationship of per capita health expenditures to GNP per capita is depicted in Figure One, which presents a plot of the information in columns 1 and 4 of Table II-A. The lower dashed line in the figure (labeled AA) is the straight line that most closely represents the scatter of points in the diagram.[2] It is estimated that, on average, a $100 increase in per capita income will lead to a $1.80 increase in government health expenditures per capita. Expressed alternatively, a 10 percent increase in

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1 The relationship is estimated by linear regression on the data in Table A with the omission of Mauritania, Chad, Guinea, Gabon, Rhodesia and South Africa. The estimated line is,

$$\text{(Health Exp./GNP)} = \underset{(17.0)}{.909} + \underset{(2.0)}{.001}\ \text{(GNP/POP.)} \qquad R^2 = .11$$

2 The estimated line is,

$$\text{(Health Exp./POP)} = \underset{(15.5)}{-1.16} + \underset{(10.0)}{.018}\ \text{(GNP/POP.)} \qquad R^2 = .75$$

(t statistics are in parentheses beneath the coefficients)

per capita income will lead to a 14 percent increase in per capita health expenditures for the average country in Table II-A.

The sharp increase in government health expenditures with income indicates that, as development proceeds, governments can be expected to cover an increasing proportion of the financial costs of health programs started with foreign funds. But the converse is also apparent, that is, the poorest countries cannot be expected to cover a large proportion of recurrent costs in the initial stages of major new donor projects.

One possible interpretation of the scatter of points in Figure One can be made with reference to the lower straight line as an expenditure norm representing average effort at each level of capacity. The line then divides countries into two groups: those above the line might be termed "high-commitment" countries and those below the line "low commitment" countries. The higher dashed line (labeled HH) represents the higher commitment countries.[1] The vertical difference between the two lines in the diagram represents the difference

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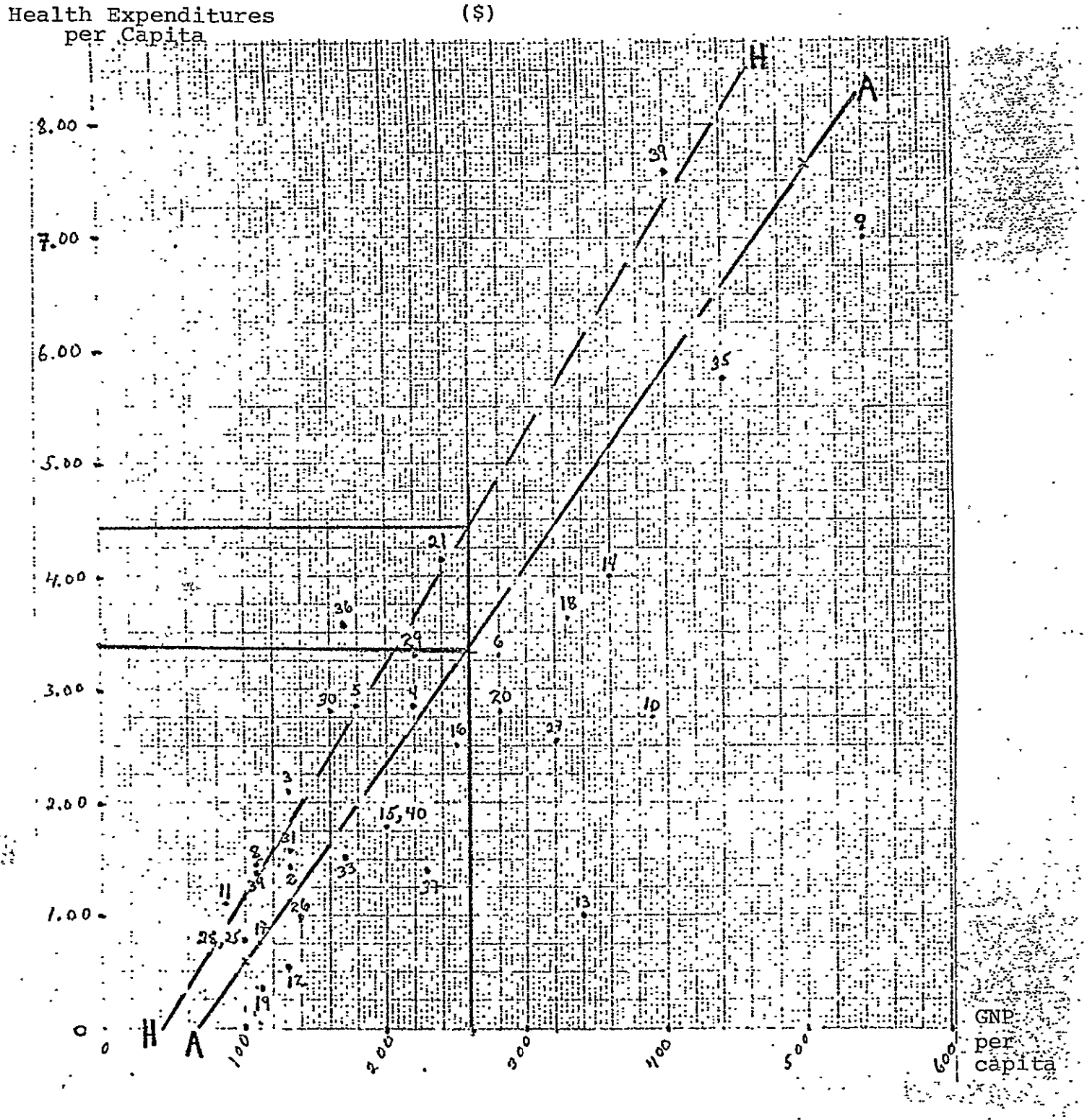
1 The line is estimated using countries 2,3,4,5,8,11,17,21,23, 25,28,29,30,31,34,36 and 39. The estimated line is,

$$\text{(Health Exp./POP.)} = \underset{(19.4)}{-.9} + \underset{(18.1)}{.02}\ \text{(GNP/POP.)} \qquad R^2 = .96$$

Figure One

RELATIONSHIP OF HEALTH EXPENDITURES PER CAPITA
TO GNP PER CAPITA.*



* Numbers in the diagram identify countries in Table II-B.

Line AA is drawn with reference to all sub-Saharan countries.

Line HH is drawn with reference to 17 "high commitment" countries.

between high-commitment and average-commitment central government health expenditures for given levels of per capita GNP. For example, with a per capita GNP of $250, the per capita central government health expenditure for the average-commitment country is estimated to be $3.30; the expenditure for a "high-commitment" country would be $4.35 or roughly one-third greater.

Interpreted in this manner, the lines AA and HH can be used to obtain estimates of the level of health expenditures that might be expected by a donor before funding part of recurrent program costs. An expenditure near the norm might be considered a minimum required amount; it might be expected that major new donor programs would be accompanied by increased efforts by recipients to place their respective central governments' contributions nearer the "high-commitment" line.

Caution should be exercised when this interpretation is applied to individual countries. Although a location below the line may result from a lack of political or social commitment, it may also be attributable to other factors -- for example, the difficulty of developing a tax structure which would allow a larger percentage of government expenditure as a percent of GNP. Conversely, locations above the line may represent greater political or social commitment; they may also, however, be the result of domestic counterpart

expenditures related to present programs that are partly financed and stimulated by foreign donors. Further, in many countries large health expenditures per capita may only reflect large past investment in government hospital-based medical care services primarily serving urban populations. Thus, although the diagram does provide a useful reference point in assessing collective national effort, the diagram gives no indication of the distribution of resources over the population and the factors determining the location for any given country shoudl be considered carefully before using the table or diagram to make a statement about the potential for central government health expenditures in a specific country.

Applying the diagram cautiously, an estimate of the aggregate amount of new funds which might be supplied locally for a sub-Saharan immunization program can be obtained. At a per capita income of $250 for the average sub-Saharan country, approximately $1.00 per capita additional central government health expenditures would be made available by moving from an average to a high commitment status. If 50 percent of the $1.00 gap between the present average and a high commitment could be closed and 20 percent of the new funds used for a childhood communicable disease program, then a potential $35 million dollars a year (350 million population x .20 x .10 . $1.00 x .5) would be available to

cover domestic program costs without reducing central government expenditures on existing health programs.

Further increases in health expenditures would be made possible by growth in per capita income. If per capita income grows at 1.5 percent per year, then additional central government health expenditures of $.97 per person could be expected even without a change in commitment.[1] And if 20 percent of this amount is used for a childhood communicable disease program an additional $5 million dollars (350 x $.07 x .2) would be available each year to cover the growth of the program.

2. An estimate of the total government health expenditures

The total central government health expenditures can be estimated for each country under the assumption that the percentage of GNP devoted to health expenditures remains as given in Table II-A for 1975.[2] Given the estimates of per capita GNP reported in column 2 of Table II-B, the government

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1 Using the slope (.018) of the line AA in Figure One, an estimate of the increase in per capita health expenditures accompanying a .015 increase in the present $260 per capita income in, .018 x .015 x $260 = $.07.

2 An alternative procedure would be to predict the percentage of GNP used for central government health expenditures through the use of the estimated relationship discussed earlier. The basic data are too weak, however, to justify this procedure.

health expenditure for each country was estimated as reported in column 5. The total annual government health expenditure for sub-Saharan Africa in 1975 was approximately $706 million. Using the same procedure, total central government health expenditures for 1976 are estimated to have been, roughly, $760 million.

B. Foreign Donor Activity

In 1975, the total volume of external aid committed to the health sector in sub-Saharan Africa is estimated to have been approximately $360 million.[1] This estimate omits private projects and the health component of multisectoral projects, as well as a Soviet or Chinese aid. A careful survey of the amoung and location of foreign donor health activity has not, to our knowledge, been made and, although potentially feasible, would require considerable time and effort to complete because of the large number of donors involved, their dispersal around the globe and the multisectoral nature of many projects.[2] The appendix presents information on foreign donor activity

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1 USDHEW, Office of International Health, Inter-Agency Working Group on African Health Strategy. 1979. Developing a U.S. Health Strategy for subSaharan Africa. Vol. 2 -- Annex c.

2 A regular periodic accounting of foreign donor activity would, however, be valuable in coordinating international efforts in the health sector.

(including USAID activities) that illustrates that any African-wide health program would involve the coordinated financial and technical cooperation of other bilateral donors and international agencies.

1. Growth of foreign donor activity

Until the last decade, foreign donor participation in the health sector in Africa had been modest; much of the foreign activity in health occurred through the efforts of private and church-related charitable organizations. Over the last few years, both multilateral and bilateral aid to the health sector has, however, increased markedly -- and the foreign health aid commitments for the future indicate that this trend will continue. The increase is sharp enough that it raises the question of the capacity of many African countries to absorb the influx of funds. However, absorptive capacity does not at present appear to provide an impediment to the continued expansion of the type of health projects now being implemented by most donor agencies. Although both the existing administrative capacity on both a local and national level in many countries, and the large ratio of population to doctors and other health personnel impede the absorption of health capital and hich technology projects, it is not likely to provide a restriction on the use of funds for well designed low technology health projects.

Many current foreign donor-sponsored health projects involve the use of low level health technology in the provision of primary health services and basic health care. The programs commonly have a training component, for both administrative and service delivery personnel, specifically intended to increase absorptive capacity and phased with the expansion of program coverage. For many types of programs, especially for low-cost delivery systems and immunization, there is considerable donor experience in other parts of the world which is transferable to African projects. Thus, although donors should remain aware of the problem of absorptive capacity and care should be taken to coordinate donor efforts, absorptive capacity does not presently appear to place a restriction on the continued expansion of preventative care health projects as long as the projects provide for training and are designed in the context of the limited extent of existing delivery system.

C. The Access to Health Services

A systematic appraisal of the extent of population having access to[1] a health delivery system in Africa has not been

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1 The concept of coverage used here is that of access. It is most simply measured as the population living within a "reasonable" distance of health services. The percentage of population actually receiving services will, in most cases, be less than the percentage with access.

made, and no central source of data is readily available. Nevertheless, this information is important to the formulation of a strategy for combatting communicable diseases, because the cost of interventions designed to be carried out over a sustained period as part of an integrated package of health services will differ considerably, depending on the available meand of delivery.

Access varies among the sub-Saharan countries from as high as ninety percent in Tanzania[1] to below ten to fifteen percent in parts of the Sahel. Informal statements in several documents point out the low percentage of population living within a reasonable distance of health facilities. In a SHDS document[2] the belief is stated that in areas of Central and West Africa, close to sixty percent of the population is not given access to modren health care. One study[3] states that, in 1966 in Swaziland, sixty percent of the population lived within five miles of a health facility; another study[4] mentions that in 1966, twenty-five percent of the Ghanaian population

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1 R.N. Grosse, et al. 1979. Some notes on the Costs and Coverage of Low-Cost Integrative Health Services. American Public Health Association: Washington, D.C. Mimeo.

2 No Author. 1977. Project proposal, Phase II, Strengthening Health Delivery Systesm. AID 625-11-509-904.

3 USDHEW, Office of International Health. 1975. Syncrisis: The Dynamics of Health. Vol. XII -- Botswana, Lesotho & Swaziland.

4 USDHEW, Office of International Health. 1975. Syncrisis: The Dynamics of Health. Vol. X -- Ghana.

had access to some kind of health care; a similar study for Senegal[1] states, that in 1974, twenty percent of the population could be reached by the health post network.

Some impression of the variations in access is given by Table II-C, which lists the population/health personnel ratios for several categories of health workers. Although the ratios cannot be used directly as indications of access, they are, to a certain extent, proxies for the presence of other resources. In interpreting the table it should be born in mind that most physicians and facilities using physicians are located in urban areas, while there is some possibility that a greater proportion of auxiliary workers will be located in rural areas. Thus, where the ratio of population to health auxiliaries is low, there is more likelihood of a high proportion of the population having access to a health delivery system. But it is not possible from the data in the table to estimate the actual percentage of the population.

To obtain an approximation of the proportion of the population with access to health services it can be assumed that all urban populations are served by health facilities, but that health resources are highly unevenly distributed in rural areas. Several studies by the USAID Office of Foreign Disaster Assistance give regional data on health facilities

which would support this assumption.[1] The comparison of the urban/rural population distribution with the distribution of health expenditures for the sample of countries in Table II-D also emphasizes the uneven access to health services. Given that twenty percent of the population are urban, and assuming that eighty percent of urban areas have access to health services but that less than ten percent of rural areas have access, it can be estimated that less than twenty-five percent (.8 x .2 + .1 x .8) of the population in sub-Saharan Africa have access to an existing health delivery system.

An example of the importance of assessing the extent of the delivery system prior to the design of a health intervention program is given by the Expanded Program on Immunization. WHO has distinguished among three potential modes of delivery:

(1). the use of existing delivery systems

(2). the use of the existing delivery system plus outreach

(3). the use of mobile units.

With the first mode, only that population with a reasonable distance allowing access would receive the service; with the second mode, access to the service would be extended by the use of non-motorized transport; and, with the third mode, the remainder of the population would be given access through

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1 USAID, Office of Foreign Disaster Assistance. Various dates. Country Profiles (for Africa).

the use of motorized vehicles and the transport of self-contained vaccination units.

The cost of an immunization increases considerably as delivery is changed from mode one, to mode two, and then to mode three. In addition, within each mode the cost of an immunization increases as additional funds are spent to increase the number of users of the health centers or to transport the services into increasingly inaccessible areas. With increasing costs such as this, a simple rule can act as a guide to the economically efficient allocation of funds. The rule states that, to obtain maximum effect, the funds should be distributed among the alternatives so that the additional effect from the last dollar spent on each alternative is equal. For immunization, where the alternatives involve a distribution of funds among countries or among regions within a given country, this rule results in the following use of funds: immunization is provided for that part of the population accessible by present delivery systems in all countries or regions within a country before the program is extended within a given country or region by using more expensive delivery modes.

Although the example refers to the EPI program, the principle is of general application and will lead to similar conclusions for other maternal-child health programs. If

efficiency is measured in cost per unit delivered, the intervention will be most efficiently allocated to a population living within an area where the intervention can be added to an existing delivery system.

While economic efficiency is an important criterion and should receive substantial weight in planning decisions, there are some important qualifications to the application of the efficiency rule described above. First, it may not be politically feasible for a government to set up a program which ignores certain geographical areas and favors others. (Similarly, it may not be feasible for a donor agency to allocate funds in a piecemeal fashion across countries covering only areas where delivery systems presently exist.) A second, and perhaps more important, qualification is that, applied automatically, the principle would lead to an uneven distribution of benefits. Because urban areas have the greatest access to existing delivery systems, the allocation rule will result in a disproportionate share of benefits accruing to urban populations and groups with relatively high per capita income.

Combined with unevenly distributed social benefits of other kinds, the restriction of interventions to the use of existing delivery systems would encourage continued rural-urban migration and have adverse distributional consequences.

On the other hand, the extension of services to additional populations through the use of outreach and mobile units prior to optimum utilization of the existing delivery system would imply the inefficient allocation of funds. The trade-off, and unavoidable choice, is between economic efficiency, measured as a technical effect per dollar spent, and equity, measured as equal access across income and regional groups.

D. Vaccine Sources in sub-Saharan Africa

At the present time there are no facilities in sub-Saharan Africa with the technological requirements for the production of DPT or measles or polio vaccines.[1] Experimental programs for the production of other vaccines have, however, taken place in several countries. Yellow fever vaccine has been produced at the Institute Pasteur in Dakar (Senegal) and Abidjan (Ivory Coast), while smallpox vaccine conforming to WHO standards has been produced in Tanzania. Although the first batches of experimental BCG production at the vaccine institute in Dar es Salaam did not meet WHO requirements, more recent batches (produced after 1978) may conform to the standard. The experimental production of smallpox vaccine in Nigeria has not been successful.

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1. Based on interviews with officials at the Center for Disease Control, Atlanta, Georgia.

With the phasing out of the production of smallpox vaccine and the introduction of the EPI programs, the interest of officials in the Tanzanian ministry of health and elsewhere has turned to the production of other vaccines. A report on the Expanded Program of Immunization in Tanzania[1] states that although diphtheria, tetanus and pertussis vaccines would be the easiest with which to begin, the necessary technical knowledge and equipment are lacking; training and capital would be required before experimental production could be undertaken. Interest has also been shown in measles vaccine, which is somewhat more technically difficult; polio vaccine would impose even greater technical difficulties. The conclusion of the report is that "whereas it may be feasible to produce a certain vaccine in Tanzania it may not be the most economic way of using national resources."[2] As an alternative the report suggests the possibility of establishing a facility for diluting vaccines imported in bulk and for filling ampoules, and developing quality control facilities.

A logical conclusion from the balanced, well-reasoned report cited above is that it is not feasible to consider

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1 Tanzanian Ministry of Health and DANIDA/WHO/UNICEF. 1978. An Evaluation Report of the Expanded Programs on Immunization.

2 Ibid., p. 61.

the use of locally produces vaccines for a large scale EPI program in Africa over the next five years. But the argument for starting to develop the capacity for vaccine production in the future should not be overlooked. The training and capital investment in a technical area often have "spill out" or "external" effects which provide benefits to other areas and sectors not considered in the original program area. Vaccine production could have such benefits and in the long run reduce the technical dependency of sub-Saharan countries. These benefits might well offset the start-up costs for immunization production projects of a modest size in Dar es Salaam, Abidjan, or Dakar.

III. PROJECTED COST ON AN IMMUNIZATION PROGRAM FOR SUB-SAHARAN AFRICA

A. Estimates of the Cost per Fully Immunized Child[1]

The cost of immunizing a child will vary by delivery mode. To obtain estimates of the cost of immunization using alternative fixed, outreach and mobile programs, we first examine a number of immunization programs for which information is available and attempt to disaggregate the cost per fully immunized child by expenditure categories as given in Table III-A and III-B. The unit costs for each category vary con-

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1 The cost estimates in this section are in terms of 1978/79 U.S. dollars and do not include an allowance for inflation.

siderably among the programs and give only rough guidance in the construction of the hypothetical costs, presented in Table III-D, which are the basis for the projections presented below.

Some rationale can be given for the component cost in each category. Vaccine costs are, roughly, the average of the Kenya, Yaounde, Sudan and Somalia program costs and include the cost of tetanus vaccine for pregnant women.[1] It is assumed that the additional handling of vaccines needed by the outreach and mobile program will entail about 5 percent additional spoilage. The cold chain costs for the fixed program are based on the examples from the Sudan and Yaounde with the addition of 50 percent for the outreach and mobile programs. The transportation cost for the fixed and outreach program are based on the programs in Yaounde, the Sudan and Indonesia. Table III-C describes the derivation of the transportation cost for the mobile program. Salaries vary with wage levels, and often differ considerably from country to country. The salary component was arbitrarily set at $2.00. The final cost category, "other", consists

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1 Several studies have demonstrated that the immunization of all women of child bearing age is more effective at reducing neonatal tetanus than the immunization of pregnant women only. (For example, Warren L. Berggren, "Administration and Evaluation of Rural Health Services: A Tetanus Control Program", Am. Jour. Trop. Med. and Hyg., Vol 23, No. 5. (September, 1974) pp. 936-949.) The logistic problems and costs, however, of including all women are much greater than a more limited program for pregnant women. It is assumed that, during the early years of an immunization program the target population for immunization to reduce neonatal tetanus will primarily be pregnant women.

largely of surveillance, evaluation and research -- and is assumed to be slightly greater for the mobile program.

The final estimates per fully immunized child are $3.65 for a fixed delivery, $4.00 for outreach, and $8.90 for a mobile delivery. Roughly 60 percent of the cost of a fixed delivery, 55 percent of the cost of an outreach delivery, and 30 percent of the cost of a mobile delivery are for domestic expenses -- personnel, local facilities, and operating costs. The remaining percentage is for expenditures requiring foreign exchange -- vaccines, cold chain equipment, vehicles, parts and fuel.

B. Projected Growth of the Fixed Delivery System

It was estimated above (Section II-C) that less than 25 percent of the population has access to the present fixed delivery system. If we assume that the number of households having access can be doubled by the use of outreach services, then at present only 50 percent of the population can be immunized without the use of mobile delivery teams. Table III-E projects the potential proportion of the population having access to health services through each of the delivery modes. The projection assumes that the growth of the fixed delivery system will be sufficient to stay abreast of the growth in population plus an additional 1 percent per year

increase. This implies that the absolute number of people reached by the fixed delivery system will grow an average of approximately 5 percent per year. Given the recent emphasis on extending the delivery of low-cost health services to rural populations, this estimate may be conservative. If the fixed delivery system expands more rapidly, the cost of immunization programs will fall accordingly.

The projected access through fixed and outreach services in Table III-E is used in the cost projections that follow, to provide an upper limit on the rate of expansion of the number of children immunized by means of the cheaper delivery modes

C. Cost Projections

Tables III-F through III-K present cost projections under alternative delivery strategies, rates of program expansion, and population projections. The costs are for a program consisting of tetamus immunization of pregnant women and DPT, measles and polio immunization of infants and including all of Africa except South Africa and the countries bordering the Mediterranean.

The first two tables compare the cost of two programs providing 100 percent access by the WHO target date of 1989. In the first projection, the program is designed to use

existing fixed delivery where possible before expanding through the use of outreach and then, finally, mobile delivery systems. In the second projection, an attempt to provide the service equitably to both urban and rural populations is made through a faster expansion of the outreach and mobile programs.[1] Most of the difference in cost of the efficient versus the equitable program occurs during the first five years. The five year cost of the equitable program is estimated to be 28 percent greater than the efficient program.

The next two projections given in Tables III-H and III-I give the costs of programs under the pessimistic view that 100 percent access cannot be achieved until 1995. Under this assumption, the first five-year cost of the equitable program is 39 percent greater than the efficient program. For either fifteen-year program, the cost for the first five years is, of course, approximately one-third less than the corresponding ten-year programs.

Tables III-F, J and K can be compared in order to obtain an indication of the sensitivity of the cost estimate to the alternative UN population projections discussed in section II-A. The five-year cost of the low-growth variant

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1 In the early years of the program there is a practical restriction on the rate at which the outreach and mobile programs may be expanded. This is reflected in the lag before outreach and mobile delivery begin.

is 73.8 million, while the five-year cost of the high-growth variant is 78.3 million -- or a difference of only 6 percent. Over the full ten year period, the difference becomes more substantial and is 8 percent of the total low-variant cost. Thus, over the short run, the accuracy of the population projections is not a significant factor in the cost projections. The small differences in cost associated with the alternative projections are apt to be obscured by the sketchy nature of the unit cost estimates and the lack of information concerning the percentage of population which can be reached by means of the existing fixed delivery system.

D. Cost of Technical Advisors

The cost of technical advisors is not included in the estimates in Tables III-F through III-K. It is difficult to project the cost of advisors over a ten year period because the rate at which advisors could be removed from the program would depend on the success of the program in the early years and the practicality of finding domestic replacements in the program countries in the later years of the project. Ideally, one medical officer, epidemiologist, would be needed per 3-5 countries in the program; in addition one operations office per country would be required in the early

years of the program.[1] However, it is unrealistic to project that the requisite 7-8 medical officers and 35 operations officers would be available to the program, although these numbers might be reached with a total effort of cooperating bilateral and multilateral organizations. The rough estimate of the cost of advisors given in Table III-L is made under the more conservative assumption that as a minimum, by spreading the responsibilities of technical officers over several country programs, the project could be carried out with as few as five medical officers and ten operations officers. Including the costs of transportation, housing, salary and indirect cost the amount per person is estimated at $120,000.[2] The total cost of advisors for the first five years of the program is $8.8 million. The cost for the full ten years, assuming a reduction in the number of advisors in the last five years is $14.6 million.

E. Foreign Exchange Requirements and Domestic Costs

Estimating that personnel, local facilities and operating costs are 60 percent of fixed delivery costs, 55 percent of outreach delivery costs, and 30 percent of mobile delivery

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1 The discussion in this paragraph is based on conversations with CDC/SMALLPOX officials.

2 Calculated at the rate for U.S. personnel.

costs, the projected domestic costs for the ten year, medium growth variant are given in Table III-L. The residual costs are for imported equipment and vaccine. Excluding the costs of technical advisors, the total costs requiring foreign exchange over the first five years of the program are $32.4 million. The total foreign exchange costs for the first five years including technical assistance is $41.2 million.

The total domestic costs for a five-year period are $44 million and, in the average country, are potentially covered by additional health expenditures accompanying growth in per capita income and the feasible increase in the central government's commitment to health. However, in the poorest countries which have relatively high current expenditures on health, additional donor support may be necessary in order to cover a part of domestic costs.

The cost estimates in Tables III-F through III-L are intended as a first attempt to approximate the cost of an immunization program based on available information. The estimates are regarded as the minimum expenditure that may be required. Although it is not feasible to predict the extent to which cost may increase, it is plausible that the cost per fully immunized child may increase significantly within all three delivery modes as the project is extended to an increasingly greater percentage of population.

IV. COMBATTING MORTALITY FROM DIARRHEA

A. Integration of diarrheal control and immunization programs

An important aspect of the EPI program is that it is designed to be delivered as part of an integrated set of services for maternal and child health. After the initial program investment for EPI has been made and as the scope of the program expands, oral rehydration[1] and maternal hygienic education programs to control diarrhea may be cost effective measures to provide in tandem with immunization. At the time of immunization, mothers can be motivated and instructed in the use of prepackaged electrolyte solutions and the handling of water and encouraged to sustain breast feeding.

A major difference between immunization and rehydration programs is that the timing of visits for immunization can occur at prearranged periodic intervals while the need for oral rehydration cannot be predicted. For this reason the conditions under which the therapy would be administered

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1 For a clear description of oral rehydration see, N.F. Pierce and N. Hirschhorn, "Oral Fluid - A Simple Weapon Against Dehydration in Diarrhoea: How it Works and How to Use it." WHO Chronicle 1: 31; 87-93 (1977). Also see, WHO, Clinical Management of Diarrhoea, Report of a Scientific Working Group, WHO/DDC/79.3 (1978).

cannot be predicted accurately. Part of the population reached by outreach or mobile teams for immunization will have access to health posts or clinics that may lack refrigeration facilities for storing vaccines but have adequate facilities for oral rehydration. But a significant part of the population visited by outreach or mobile teams will have to rely on local dispensaries for the dsitribution of oral rehydration packets and on home administration of the therapy. Several studies have demonstrated the dramatic effectiveness of oral rehydration in controlled clinical therapy. While less well established, evidence is also accumulating that home administered oral therapy can be effective.[1] However, given the potential variability of the conditions under which home therapy would be carried out the effectiveness cannot be predicted accurately.

B. Cost of Oral Rehydration

The costs of oral rehydration are the cost of the electrolyte packets (about 10¢ per packet, two packets per episode), the cost of booklets or cards illustrating use, the cost of training health workers, the cost of personnel

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1 For instance, Mahalanabis, D. et al. Oral Fluid Therapy Among Bangladesh Refugees. Johns Hopking Medical Journal 132: 197-205. (1973).

time needed to motivate and instruct in the use of the solution, administrative costs and transportation costs. In the cost effectiveness analysis contained in the second part of this report[1] it is estimated (a very rough estimate) that the cost of adding an oral rehydration program to an immunization program would be .45 per child covered by the program.

The cost of an oral rehydration program for sub-Saharan Africa starting in 1980 and reaching the same populations as the immunization program are given in Table A-4.[2] The five year cost (1980-1984) is $39.8 million. The ten year cost is $160.5 million. Forty percent of the cost (rehydration packets, equipment) require foreign exchanges, the remaining sixty percent are domestic costs.

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1 H.N. Barnum, Cost Effectiveness of Programs to Combat Communicable Childhood Diseases in Kenya, for USAID (Contract AID/SOD/PDC-C-0201 One America, Inc.), January, 1980.

2 The table is based on the medium population growth, ten year variant.

TABLE I-A

ESTIMATES OF THE ANNUAL NUMBER OF BIRTHS IN SUBSAHARAN AFRICA, 1980-1994, UNDER ALTERNATIVE POPULATION PROJECTIONS [1]

YEAR	NUMBER OF BIRTHS[2] (000,000's)		
	LOW VARIANT	MEDIUM VARIANT	HIGH VARIANT
1980	15.3	15.7	16.1
1981	15.7	16.1	16.6
1982	16.1	16.6	17.0
1983	16.6	17.1	17.6
1984	17.0	17.6	18.1
1985	17.4	18.1	18.6
1986	17.9	18.6	19.2
1987	18.4	19.1	19.8
1988	18.8	19.7	20.4
1989	19.3	20.2	21.0
1990	19.8	20.8	21.7
1991	20.3	21.4	22.4
1992	20.7	22.0	23.1
1993	21.2	22.7	23.8
1994	21.8	23.2	24.5

1 Based on high, medium and low variant population projections in United Nations. 1977. World Population Prospects as Assessed in 1973. Population Studies no. 60.

2 Starting from 350.2 million total population in 1980. This figure is based on a 1979 extimate of 340.5 million for all of Africa except Morocco, Algeria, Tunisia, Egypt, Libya and South Africa. Source: Population Reference Bureau. 1979. 1979 World Population Data Sheet.

TABLE I-B

DEMOGRAPHIC ASSUMPTIONS UNDERLYING ESTIMATES OF NUMBER OF BIRTHS IN AFRICA FOR 1980-1995

PARAMETER	YEAR			VARIANT[1]
	1980-85	1985-90	1990-95	
Rate of	2.86	2.88	2.86	Medium
Natural	2.98	3.07	3.12	High
Increase	2.67	2.59	2.40	Low
Crude	44.8	43.3	41.5	Medium
Birth	45.9	44.6	43.4	High
Rate	43.7	41.3	37.9	Low
Crude	16.2	14.5	12.9	Medium
Death	15.8	13.9	12.2	High
Rate	17.0	15.4	13.8	Low

1 See United Nations. Op. cit.

TABLE II-A

CENTRAL GOVERNMENT HEALTH EXPENDITURES IN SUBSAHARAN AFRICA

NO.	COUNTRY	YEAR	CENTRAL GOVERNMENT HEALTH EXPENDITURES [a]			GNP [c]		TOTAL GOVERNMENT EXPENDITURE AS % OF GNP [a]
			Per Capita Col 1	% of GNP Col 2	% of Total Budget Col 3	Per Capita ($) Col 4	Annual % Growth Rate 1960 – 1976 Col 5 %	Col 6
	SAHEL and WEST							
1	Mauritania	1975	4.16[e]	1.3[e]	5.2[e]	320	3.7	24.6
2	Sudan	1973	1.43	1.1[a]	4.8	130	0.4	22.9
3	Benin	1975	2.08	1.6	10.7	130	0.1	14.9
4	Cape Verde	1972	2.86	1.3	2.7	220[d]	...	49.4
5	Gambia	1975	2.88	1.6	8.6	180	1.1[b]	18.7
6	Ghana	1973	3.30	1.1	6.2	300[d]	-0.1	17.9
7	Guinea	1971	1.32[e]	1.1[e]	2.4[e]	120[d]	0.4	45.5
8	Guinea-Bissau	1972	1.43	1.3	7.3	110[d]	...	17.8
9	Ivory Coast	1975	7.02	1.3	5.9	540	3.4	22.2
10	Liberia	1973	2.73	.7	3.7	390[d]	2.0	19.1
11	Mali	1970	1.11	1.3	11.0	85[d]	0.9	11.8
12	Niger	1975	.39	.3	1.3	130	-1.1	23.1
13	Nigeria	1975	1.02	.3	1.3	340	3.5	23.1
14	Senegal	1975	3.96	1.1	5.8	360	-0.7	19.1
15	Sierra Leone	1975	1.80	.9	6.1	200	1.1	14.7
16	Togo	1975	2.50[b]	1.0[b]	6.5[b]	250	4.1	15.4
17	Upper Volta	1975	.77[b]	.7[b]	4.8[b]	110	0.8	14.5
	CENTRAL AFRICA							
18	Angola	1973	3.63	1.1	5.0	330[d]	3.0	21.9
19	Burundi	1975	.55	.5	6.2	110	2.3	8.1
20	Cameroon	1975	2.80[b]	1.0[b]	7.8[b]	280	2.8	12.8
21	Central Africa Rep.	1975	4.18[b]	1.9[b]	8.4[b]	220	0.3	22.6
22	Chad	1975	1.32[e]	1.1[e]	6.5[e]	120	-1.1	16.7
23	Congo-Rep.	1975	9.18[b]	1.8[b]	6.1[b]	510	2.8	29.5
24	Gabon	1975	15.24	.6	1.8	2540	...	34.5
25	Rwanda	1973	.70	.7	5.5	100[c]	0.8	12.7
26	Zaire	1975	.98	.7	2.3	140	1.4	30.8

TABLE II-A
(continued)
CENTRAL GOVERNMENT HEALTH EXPENDITURES IN SUBSAHARAN AFRICA

NO.	COUNTRY	YEAR	CENTRAL GOVERNMENT HEALTH EXPENDITURES			GNP c/		TOTAL GOVERNMENT EXPENDITURE AS % OF GNP a/
			Per Capita Col 1	% of GNP Col 2	% of Total Budget Col 3	Per Capita ($) Col 4	Annual % Growth Rate 1960 - 1976 Col 5 %	Col 6
	EAST AFRICA							
27	Botswana	1974	2.56	.8	3.3	320 d/	10.2	24.4
28	Ethiopia	1975	.80	.8	5.6	100	1.9	14.2
29	Kenya	1975	3.30	1.5	6.4	220	2.6	23.3
30	Lesotho	1975	2.88	1.8	5.3	160	4.6	33.9
31	Malawi	1975	1.56	1.2	6.7	130	4.1	17.9
32	Mauritius	1975	14.58	1.8	6.2	810	1.2	29.0
33	Mozambique	1973	1.53 b/	.9 b/	4.8 b/	170 d/	1.4	18.8
34	Somalia	1975	1.43	1.3	5.7	110	0.3	22.7
35	Swaziland	1975	5.72	1.3	5.4	440	4.2	23.9
36	Tanzania	1975	3.57	2.1	6.4	170	2.6	32.6
37	Uganda	1975	1.38	.6	5.2	230	1.0	11.6
38	Zambia	1975	12.18	2.9	5.5	420	1.7	52.6
39	Sao Tome and Phillipe	1973	7.60	1.9	7.8	400 d/	...	24.3
40	Madagascar	1972	1.80	.9	4.7	200 d/	-0.1	19.2
41	S. Rhodesia	1974	7.15	1.3	5.1	550 d/	2.2	25.5
42	S. Africa	1975	3.81	.3	1.8 b/	1270	3.0	21.4

FOOTNOTES FOR TABLE II-A

a Based on United Nations. n.d. Statistical Information Bulletin for Africa. No. 11 E/CN.14/S1B/22, except where indicated.

b Based on USDHEW, Office of International Health. Inter-Agency Group on African Health Strategy, which was, in turn, taken from World Bank. 1975. Health Sector Policy Paper. Annex 3. Washington, D.C. The per capita figure is from GNP estimates in col. 4.

c World Bank development report, 1978 and 1976, except where indicated.

d Estimated by extrapolation from another date.

e Interpolated from linear regression of col. 2 on col. 4 for existing data.

TABLE II-B

ESTIMATED CENTRAL GOVERNMENT HEALTH EXPENDITURES FOR 1975

COUNTRY	POPULATION[a] (000's) Col. 1	GNP per capita[b] ($) Col. 2	CENTRAL GOVERNMENT HEALTH EXPENDITURES		
			% of GNP[c] Col. 3	per capita ($) Col. 4	TOTAL (000's of $) Col. 5
SAHEL and WEST AFRICA					
Mauritania	1322	320	1.3	4.16	5500
Sudan	15550	270	1.1	2.97	46184
Benin	3110	130	1.6	2.08	6469
Cape Verde	285[d]	260[d]	1.3	3.38	963
Gambia	519	180	1.6	2.88	1495
Ghana	9870	590	1.1	6.49	64056
Guinea	5540	130	1.1	1.43	7922
Guinea Bissau	530	120	1.3	1.56	827
Ivory Coast	6700	540	1.3	7.02	47034
Liberia	1549	410	.7	2.87	4446
Mali	5697	90	1.3	1.17	6665
Niger	4592	130	.3	.39	1791
Nigeria	75023	340	.3	1.02	76523
Senegal	5000	360	1.1	3.96	19800
Sierra Leone	2982	200	.9	1.80	5368
Togo	2220	250	1.0	2.50	5550
Upper Volta	6032	110	.7	.77	4645
REGIONAL TOTAL	146521	316	.7	2.08	305237
CENTRAL AFRICA					
Angola	5470	370	1.1	4.07	22263
Burundi	3732	110	.5	.55	2053

TABLE II-B (continued)

COUNTRY	POPULATION[a] (000's) Col.5	GNP per capita[b] ($) Col.2	CENTRAL GOVERNMENT HEALTH EXPENDITURES		
			% of GNP[c] Col.3	per capita ($) Col.4	TOTAL (000's of $) Col.5
CENTRAL AFRICA (cont'd)					
Cameroon	7435	280	1.0	2.80	20818
Central Africa Republic	1787	220	1.9	4.18	7470
Chad	4035	120	1.1	1.32	5326
Congo-Rep.	1329	510	1.8	9.18	12200
Gabon	536	2540	.6	15.24	8169
Rwanda	4137	100	.7	.70	2896
Zaire	24721	140	.7	.98	24227
REGIONAL TOTAL	53182	213	.9	1.98	105421
EAST AFRICA					
Botswana	666	350	.8	2.80	1865
Ethiopia	27950	100	.8	.80	22360
Kenya	13350	220	1.5	3.30	44055
Lesotho	1217	160	1.8	2.88	3505
Malawi	5044	130	1.2	1.56	7869
Mauritius	883	810	1.8	14.58	12874
Mozambique	9240	180	.9	1.62	14969
Somalia	3180	110	1.3	1.43	4547
Swaziland	494	440	1.3	5.72	2826
Tanzania	14738	170	2.1	3.57	52615
Uganda	11556	230	.6	1.38	15947

TABLE II-B (continued)

COUNTRY	POPULATION[a] (000's) Col. 1	GNP per capita[b] ($) Col. 2	CENTRAL GOVERNMENT HEALTH EXPENDITURES		
			% of GNP[c] Col. 3	per capita ($) Col. 4	TOTAL (000's of $) Col. 5
EAST AFRICA (cont'd)					
Zambia	4920	420	2.9	12.18	59926
REGIONAL TOTAL	93238	182	1.4	2.61	243357
Rhodesia	6310	550	1.3	7.15	45116
Sao Tome and Phillipe	80	460	1.9	8.74	699
Madagascar	8833	200	.9	1.80	15899
GRAND TOTAL	308164	259	.9	2.29	806472

a World Bank Atlas, 1978

b World Bank Atlas, 1978

c See Table III-A

d USAID, Office of Foreign Disaster Assistance. 1979a. Cape Verde: A Country Profile.

TABLE II-C

CATEGORIES OF HEALTH PERSONNEL BY RATIO (population/category of personnel)

Date	Country	Physicians	Dentists	Pharmacists	Medical Assistants	Nursing Personnel	Nursing and Midwifery Personnel	Multi-Purpose Health Auxiliary
1973	Angola	15,170	--	66,800	15,060	1,870	1,710	17,453
1974	Benin	36,060	378,630	77,670	--	3,220	2,580	--
1975	Botswana	9,580	115,000	69,000	4,130	1,270	1,440	4,481
1972	Burundi	45,990	1,134,330	261,770	--	7,090	6,570	--
1972	Cape Verde	12,950	205,000	147,500	--	3,900	3,750	--
1973	CAE	27,970	330,000	150,000	6,110	2,260	2,070	6,904
1974	Chad	44,370	1,974,500	789,800	136,170	6,990	5,560	--
1973	Comoros	15,320	145,600	145,500	--	2,020	1,760	--
1973	Congo	6,160	100,400	31,380	59,060	640	600	--
1971	Eq. Guinea	11,560	--	72,250	15,210	72,250	26,270	--
1971	Gabon	4,210	125,000	33,330	--	610	540	--
1969	Gambia	18,950	360,000	180,000	3,750	15,000	1,950	--
1974	Ghana	11,220	218,340	21,640	53,970	870	630	--
1973	Guinea	22,380	233,700	131,500	5,900	6,230	3,880	4,263
1971	Guin-Bissau	10,240	--	563,000	--	4,580	2,960	563,000
1974G	Ivory Coast	15,270	226,900	91,630	--	2,220	1,890	--
1973	Kenya	16,300	192,630	76,580	18,520	3,360	2,470	3,339
1973	La Reunion	1,950	6,320	6,080	--	270	260	--
1974	Lesotho	20,320	338,670	203,200	--	19,170	3,380	--
1973	Liberia	12,570	127,620	237,000	42,540	1,200	1,030	--
1973	Madagascar	11,610	99,700	82,230	--	3,580	2,530	--
1971X	Malawi	85,830	649,860	303,270	10,340	6,550	5,210	--
1972G	Mali	33,330	777,670	466,600	1,166,500	2,480	2,170	--
1973	Maurit.	17,700	251,400	179,570	--	3,790	3,600	5,792
1974G	Mauritius	3,710	62,290	218,000	--	900	630	--
1971	Mozambique	16,680	531,750	60,770	--	4,790	3,799	26,504
1974	Niger	41,060	746,000	639,430	--	4,970	4,710	95,234
1973	Nigeria	25,440	578,710	119,450	--	6,230	4,370	--
1974	Rwanda	53,550	2,061,500	1,374,330	23,700	11,480	5,930	95,884
1974	Senegal	15,360	148,790	--	--	1,920	1,630	--
1970	S. Leone	17,110	212,500	364,290	--	3,600	2,590	2,140
1973	Somalia	15,560	750,750	143,000	--	--	--	--
1974	Sudan	12,370	116,270	55,530	10,530	1,550	970	--
1974	Swaziland	8,850	79,670	59,750	478,000	990	560	--
1973	Togo	22,280	529,250	88,210	19,790	2,490	1,550	19,785
1974	Uganda	20,690	500,000	399,000	19,040	6,870	3,100	16,309
1971	Un. Rep. of Cam.	26,220	590,000	96,720	--	2,270	--	22,544
1973	U.R. of Tanz.	20,800	177,000	118,000	13,650	3,180	580	--
1974	Upper Volta	59,570	655,220	393,000	5,897,000	4,520	4,240	--
1972	Zaire	27,950	714,380	174,500	245,010	11,700	7,170	19,555
1971	Zambia	8,110	122,140	52,780	4,660	2,430	1,710	4,262

X - Coverage of these data unknown.
G - Personnel in Government Services

Source: World Health Organization 1976. World Health Statistics Annual. Vol. III.

TABLE II-D

A COMPARISON OF ESTIMATED URBAN AND RURAL HEALTH EXPENDITURES AND POPULATION

COUNTRY	ESTIMATED PERCENT OF TOTAL EXPENDITURE [1]		ESTIMATED PERCENT OF TOTAL POPULATION [2]	
	URBAN	RURAL	URBAN	RURAL
Benin	71	29	14	86
Cameroon (East)	81	19	29	71
Chad	68	32	14	86
Gabon	46	54	32	68
Guinea	73	17	20	80
Liberia	75	25	29	71
Mali	85	15	17	83
Mauritania	55	45	44	66
Niger	61	39	9	91
Nigeria	65	35	18	82
Senegal	84	16	32	68
Sierra Leone	79	21	15	85
Upper Volta	16	84	4	96

1 Reported in (no author) n.d. Strengthening Health Delivery Systems. Project Proposal, Phase II. Reported to American Public Health Association. AID 625-11-509-904. p. 103.

2 Population Reference Bureau. Op. cit.

TABLE III-A

COMPOSITION OF TOTAL PROGRAM COST PER FULLY IMMUNIZED CHILD FOR VARIOUS PROGRAMS (BY PERCENT)

PROGRAM[e]	VACCINE & SUPPLIES (SYRINGES, etc.) (%)	COLD CHAIN EQUIP. & OTHER (%)	TRANS-PORTATION (%)	SALARIES & TRAINING (%)	EVALUATION SURVEIL-LANCE, RESEARCH, OTHER (%)	TOTAL COST FULLY IMMUNIZED CHILD (%)
Kenya[h]	22	3	6	66	3	3.90
Somalia[g]	19	9	43	29	-	7.04
Sudan[f]	5	2	4	89	-	9.25
Yaounde, Cameroon[f]	47	10[b]	10[b]	25	7	1.90
Indonesia[h]	36	10	11	34	9	5.10[d]
Cali, Colombia[g]	19	3	-	74	4	6.10
Hypothetical Example (Crease)	16	12[a]	14[a]	58	-	3.54

a Includes reallocation of "maintenance" category to cold chain and transportation.

b Arbitrary division of "material and transportation" category.

c Includes "promotion" (3% of total cost)

d With addition of costs associated with measles vaccination not originally included in the project paper.

e See references following Table III-B.

f Does not include maternal immunization with tetanus antitoxin.

g Includes cost of tetanus immunization of women of child bearing age.

h Includes cost of tetanus immunization of pregnant women.

TABLE III-B

COMPOSITION OF TOTAL COST PER FULLY IMMUNIZED CHILD FOR VARIOUS IMMUNIZATION PROGRAMS ($)

COUNTRY[b]	DESCRIPTION	COST PER FULLY IMMUNIZED CHILD BY EXPENDITURE CATEGORY [a]					TOTAL COST/ F.I.C.
		VACCINE & SUPPLIES	COLD CHAIN	TRANSPORTATION	SALARIES &TRAINING	OTHER	
Kenya	primarily fixed and outreach	.86	.12	.24	2.57	.11	3.90
Somalia	primarily mobile	1.34	.63	3.03	2.04	-	7.04
Sudan[c]	fixed and outreach	.46	.19	.37	8.23	-	9.25
Yaounde, Cameroon	primarily fixed	.89	.19	.20	.49	.13	1.90
Indonesia	fixed, outreach, some mobile	1.84	.51	.56	1.73	.46	5.10
Cali, Colombia	fixed	1.16	.18	-	4.52	.24	6.10
Hypothetical Example (Crease)	fixed	.57	.42	.49	2.06	-	3.54

a Derived by implication from Table III-A.

b References follow table.

c Does not include maternal immunization with tetanus antitoxin.

References for Tables III-A and III-B

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TABLE III-C

ESTIMATION OF VEHICLE COST FOR MOBILE PROGRAM[1]

1). Vehicle Costs

Cost of Vehicle	=	$ 15,000	(Land Rover)
Spare Parts (25%)	=	3,750	(Assumption used by Bassett and Hadler)
		$ 18,750	
Life of vehicle	=	5 years	
Cost per year	=	$ 3,750	

2). Annual Operating Costs

Gasoline and Oil	=	$ 2,200	(Approximately 20,000 miles per year, 12 miles per gallon $1.25 per gallon, $100 oil/year)
Maintenance	=	2,000	
		$ 4,200	

3). Total Cost Per Vehicle Per Year = $3,750 + $4,200 = $7,950

4). Number Of Children Immunized Per Year Per Vehicle

Assuming:
1). a new location every other day
2). 50 immunization contacts per location
3). 280 working days per year
4). four contacts per fully immunized child, then each vehicle will account for 1,750 (50 x 140 ÷ 4 = 1,750 fully immunized children per year.)

5). Vehicle and Maintenance Cost Per Fully Immunized Child

Equals total vehicle costs per year divided by the number of children fully immunized per year, or $4.54 (7,950/1,750). Adding an additional .20 for the transportation cost to service the central fixed facility gives a total transportation cost of $4.74 (approximately $4.75) per fully immunized child for the mobile program.

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1 This cost has been revised upward by 100% over the estimates given in the first draft of the report. The increase is due to a revised estimate of the number of immunization contacts per location. The new estimate is 50; the old estimate was 100.

TABLE III-D

HYPOTHETICAL COSTS PER FULLY IMMUNIZED CHILD
USING ALTERNATIVE DELIVERY MODES
$

DELIVERY MODE	COST PER FULLY IMMUNIZED CHILD BY EXPENDITURE CATEGORY					TOTAL[c] COST/ F.I.C.	TOTAL[b] DOMESTIC COST/ F.I.C.
	VACCINE SUPPLIES	COLD CHAIN	TRANS-PORTATION	SALARIES TRAINING	OTHER		
FIXED	1.00	.20	.20	2.00	.25	3.65	2.20
OUTREACH	1.05	.30	.40	2.00	.25	4.00	2.20
MOBILE	1.05	.30	4.75[a]	2.50	.30	8.90	2.75

a See Table III-C

b Salaries plus a part of "other." "Other" is composed largely of surveillance.

c Includes cost of maternal immunization against tetanus.

TABLE III-E

PROJECTED PERCENTAGE OF POPULATION
WITH ACCESS THROUGH
FIXED AND OUTREACH DELIVERY

YEAR	Projected Growth of fixed delivery system	Total potential access including outreach	Excess reachable only by mobile units
1980	25	50	50
1981	25.5	51	49
1982	26	52	48
1983	26.5	53	47
1984	27	54	46
1985	27.5	55	45
1986	28	56	44
1987	28.5	57	43
1988	29	58	42
1989	29.5	59	41
1990	30	60	40
1991	30.5	61	39
1992	31	62	38
1993	31.5	63	37
1994	32	64	36

TABLE III-F

PROJECTED COST OF IMMUNIZATION PROGRAM:
PROJECTION #1 (DELIVERY ALTERNATIVE NO. 1
MOST EFFICIENT USE OF EXISTING DELIVERY SYSTEM,
FULL ACCESS BY 1990, MEDIUM VARIANT POPULATION PROJECTION)

YEAR	TOTAL NUMBER OF BIRTHS (000'000's)	TOTAL PROGRAM ACCESS (%)	PERCENT OF COVERED[1] BIRTHS REACHED BY:			TOTAL PROGRAM COST (000'000's of $)
			FIXED	OUTREACH	MOBILE	
1980	15.7	10	10	-	-	4.6
1981	16.1	20	20	-	-	9.4
1982	16.6	30	26	4	-	14.7
1983	17.1	40	27	13	-	20.6
1984	17.6	50	27	23	-	26.8
1985	18.1	60	28	28	4	36.2
1986	18.6	70	28	28	14	50.4
1987	19.1	80	29	29	22	63.8
1988	19.7	90	30	29	32	80.4
1989	20.2	100	30	30	40	94.6

TOTAL COST FOR FIRST FIVE YEARS: 76.1
TOTAL COST FOR TEN YEARS: 401.6

1 Projection assumes 80% of births with access to immunization services will actually be covered by the program.

TABLE III-G

PROJECTED COST OF IMMUNIZATION PROGRAM:
PROJECTION #2 (DELIVERY ALTERNATIVE NO. 2
EQUITABLE USE OF LESS EFFICIENT DELIVERY MODES,
FULL ACCESS BY 1990, MEDIUM VARIANT POPULATION PROJECTION)

YEAR	TOTAL NUMBER OF BIRTHS (000'000's)	TOTAL PROGRAM ACCESS (%)	PERCENT OF COVERED[1] BIRTHS REACHED BY:			TOTAL PROGRAM COST (000'000's of $)
			FIXED	OUTREACH	MOBILE	
1980	15.7	10	10	-	-	4.6
1981	16.1	20	15	5	-	9.6
1982	16.6	30	15	10	5	18.5
1983	17.1	40	15	15	10	27.9
1984	17.6	50	18	18	14	36.9
1985	18.1	60	20	20	20	47.9
1986	18.6	70	24	23	23	57.2
1987	19.1	80	27	27	26	66.9
1988	19.7	90	29	29	32	79.8
1989	20.2	100	30	30	40	94.6

TOTAL COST FOR FIRST FIVE YEARS: 97.5
TOTAL COST FOR TEN YEARS: 444.0

1 Projection assumes 80% of births with access to immunization services will actually be covered by the program.

TABLE III-H

PROJECTED COST OF IMMUNIZATION PROGRAM:
PROJECTION #3 (DELIVERY ALTERNATIVE NO. 3
MOST EFFICIENT USE OF EXISTING DELIVERY SYSTEM,
FULL ACCESS BY 1995, MEDIUM VARIANT POPULATION PROJECTION)

YEAR	TOTAL NUMBER OF BIRTHS (000'000's)	TOTAL PROGRAM ACCESS (%)	PERCENT OF COVERED[1] BIRTHS REACHED BY			TOTAL PROGRAM COST (000'000's of $)
			FIXED	OUTREACH	MOBILE	
1980	15.7	7	7	–	–	3.2
1981	16.1	13	13	–	–	6.1
1982	16.6	20	20	–	–	9.7
1983	17.1	27	27	–	–	13.5
1984	17.6	33	27	6	–	17.3
1985	18.1	40	28	12	–	21.7
1986	18.6	47	28	19	–	26.5
1987	19.1	53	29	24	–	30.8
1988	19.7	60	29	29	2	37.8
1989	20.2	67	30	30	7	47.2
1990	20.8	73	30	30	13	57.4
1991	21.4	80	31	31	18	68.0
1992	22.0	87	31	31	25	80.9
1993	22.7	93	32	32	29	91.3
1994	23.3	100	32	32	36	105.4

TOTAL COST FOR FIRST FIVE YEARS: 49.8
TOTAL COST FOR FIRST TEN YEARS: 213.8
TOTAL COST FOR FIFTEEN YEARS: 616.8

1 Projection assumes 80% of births with access to immunization services will actually be covered by the program.

TABLE III-I

PROJECTED COST OF IMMUNIZATION PROGRAM:
PROJECTION #4 (DELIVERY ALTERNATIVE NO. 2
EQUITABLE USE OF LESS EFFICIENT DELIVERY MODES,
FULL ACCESS BY 1995, MEDIUM VARIANT POPULATION PROJECTION)

YEAR	TOTAL NUMBER OF BIRTHS (000'000's)	TOTAL PROGRAM ACCESS (%)	PERCENT OF COVERED[1] BIRTHS REACHED BY			TOTAL PROGRAM COST (000'000's of $)
			FIXED	OUTREACH	MOBILE	
1980	15.7	7	7	–	–	3.2
1981	16.1	13	8	5	–	6.3
1982	16.6	20	8	7	5	13.5
1983	17.1	27	9	9	9	20.4
1984	17.6	33	11	11	11	25.6
1985	18.1	40	14	13	13	31.7
1986	18.6	47	16	16	15	38.1
1987	19.1	53	18	18	17	44.2
1988	19.7	60	20	20	20	52.2
1989	20.2	67	23	22	22	59.4
1990	20.8	73	25	24	24	66.7
1991	21.4	80	27	27	26	75.0
1992	22.9	87	29	29	29	84.5
1993	22.7	93	31	31	31	93.2
1994	23.3	100	32	32	36	105.4

TOTAL COST FOR FIRST FIVE YEARS: 69.0
TOTAL COST FOR FIRST TEN YEARS: 294.6
TOTAL COST FOR FIFTEEN YEARS: 719.2

1 Projection assumes 80% of births with access to immunization services will actually be covered by the program.

TABLE III-J

PROJECTED COST OF IMMUNIZATION PROGRAM:
PROJECTION #5 (DELIVERY ALTERNATIVE NO. 1
EFFICIENT USE OF EXISTING DELIVERY SYSTEM,
FULL ACCESS BY 1990, LOW VARIANT POPULATION PROJECTION)

YEAR	TOTAL NUMBER OF BIRTHS (000'000's)	TOTAL PROGRAM ACCESS (%)	PERCENT OF COVERED[1] BIRTHS REACHED BY			TOTAL PROGRAM COST (000'000's of $)
			FIXED	OUTREACH	MOBILE	
1980	15.3	10	10	-	-	4.5
1981	15.7	20	20	-	-	9.2
1982	16.1	30	26	4	-	14.3
1983	16.6	40	27	13	-	20.0
1984	17.0	50	27	23	-	25.9
1985	17.4	60	28	28	4	34.8
1986	17.9	70	28	28	14	48.5
1987	18.4	80	29	29	22	61.5
1988	18.8	90	29	29	32	76.2
1989	19.3	100	30	30	40	90.4

TOTAL COST FOR FIRST FIVE YEARS: 73.8
TOTAL COST FOR TEN YEARS: 385.2

1 Projections assumes 80% of births with access to immunization services will actually be covered by the program.

TABLE III-K

PROJECTED COST OF IMMUNIZATION PROGRAM:
PROJECTION #6 (DELIVERY ALTERNATIVE NO. 1
EFFICIENT USE OF EXISTING FACILITIES,
FULL ACCESS BY 1990, HIGH VARIANT POPULATION PROJECTION)

YEAR	TOTAL NUMBER OF BIRTHS (000'000's)	TOTAL PROGRAM ACCESS (%)	PERCENT OF COVERED[1] BIRTHS REACHED BY			TOTAL PROGRAM COST (000'000's of $)
			FIXED	OUTREACH	MOBILE	
1980	16.1	10	10	-	-	4.7
1981	16.6	20	20	-	-	9.7
1982	17.0	30	26	4	-	15.0
1983	17.6	40	27	13	-	21.2
1984	18.1	50	27	23	-	27.6
1985	18.6	60	28	28	4	37.2
1986	19.2	70	28	28	12	52.0
1987	19.8	80	29	29	22	66:2
1988	20.4	90	29	29	32	82.7
1989	21.0	100	30	30	40	98.4

TOTAL COST FOR FIRST FIVE YEARS: 78.3
TOTAL COST FOR TEN YEARS: 414.7

1 Projection assumes 80% of births with access to immunization services will actually be covered by the program.

TABLE III-L

THE COST OF TECHNICAL ADVISORS[a]

YEAR	NUMBER OF MEDICAL ADVISORS	NUMBER OF OPERATIONS OFFICERS	TOTAL NUMBER OF TECHNICAL ADVISORS	COST (000,000) of $
1980	5	10	15	1.8
1981	5	10	15	1.8
1982	5	10	15	1.8
1983	5	10	15	1.8
1984	4	9	13	1.6
1985	4	8	12	1.4
1986	4	7	11	1.3
1987	3	6	9	1.1
1988	3	5	8	1.0
1989	3	5	8	1.0

FIVE YEAR TOTAL:	8.8
TEN YEAR TOTAL	14.6

1 The cost per man is assumed to be $120,000 per year.

TABLE III-M

FOREIGN EXCHANGE COSTS FOR COST PROJECTION #1
(000'000's of $)

YEAR	TOTAL PROGRAM COSTS[a]	TOTAL DOMESTIC COSTS[b]	TOTAL FOREIGN COSTS	TOTAL FOREIGN COSTS INCLUDING TECHNICAL ADVISORS[c]
1980	4.6	2.7	1.9	3.7
1981	9.4	5.5	3.9	5.7
1982	14.7	8.6	6.1	7.9
1983	20.6	11.8	8.8	10.6
1984	26.8	15.1	11.7	13.3
1985	36.2	18.9	17.3	18.7
1986	50.4	23.0	27.4	28.7
1987	63.8	27.1	36.7	37.8
1988	80.4	32.2	48.2	49.2
1989	94.6	36.3	58.3	59.3
Five Year Total	76.1	43.7	32.4	41.2
Ten Year Total	401.6	181.3	220.3	234.9

a Excluding the cost of technical advisors. Including technical advisors the five year total is $84.9 million and the ten year total is $416.2 million.

b Assumes domestic costs are 60 percent of fixed mode costs, 55 percent of outreach, and 30 percent of mobile costs.

c See Table III-L.

TABLE IV-A

PROJECTED COST OF ORAL REHYDRATION ADDED TO AN IMMUNIZATION PROGRAM (ASSUMING FULL ACCESS BY 1990, MEDIUM VARIANT POPULATION PROJECTION)

YEAR	TOTAL NUMBER OF CHILDREN 0-4	TOTAL PROGRAM ACCESS	TOTAL PROGRAM COSTS[a] (000'000) of $
1980	68.3	10	2.5
1981	70.0	20	5.0
1982	72.2	30	7.8
1983	74.4	40	10.7
1984	76.6	50	13.8
1985	78.7	60	17.0
1986	80.9	70	20.4
1987	83.1	80	23.9
1988	85.7	90	27.8
1989	87.9	100	31.6

TOTAL COST FOR FIRST FIVE YEARS: 89.8
TOTAL COST FOR TEN YEARS: 160.5

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a Cost per child per year is $.45. It is assumed that actual coverage is 80 percent of access. The estimate also depends crucially on the assumption that (1). the average number of cases of diarrhea per year is 4.2 for children 0-1 years of age, 1.8 for children 1-2 and .9 for ages 2-5 and (2). the proportion of cases requiring treatment is .5. (See Cost Effectiveness of Programs to Combat Childhood Communicable Diseases in Kenya, Part II of this report)

APPENDIX

FOREIGN DONOR HEALTH ACTIVITY

This appendix presents material that illustrates the extent of foreign donor health activities in Africa. The size of the activity indicates that any Africa-wide health program will be carried out with the extensive cooperation of both bilateral and multilateral donors. The cooperation would include technical, as well as financial, assistance. While it is difficult to provide specific information on the scope of foreign donor activity some general statements, based on documents and interviews with officials at several donor agencies, are possible. Annex C of the USAID/HEW Health Strategy ... report[1] also contains a discussion of external health aid to Africa.

1. Bilateral donors

The roles and programs sponsores by donor agencies differ considerably.

For example, Belgium's health aid is used primarily for the development of basic health services. Projects funded by Belgium include:[2]

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1 USDHEW, Office of International Health, Inter-Agency Working Group on African Health Strategy. Op. cit., pp. C-1 to C-11.

2 Ibid., pp. C-7 to C-8.

Burundi and Zaire	-	tuberculosis control
Cameroon and Zaire	-	paramedical manpower training
Ivory Coast	--	nutrition, health education and social medicine
Niger	-	preventative and curative health care system
Rwanda and Sudan	-	trypanosomiasis and leprosy control
Zambia and Zaire	-	pilot rural health projects

French health aid is primarily allocated to francophone African countries. The majority of the aid, seventy-four percent in 1977, provides French medical personnel -- medical officers, pharmacists and dentists -- in the support of local health services. Nine percent of the aid was spent on construction, renovation, equipment, and logistic support for health units. French health programs also include the training of Africans, both in France and Africa. Total French health assistance in 1977 amounted to $35 million dollars.[1]

The largest part of British aid to Africa (totalling approximately $6 million in 1976) is allocated to capital development, primarily to Malawi, the Seychelles, Mali and Lesotho.[2] Other donors with sizable programs in Africa are West Germany, Canada, Sweden, Netherlands and Denmark. Table A-1, which surveys donor activities for a random selection of ten African countries, is taken from Annex C to the USAID/HEW report cited above.

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1 Ibid., pp. C-8 to C-9.

2 Ibid., pp. C-9 to C-10.

2. Multilateral donors

The World Health Organization provides technical and organizational assistance as well as funds for the development of primary health care, basic health services and the training of health personnel. Many of the WHO activities involve the provision of technical assistance and guidance in cooperative efforts where a sizable proportion of financial support is provided by other donors; approximately forty percent of total WHO funds come from collaborating donors such as the World Bank, UNDP, and private organizations.

Table A-2 gives the distribution of multilateral USAID health project funds among African countries. The table does not include regional projects such as the onchocerciasis control program for the Voltaic River basin area.

The World Bank's activities in health have increased over the last three to four years. Table A-3 gives a breakdown of the expenditures in Africa for FY 1971 - FY 1979. The total expenditure on health over the eight-year interval was $44 million. Most World Bank health funds are components of larger rural development projects affecting more than one sector. The largest percentage of health component functions (See Table A-4) are for sector control, primarily for the control of the fly in Western Africa that transmits onchocerciasis, but also for malaria and schistosomiasis control.

These programs are often part of irrigation or resettlement schemes which open new agricultural land. A part of the functions designated as preventative services, maternal services and child care services are for immunization, but the exact allocation of funds by country and size is not available.

3. AID Programs for the delivery of low-cost health services

Table A-5 summarized thirteen integrated low-cost health projects in Africa, current in 1978, funded by USAID.[1] Many of the projects are regional rather than national in scope and have rural as well as urban poyulations as the target group. The projects are, therefore, involved with the distribution of basic maternal and child health services to a broad population base. The components of the projects are given in Table A-6. Disease control and immunization are involved in approximately 40% of the thirteen projects listed.

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1 See Baumslag, N.; C. Roessel and E. Sabin. 1978. A.I.D. Integrated Low-Cost Health Projects. Two volumes. USDHEW, Office of International Health.

TABLE A-1

SURVEY OF BILATERAL HEALTH PROGRAMMING IN SUB-SAHARAN AFRICA (U.S.$) a/

BILATERAL PROGRAM	CAPE VERDE	CENTRAL AFRICAN EMPIRE	GABON	GAMBIA	LIBERIA	MALI	MAURITANIA	MOZAMBIQUE	SENEGAL	ZAMBIA
	$	$	$	$	$	$	$	$	$	$
Belgium - 1976									137,400	
- 1977										57,200
Canada - 1976									1,000,000	1,000,000
Denmark - 1977										229,168
Egypt - 1977		62,400								
Finland - 1977										72,000
France - 1977		2,360,867	14,800				91,300			
Germany - 1977			1,750,000		135,730					
Italy - 1977		61,600			85,000	11,000		650,000		15,000
Japan - 1977		30,440								
Korea - 1977		70,000			28,200					
Malta - 1977					51,000					
Netherlands - 1977			500,000	15,600	829,000				600,000	719,770
Norway - 1977										135,784
Sweden - 1977					29,400					844,000
United Kingdom - 1977				232,980	35,000					

a/ Source: USDHEW, Office of International Health, Inter-Agency Working Group on African Health Strategy. Op. cit.

APPENDIX
TABLE A-2

MULTILATERAL DONOR AND USAID HEALTH PROGRAMS
IN SUBSAHARAN AFRICA[a]
(See footnotes for dates)

COUNTRY	WHO and UNDP[b] (000's & $)	WORLD BANK[c] (# of projects)	USAID[d] (000's & $)
SAHEL AND WEST			
Benin	108		9,128
Cape Verde	75		7,000
Gambia	137	1	
Ghana	1,579		16,241
Guinea	645		
Guinea Bissau	314		
Ivory Coast	61	1	
Liberia	53	2	15,357
Mali	420	1	3,890
Mauritania		1	2,450
Niger	575		17,002
Nigeria	4,383		
Senegal	3,364	2	5,019
Sierra Leone	221		
Sudan	2,077		34,063
Togo	505	1	8,000
Upper Volta	858	1	14,453
CENTRAL AFRICA			
Angola			
Burundi	3,148		
Cameroon	2,117	4	32,224

APPENDIX
TABLE A-2 (continued)

COUNTRY	WHO and UNDP[b] (000's & $)	WORLD BANK[c] (# of projects)	USAID[d] (000's & $)
CENTRAL AFRICA (continued)			
Central Africa Republic	732		1,693
Chad	364		9,101
Congo			
Gabon	750		
Rwanda	402	3	11,320
Zaire	107		12,002
EAST AFRICA			
Botswana	818		6,430
Ethiopia	1,845	2	
Kenya		2	23,689
Lesotho	299		9.551
Malawi	469	6	1,020
Mauritius	15	2	
Mozambique	1,084		
Somalia	888	1	23,200
Swaziland		1	7,500
Tanzania	733	4	21,948
Uganda	355	1	
Zambia	828	2	
Sao Tome Phillipe	2		
Madagascar	1,006	2	
South Rhodesia	73		
	31,410		

FOOTNOTES FOR TABLE A-2

a This is a summary of the information discussed in the text. The table should be regarded as incomplete, as donors may have activities not indicated, and some donor agencies are omitted.

b These are not annual expenditures. Dollar amounts are for projects with estimated completion dates between 1977 and 1982. Water and sanitation projects are included.

c From computer printout provided by Susan Ueber Raymond, Office of Environmental and Health Affairs, World Bank. The numbers in the table represent the number of World Bank projects in each country with health sector components. The data cover fiscal years 1971 to 1979.

d These are not annual expenditures. Dollar amounts include some projects under design and are for projects with estimated completion dates between 1977 and 1982. The data are taken from a list compiled by T. Schroedel (summer intern) for USAID/DS/Office of Health. Regional projects totaling $107 million are omitted. Water and sanitation projects are included. For additional detail see Table A-IV.

APPENDIX
TABLE A-3

WORLD BANK HEALTH PROGRAMS IN AFRICA
(Fiscal Year 1971 to Fiscal Year 1979)

I. World Bank health expenditures are components of multisectoral projects. The total number of components in Africa is 38, with an approximate component expenditure of $44 million (including contingencies). The total health component expenditure is 3.8 percent of total World Bank project costs in Africa.

II. Breakdown of Components by Project Sector

Rural Development	22%
Irrigation	3%
Education	6%
Urban	5%
Other	2%

III. Component Functions (Total greater than 100% due to multifunctional nature of components)

Vector Control	38%
Preventative Services	31%
Material Services	25%
Childcare Services	20%
Health Education	25%
Other	25%

TABLE A-4

SUMMARY OF AID INTEGRATED LOW-COST HEALTH, NUTRITION AND POPULATION PROJECTS IN AFRICA

	COSTS MILLION $	PROJECT LIFE (FISCAL YEARS)	TARGET GROUP	COVERAGE	PURPOSE	NUTRITION COMPONENT
CAMEROON PID MEDCAM	14.9 (grant)	1979 to 1983	*ne	National	Extension of rural health services through three tiered workers to be trained in two centers (Yaounde & Douala).	Middle level health workers will be trained to provide basic nutrition services.
CAPE VERDE ISLAND BASIC RURAL HEALTH SERVICES	1.5 (grant)	1979 to 1981	240,000	National	Expand and improve capability to deliver basic health services.	Health Educators in the basic rural health centers initiate, within the community, nutrition education (trained by UNICEF and chosen by the community).

* Not estimatable

TABLE A-4 (continued)

	COSTS MILLION $	PROJECT LIFE (FISCAL YEARS)	TARGET GROUP	COVERAGE	PURPOSE	NUTRITION COMPONENT
CENTRAL AFRICA AFRICAN EMPIRE (OUHAM PROVINCE) RURAL HEALTH	1.7 (grant)	1977 to	350,000	Regional	Health Management and Training Village health edu - cation rural sanitation and basic village Level Health Care Agency. (VLUCA). These workers are chosen by the village. Prefectural Base Health Office (PHBO) uses data collection and analysis as an evaluation tech- nique for health education.	VLUCA provides MCH and nutrition services. Agriculture extension agents and community development agents promote nutrition and agriculture programs. PHBO develop fish and poultry programs.
GHANA DANFA RURAL HEALTH/ FAMILY PLANNING	3.03 (grant)	1976 to	*ne	Regional	Investigate factors associated with health and family planning. Train health workers. Demonstrate cost effectiveness of the health care programs. (integrated family health planning.)	Project III Outputs Methods for improvement of nutritional status in rural communities.

TABLE A-4 (continued)

	COSTS MILLION $	PROJECT LIFE (FISCAL YEARS)	TARGET GROUP	COVERAGE	PURPOSE	NUTRITION COMPONENT
LESOTHO RURAL HEALTH DEVELOPMENT (MEDEX)	3.2 (grant)	1977 to	1.1	National	To upgrade management competence, planning and administration and set the stage for new health workers. (Medex and Village health workers)	VHW trained in basic MCH tasks such as: 1. Weighing of of children. 2. Methods of safe food storage. 3. Nurse clinician will be able to gather baseline nutrition data from community health education duties. 4. Stress of the development of: Kitchen gardens, proper weaning diets, use of wild foods, diets for pregnant and lactating mothers and pre-school children.

TABLE A-4 (continued)

	COSTS MILLION $	PROJECT LIFE (FISCAL YEARS)	TARGET GROUP	COVERAGE	PURPOSE	NUTRITION COMPONENT
LIBERIA PID INTEGRATED NATIONAL HEALTH SYSTEMS	4.1 (grant)	1978 to 1982	*ne	National	Establish a rural integrated national health system assisted by linkage with a U.S. medical center and the John F. Kennedy National Medical Center in Liberia.	Special health manpower training project output did not define nutrition activities.
LIBERIA LOFA COUNTY RURAL HEALTH	1.5 (grant)	1975	155,000	Regional	Develop test and institutionalize a network of health post centers and hospitals through trained paramedical personnel to deliver improved health services.	Not stated.

TABLE A-4 (continued)

	COSTS MILLION $	PROJECT LIFE (FISCAL YEARS)	TARGET GROUP	COVERAGE	PURPOSE	NUTRITION COMPONENT
MALI RURAL HEALTH SERVICES DEVELOPMENT	4	1977 to 1980	3/6	*one arrondissement in each of the three (3) selected regions.	1. Bring health service to village level. Emphasize health promotion and disease prevention.	1. Birth weight census. 2. Weight and arm circumference of infants and young children. 3. Diagnosis and evaluation of feeding and weaning practices. 4. Iron supplements in pregnancy. 5. Diagnosis and referral of malnutrition.

* arrondissement = 20-40 villages.

TABLE A-4 (continued)

	COSTS MILLION $	PROJECT LIFE (FISCAL YEARS)	TARGET GROUP	COVERAGE	PURPOSE	NUTRITION COMPONENT
NIGER IMPROVEMENT RURAL HEALTH	13.3 (grant)	1978 to 1982	3,500 villages	Regional	Establish rural health delivery system through volunteer village health team (VHT) with two (2) health matrons (mid-wives), village leaders and an administrative committee. Provide training and institution support.	VHT will do nutrition education.
SENEGAL RURAL HEALTH SERVICE DEVELOPMENT	3.3 (grant)	1977 to 1980	2,884 (Sine-Saluom	Regional	Create staffed village health posts through a village Hut network. VHW community involvement (major) (emphasis is training).	Simple nutrition education by VHW. Monthly supervision through an "Itinerant Agent".
SUDAN HEALTH SERVICE DELIVERY PID STAGE	21.8 (grant)	1978 to 1983	*ne	Rural Nationwide	Improved Rural Health Delivery. Provide basic health care. Improve nutritional status of mothers, infants and preschool children.	Not defined.

TABLE A-4 (continued)

	COSTS MILLION $	PROJECT LIFE (FISCAL YEARS)	TARGET GROUP	COVERAGE	PURPOSE	NUTRITION COMPONENT
TANZANIA MANPOWER TRAINING PROGRAM FOR MATERNAL & CHILD HEALTH AIDES	10.8 (grant)	1973 to 1982	13 million (90% of rural population)	National	Train maternal child health aides (MCHAS) capable of providing comprehensive MCH and spacing services to the rural population.	MCHAS provide MCH services and nutrition education.
ZAIRE BASIC FAMILY HEALTH SERVICES	2.6 (grant)	1979 to 1981	Fertile women and children under 5 years.	1.2 million	Develop basic family health services.	Not defined.

APPENDIX
TABLE A-5

NUTRITION AND NUTRITION-RELATED COMPONENTS
IN USAID INTEGRATED HEALTH PROJECTS

AFRICA	Mali	Lesotho	Ghana	Liberia I	Sudan	Cape Verde Islands	C.A. Empire	Liberia II	Niger	Senegal	Zaire	Tanzania	Cameroon
BREAST-FEEDING	X												
WEANING		X	X										
NUTRITION EDUCATION	X	X	X	X	X			X	X	X			
WEIGHT CHARTS	X	X											
MATERNAL SUPPLEMENTATION	Fe												
INFANT SUPPLEMENTS													
DEVELOP WEANING FOODS	X	X	X										
DIETARY FORTIFICATION													
FOOD PRODUCTION		G			X		F						
IMMUNIZATION	X			X		X			X				
DISEASE CONTROL	D,W				M								
WATER SUPPLY	X			X			X						
SANITATION	X		X	X	X	X	X	X	X	X			
FAMILY PLANNING	X	X	X	X				X			X		
COMMUNITY PARTICIPATION		X											
MASS MEDIA													

(S) Small Animals (D) Antidiarrheal (W) Deworming (M) Malaria
(Fe) Iron (G) Family Gardens (F) Fish Ponds