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COST ANALYSIS OF THE NATIONAL IMMUNIZATION  
AND CDD PROGRAMS IN  
THE REPUBLIC OF TURKEY

Submitted to the Asia/Near East Bureau  
Agency for International Development

MARCH 1988

**Resources for  
Child Health  
Project**

**REACH**



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COST ANALYSIS OF THE NATIONAL IMMUNIZATION AND CONTROL OF DIARRHEAL  
DISEASE PROGRAMS IN THE REPUBLIC OF TURKEY

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April, 1988

Supported by the Resources for Child Health (REACH) Project under AID  
contract no. DPE-5927-C-00-5068-00.



## ACKNOWLEDGEMENTS

This study would not have been possible without the assistance and dedication of several individuals. First, I would like to thank Ms. Nimet Çobanoğlu for her assistance in data collection and interviews with government officials. Dr. Nilüfer Ünner, Assistant Director PHC and Dr. Mehmet Ali Biliker, provided support for the study within the PHC Directorate and helped organize the final briefing on the results of the study for the WHO Comprehensive Review team. Other officials in the Ministry provided valuable information on program costs as well.

Dr. Sarojini Abraham, Dr. Nefise Bazoğlu, Dr. Serap Maktav, Mr. Gary Gleason, and Mrs. Zuhâl Orun of the UNICEF office in Ankara who made logistical arrangements for the study and who offered their assistance during data collection. I would like to thank Dr. Ko Keja of WHO/Geneva and other members of the Comprehensive Review Team for their comments and suggestions.

Additional recognition should go to Mr. İlhan İnan for his participation in data collection during the facility study in Istanbul and in providing necessary translation and interpretation between English and Turkish. Special thanks goes to my colleague Dr. Pierre Claquin for providing guidance and support for the study, and for participating in the facility study as well.

Special mention goes to Dr. Neşe Yeminecioğlu of the PHC Directorate who provided valuable assistance in data collection and analysis, and whose dedication made a difference in the quality of the study.

## LIST OF ABBREVIATIONS

CDD = Control of Diarrhoeal Disease program

EPI = Expanded Programme on Immunization

GOT = Government of Turkey

MCH/FP = Maternal and Child Health/Family Planning

MOHSA = Ministry of Health and Social Assistance

ORS = oral rehydration salts

ORT = oral rehydration therapy

PHC = primary health care

TRT = Turkish Radio and Television

UNICEF = United Nation's Children Fund

USAID = United States Agency for International Development

WHO = World Health Organization

## GLOSSARY OF TERMS

This is a partial list of economic and financial terms that are used in this report.

Resource: The inputs which are required to produce or deliver a good or service. Resources include labor, materials, and money.

Cost: A cost refers to the monetary value of resources used to deliver or produce a good or service. In this report, the terms cost, full cost, resource cost, and full resource cost are synonymous. Monetary value may be the same as the price.

Total Cost: The total cost of a program is equal to the sum of the value of all resources used. Total costs can be divided into fixed costs and variable costs. Fixed costs plus variable costs equal total costs.

Variable Cost: Variable costs are a result of the numbers of services provided. The cost of vaccines is a variable cost because each child uses a vaccine and incurs a cost.

Fixed Cost: Fixed costs are those which are not directly linked and do not vary in magnitude by the numbers of outputs or services delivered. For example, one fixed cost for an immunization program is vehicle cost because each child vaccinated does not require a separate vehicle.

Investment Cost: Investment are those which accrue benefits in the future or which are made infrequently in a program. Investment costs refer to the value of these investments. For example, building costs and vehicle costs represent investment costs for both immunization and CDD programs.

Recurrent Cost: Recurrent costs are equal to the value of resources used on an annual, monthly, or daily basis to produce or deliver a good or service. For instance, vaccine costs occur every day of an immunization program and are therefore a recurrent cost of that program.

Opportunity Cost: An opportunity cost is a measure of the amount of resources used to produce one thing instead of another. For instance, the value of a mother's time spent waiting to receive treatment for diarrhea for her child represents an opportunity cost to the mother, who could have been working in the fields or doing other activities.

Cost-effectiveness: A technique which is used to determine whether the effectiveness of a program (health outcomes) are worth its costs. The ratio between the full cost and the effectiveness of a program is its cost-effectiveness.

Cost Category: A name given to classify a wide variety of costs into similar groups such as personnel, transportation, media, equipment, etc.

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Cost Profile: This is the "thumbprint" of a program and characterizes what a program is like in terms of its cost. It is calculated by taking ratios between total cost and the value of each cost category.

Expenditure: Money which is actually spent to buy a service or good.

Budget: A yearly account which estimates how much money goes in and comes out of the national government or a household. Budgeting is usually part of the planning process for health. In Turkey, a budget is made every year for the MOHSA and each Directorate within the MOHSA. This budget may or may not be equivalent to the amount of money spent at the end of the year.

Financial Analysis: An evaluation of who is paying and how much is being spent.

Financing: How something is paid for. For example, when the MOHSA finances the immunization and CDD programs, they are paying for these programs out of the government budget. When individual patients give donations to health centers, they are financing some part of the delivery of services.

Fully Vaccinated Child: A fully vaccinated child in this report refers to a child which has received at least one dose of BCG, one dose of measles, three doses of oral polio, and three doses of DPT. Children which have received most but not all of the doses mentioned above are not considered fully vaccinated.

Parastatal: A parastatal is an organization which lies between the government and the private sector. An example is the Turkish Radio and Television which receives some funds from the national government but which is run as a private organization.

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## EXECUTIVE SUMMARY

This study was undertaken as part of a joint Government of Turkey/WHO/UNICEF/USAID Comprehensive Review of the Expanded Program on Immunization and the Program for the Control of Diarrheal Diseases in Turkey. The purpose of this study was to examine the costs of both the national immunization and the national control of diarrheal diseases programs in order to determine how many resources will be needed in the future and who is paying for these programs now. The sustainability of the EPI has received more attention during the last two years, primarily as a result of the intensity of acceleration efforts and their consequent demand for resources, including human, material, institutional, and financial. The financial sustainability of the EPI has been of concern in the Republic of Turkey because of the level of donor assistance which was required to undertake the national immunization campaign in 1985 and to establish a stronger routine system.

### National EPI

The national EPI is currently operating on a routine basis in a variety of health facilities, including health centers, health houses, MCH/FP centers, and hospitals. A major governmental commitment to the program was made in 1985 during the national immunization campaign, and this commitment has remained with the program until the present time. In addition, there is significant contribution of mass media and social mobilization to the routine EPI, which also began during the 1985 campaign, but which has lasted until today.

The study included two types of analyses: a policy-level evaluation of national program costs and general cost-effectiveness, and an operational or "micro-analysis" of the factors which influence the cost of delivering immunization services in health facilities. The WHO-recommended methods for costing immunization and diarrheal disease programs were used as guidelines for these studies (WHO EPI/GEN 79/5, Creese, 1979).

Total cash expenditures for 1987 for the EPI were approximately \$2 million and total resource cost (including donated labor, equipment, vehicles, and media time) was nearly \$14 million for the year. Recurrent costs were 83% of total costs, with salaries and benefits (65%), media (10%), and cold chain equipment depreciation (8%) the three leading cost categories. The most important expenditure categories were vaccination supplies or disposable syringes (34%) and vaccines (33%).

The Ministry of Health and Social Assistance (MOHSA) is financing nearly all of the costs of the EPI (97% including government parastatals), with donor organizations such as UNICEF financing the cost of vaccines, vaccination supplies, and cold chain equipment. These results are promising and show that this program is integrated into the MOHSA.

Based on the results of the 1988 coverage survey, 57% of all children between the ages of 12 and 23 months were completely vaccinated (over 800,000 children). Therefore, the cost per fully vaccinated child was

\$17.08. This figure is somewhat higher than what has been determined for other routine systems in the world, but falls within a range of cost-effectiveness figures from the literature.

To complement information that was collected at the national level, a survey was conducted in 16 health facilities in Istanbul, Ankara, and Van provinces to determine factors which influence the cost of delivering immunizations at that level. The results of the survey suggest that the number and types of personnel involved in administering vaccinations and the monthly number of kilometers traveled to replenish stock or to buy necessary supplies had a measurable effect on the cost structure of the facilities. In addition, the average cost per dose ranged from \$8.15 to \$0.24 for the sample, showing a wide variation in cost and immunization activity. When these data are segregated by type of facility, one found that the average cost per dose in village health centers (\$6.46) was 19 times that in city health centers (\$0.34). These data suggest that it is more costly to deliver services to rural populations. However, when total immunization activity is adjusted for the catchment area population of each of these facilities, city health centers have the lowest "index of activity". These data may be the result of high coverage in cities, high competition among types of health care providers, or low immunization activity.

#### National CDD Program

The cost of the national control of diarrheal disease program (CDD) was estimated in the same manner as for the EPI. The goal of the CDD is to manage all mild to moderate cases of childhood diarrhea presenting at health centers with oral rehydration salts, and to educate mothers to use ORS at home for subsequent diarrheal disease episodes. The CDD program began in mid-1985, and unlike the national EPI, has less of a government commitment.

Total expenditures for the CDD program were \$800,000 and the full cost of the program was \$4 million, with recurrent costs being predominant at 97% of total cost. Procurement of ORS packets was the most important expenditure, followed by printing and reproduction of training materials. Both of these categories of expenditure are being financed almost entirely by donor organizations. Personnel and media costs were the two most important full resource cost categories, at 78% and 11%, respectively.

The Government of Turkey is financing approximately half of all expenditures, as compared with the national EPI of which more than 70% is being funded by the government. UNICEF is the primary donor organization, financing 45% of total expenditures for the program.

The cost per child treated was \$9.66 which is higher than is found in other countries with a mass media component. This figure may reflect the initial high program development costs and lag in program acceptors. This is clearly represented by the low variable cost and the high uncovered population.

## Financing of Primary Health Care

Although primary health care is financed primarily by the Government of Turkey, local gubernatorial budgets, the Health Foundation, and the population at large supplement the resource pool for PHC. At the provincial and district level, the governor's offices provide in-kind donations to PHC. The national Foundation for Health and Social Assistance was established to provide financial support to the MOHSA at the national, provincial and district levels. This Foundation receives most of its resources from patient donations at primary health care centers.

Based on results of the facility study, the average patient donation (adjusted for population size) was \$0.11 in 1987. On average, 40% of revenues generated at health facilities are retained at that level, with the remaining balance being forwarded to provincial General Directorates and Foundation headquarters in Ankara. Only village health centers in the sample were able to retain nearly 75% of all donations for the year, and these facilities were the only one which expended all of their revenues. Other facilities carried balances forward into 1988.

This study showed that spending patterns within health facilities did not counterbalance those at the central level, which tend to be more for indirect expenditures such as rent and utilities, but rather supported these patterns. On average, nearly 50% of all health facility expenditures were for indirect costs in 1987. Less than one-quarter of expenditures were for direct patient care.

Donations at primary care facilities represent an increased potential for the future financing of PHC. However, this potential remains unexploited by the MOHSA.

## Conclusions and Recommendations

o The national EPI is on its way to becoming a financially sustainable program within the Ministry of Health and Social Assistance. Nearly all of the full costs (97%) and most of the expenditures (70%) are being financed by the government. However, given the trend of decreasing budget allocations to the MOHSA from the central government, adequate funds for the EPI will need to be continually secured in order to sustain the program at its current level or to strengthen it in the future. In addition, adequate financing for vaccines and syringes needs to be sought in the short and medium term, until Turkey has the capacity to produce these items internally.

o Training costs are being borne primarily by donor organizations. This situation represents a potential threat to the sustainability of on-going training for both the EPI and CDD programs. Therefore, attention should be paid to outlining alternative training strategies (e.g., medical school curriculums, training of midwives, workshops, etc.) and to determining the recurrent costs of these training options. This type of exercise will also provide a means by which the least costly option can be chosen.

o The costs of both the national EPI and the national CDD program needs to be monitored on a routine basis, in order to predict shortfalls in adequate financing, and in order to prepare for improvements in the program such as surveillance systems and routine training. This is particularly true for the national CDD program, in which the government has yet to make a significant financial commitment and which competes for resources with other priority Directorate programs.

o The variation in cost per dose per health facility was not merely a function of the level of immunization activity at the health centers. Inefficiencies in the distribution of vaccines and needed supplies and in the provision of services (i.e., offering immunizations every day of the week and having several staff members provide the services) may be some reasons for this variation.

o Additional studies should be undertaken to evaluate the amount of resources being generated in health facilities in a wider sample of provinces and to estimate the potential of these resources to finance priority PHC programs such as CDD and EPI.

o The government should provide health facilities with guidance about how facility-generated resources should be spent. For example, proportions of expenditures could be recommended, such as more than 50% of facility expenditures should be for direct patient-related services.

o The cost of delivering the EPI and CDD programs in the private sector should be explored in the future.

o A feasibility study of the cost of upgrading the national quality control laboratory and the future recurrent cost burden on the MOHSA should be undertaken. Discussions with the World Bank should take place concerning these studies.

## **I. INTRODUCTION**

### **A. Purpose of Visit**

The sustainability of national Expanded Program on Immunization (EPI) has received more attention during the last two years, primarily as a result of the intensity of acceleration efforts and their consequent demand for resources, including human, material, institutional, and financial. The financial sustainability of the EPI has been of concern because of the level of donor assistance which has been instrumental in establishing routine systems or in accelerating the program. In order to address these issues, several questions have emerged: 1) how much does it cost to attain a certain level of coverage?, 2) how much will it cost to maintain this coverage level? and 3) where are most of the resources coming from and will this level be maintained in the future?

The Republic of Turkey undertook a national immunization campaign in late 1985 through early 1986 with the support of UNICEF. It was estimated that during the campaign, 47 million doses of vaccine were distributed at a cost of \$49 million. A high level of political commitment and the enormous, creative social mobilization efforts characterized the campaign and were major reasons for its success.

Now, two years later, the EPI operates on a routine basis in government health centers and health houses. There is some concern over whether the results of the 1985 campaign are sustainable and at what level of expense to the government and to international donors. In order to address these issues, a cost analysis of the national immunization program was requested by UNICEF/NY of the REACH Project/AID as part of a Comprehensive Program Review scheduled for February. The analysis also included a cost evaluation of the national CDD program as it was also part of the Review.

### **B. Scope of Work**

The original scope of work involved two kinds of analyses for the EPI: 1) a policy-level evaluation of national program costs and general cost-effectiveness of the program; and 2) an operational or "micro-level" analysis of the factors which influence the cost of delivering services in health centers. This scope of work was enlarged to include a cost-effectiveness analysis of the national CDD program. Appendix A contains a detailed scope of work for the study.

### **C. Role of the Studies in the MOHSA**

At the beginning of this consultancy, the consultant was able to outline the benefits of the costs analyses to the Ministry of Health and Social Assistance. One of the major efforts of this consultancy has been to place a contextual framework around both the interpretation and the use of economic and financial study results. It is anticipated that the MOHSA will use this cost analysis as a basis for establishing on-going monitoring and evaluation mechanisms for these two programs.

## II. BACKGROUND ON TURKEY

### A. Economic Conditions

According to a detailed World Bank "Health Sector Review" prepared in 1985, the GNP per capita is estimated to be \$1,370 in 1982, which places the country in the range of "middle income countries". Turkey has applied to become a member of the European Economic Community (EEC) and is waiting approval.

Although the country has experienced substantial economic growth in recent years, these benefits have not transferred to the health sector. The country spends approximately 3.5% of its GNP on health (\$40 per capita). More than half of these expenditures are direct payments by households. The proportion of government budget allocated to health was 1.9% in 1987. This allocation represents an increase in real terms of 33% over the previous year. Nevertheless, this increase is not commensurate with inflation, which rose to 50% in that year. Health represents only 1.4% of total public investment in 1987. The forecast for 1988 appears brighter, with approximately 4.1% of the total government budget being allocated to health, representing an increase in total public investment to 1.8%.

### B. Health Conditions

Although Turkey appears to have a more favorable economic situation than most developing countries, it has a high infant mortality rate at 95 per 1000 live births (UNICEF, 1986). The greatest cause of infant mortality is perinatal complications, followed by pneumonia (18%), diarrheal disease (8%), meningitis, and other infectious diseases. Children less Infectious diseases (measles) and accidents are major causes of mortality in children less than five years of age. Measles is a major cause of childhood morbidity, along with diarrhea, pneumonia, and intestinal infections (World Bank, 1985).

There is a wide variation in the distribution of wealth and in health status in Turkey, with the poorest areas being in the Eastern part of the country. In addition, urban areas have lower rates than rural ones.

The average life expectancy is 63, with men having a lower expectancy at 61 years compared to women at 66 years. The population growth rate is 2.2 (1973-82), and a woman has on average 4.1 live births (World Bank, 1985).

The total population is estimated to be 53 million, with children less than five representing 13.3% of the total population, and children less than one year representing 3.5% of the total. The growing trend toward urbanization has led to the development of large, peri-urban areas, called "gecekondu", which lack adequate drinking water and waste disposal facilities. About 45% of the population lives in urban areas, and about half of Ankara's population lives in the gecekondu (1985).

### C. Health Infrastructure

The health care infrastructure is well-developed with a system of tertiary and secondary hospitals, health centers, MCH and Family Planning centers, Tuberculosis Centers, and health houses. There are a total of 3,079 primary health centers and 196 MCH/FP centers. Each of these centers is categorized by type and by population size, with the largest centers serving approximately 200,000 population to 10,000 population in the smallest centers.

Although access varies by location in the country, with the West being more highly developed than the Eastern part of the country, there are still many health centers and health houses for which construction has been delayed.

In addition, staffing of these facilities remains a major problem. By law, all physicians must serve 18 months to two years of compulsory service in primary health centers. However, there is a strong motive to end this service as quickly as possible, and the average duration of service is 4-5 months. There is also a great shortage of trained nurses in the country and staff turnover is very high. Therefore, although access to facilities may not be a major problem, the continuous staffing of health centers and other primary health care facilities remains one of the greatest challenges for the MOHSA.

### D. Role of the Donor Community

There are two primary donors to child survival activities in Turkey at the present moment: UNICEF and the WHO. Most of the child survival resources have come from UNICEF, as was evidenced during the 1985-86 immunization campaign. USAID and Rotary International have provided assistance to UNICEF/Ankara directly. A.I.D. Washington provided \$1 million in 1985 which has been allocated through 1989. Continued donor investment in the EPI, while strong, probably will not be at the same level as previously experienced.

### III. COST ANALYSES

#### A. EPI

##### 1. Program description for 1987

Although the Expanded Program on Immunization began in 1981, a major governmental commitment was made to immunizing children during the 1985 campaign. The EPI is currently operating on a routine basis, with vaccinations being given primarily in government health centers, health houses, MCH/FP centers and TB centers. Access of the population to these centers is virtually 100%. Vaccinations are provided in these centers, and outreach services are found principally in the most remote areas. Therefore, the major strategy of the EPI in Turkey is routine services provided through fixed centers.

The EPI is managed by the PHC Directorate in the Ministry of Health and Social Assistance (MOHSA), under the Communicable Diseases Division.

##### 2. Data sources and methods

This is the second cost-effectiveness study to be undertaken for the EPI in Turkey. The previous study, performed by Dr. Alan Fairbank, examined the cost per dose for the 1985 campaign, which was estimated to be \$1.08. The present study has adapted the standard, WHO-recommended methodology (Creese, 1977). The results include total expenditures for the EPI among various organizations and ministries which measures monetary contributions to the program. In addition, this analysis also measures the full resource cost of the immunization program, including the opportunity cost of personnel time, donated media broadcasting time, depreciation cost of cold chain equipment and vehicles, and cost of vaccine administered to children. Results are presented in terms of recurrent and investment costs as well as variable and fixed costs for the program.

The analysis used an average exchange rate for 1987 of 860 Turkish liras to one U.S. dollar. This rate was provided by the Central Bank of the Republic of Turkey. The inflation rate chosen for the analysis was 10% for internationally-procured goods, and 50% for local costs. These figures were provided by the World Bank office and the American Embassy. The State Planning Organization of Turkey reports a lower inflation rate for the country, and the Planning, Research, and Coordination Division of MOHSA reports a 25-35% inflation rate.

The depreciation cost of buildings was not included in the main analysis for several reasons. First, a primary health infrastructure has been well-established in Turkey for several years, and although construction of facilities is continuing, there is almost universal access to immunization services at the present time. Therefore, immunization services are not dependent upon future construction of facilities. Second, building maintenance costs were allocated to the immunization program, because access to services is linked to whether the health facility can be maintained in full operation. Finally, given the rate of inflation (50%), the depreciation cost of buildings would have become one of the most important cost categories for the EPI, thereby masking the most relevant costs of delivering services (see Section 4.5 for a Sensitivity Analysis).

Data were collected in Ankara and Istanbul during the period of January 22 through February 10, 1988. Information on the quantities of inputs and their unit costs was collected in the PHC and MCH/FP Directorates of MOHSA, through interviews with representatives from the Ministry of Interior, the Ministry of Youth Education, and Sports, the Planning, Research, and Coordination Division of MOHSA, and at donor organizations, such as UNICEF, WHO, the World Bank, and the American Embassy.

Information on the cost of delivering immunizations through the private sector and in the hospital sector was not included in this study. The role of these providers in overall immunization coverage is low at the present time (approximately 5%). The figures presented below represent the cost of the EPI in public primary health care facilities which provide the majority of services.

To complement information collected at the national level, a small survey of 10 local administration offices (governor's offices) and of four Health Foundation offices was conducted. Most of the major contributions to the EPI at the provincial level were from Istanbul province, which represents over 10% of the total population of Turkey (see Appendix B for examples of this survey).

### 3. Joint costs and private costs

Direct allocation of expenditures and costs were made for most of the cost categories. However, because the EPI is integrated into other primary health care services, there were substantial shared or joint costs which had to be allocated. Allocation of salary costs, for example, was made on the basis of the proportion of time spent by health workers on EPI, estimated to be 15% of total time. Allocation of PHC budget categories, such as transportation, overhead, per diem, vehicle depreciation, and printing and reproduction costs were also made on the basis of this same proportion. The sensitivity analysis in Section 4.5 measures what the change would be in total cost and cost per fully vaccinated child, if this proportion were increased.

Because of the economic situation in Turkey, which results in financial shortages in the Ministry of Health (for per diem and transportation costs), there is significant out-of-pocket costs for health workers for the EPI. These costs are difficult to quantify, but anecdotal information from the facility survey in Istanbul, shows that health workers often finance their own transportation to collect vaccine stock or to attend training meetings. These costs were not included in the present analysis.

### 4. Presentation of results

#### 4.1 Expenditures for the EPI

Information on the expenditures made in 1987 for the routine program are presented in Appendix C.1. Expenditure information was collected for MOHSA (PHC and MCH/FP Directorates and the TB Eradication Department), local administration expenditures for Ankara and Istanbul provinces

(representing 5-10% of the total population), Turkish Radio and Television (a parastatal organization of the government), the National Foundation for Health and Social Assistance (a non-governmental organization which financially supports the MOHSA), the World Health Organization (WHO), and UNICEF. Contributions to the EPI from USAID and Rotary International were made directly to UNICEF. However, the analysis segregates these contributions in order to elucidate the types of costs which are being financed by each contributor.

The total expenditures for the EPI was approximately 1.9 million U.S. dollars (1.7 billion TL). Table 1 illustrates the proportion of expenditures by type and compares them with the proportions for full resource cost. Vaccine and vaccination supplies (primarily needles and disposable syringes) represented 66% of total expenditures in 1987. Donor contributions were approximately 40% of that amount (\$422,200/\$1,288,410). USAID financed the procurement of 1 million doses of measles vaccine and technical assistance for a total contribution of \$190,000 in 1987. Donor contributions were also significant for training and printing costs. Transportation and travel costs were the third largest expenditure category for the EPI at 11% of the total. Recurrent expenditures represented 95% of the total for the year.

Vaccine and syringe expenditures are presented in Table 2. The government procured RCG and some DPT in 1987, for a total of \$162,125. In addition, the Health Foundation assisted MOHSA with approximately \$48,000 for DPT procurement.

Table 3 presents the proportion of total expenditure and full cost by source. One can see that the Government of Turkey is financing a substantial proportion of the total (65% of expenditures), with the MOHSA financing greater than 50% of the total.

Expenditures for delivering BCG through the TB Eradication Department were approximately \$250,000 in 1987. If BCG was integrated into the routine EPI, this could potentially represent a savings of this amount.

TABLE 1

COMPARISON BETWEEN DISTRIBUTION OF EXPENDITURE  
AND COSTS BY CATEGORY FOR THE EPI IN TURKEY

COST CATEGORY	EXPENDITURE TO PROGRAM	FULL RESOURCE COST
I. RECURRENT COSTS		
Salaries/Benefits	0.0%	64.6%
Per Diem	3.5%	0.5%
Per Diem-Training	1.1%	0.2%
Trans + Travel	11.1%	1.6%
Trans-Training	1.5%	0.2%
Freight + Shipping	4.3%	0.6%
Vaccine	33.2%	1.7%
Vaccination Supplies	33.6%	2.6%
Media	0.9%	9.8%
Other Supplies	1.5%	0.2%
Maintenance Vehicles	0.9%	0.1%
Maint. Cold Chain	.0%	.0%
Print/Trans/Repro	2.5%	0.3%
Building maint.	3.0%	0.4%
Subtotal	97.2%	82.9%
II. INVESTMENT COSTS		
Cold Chain Equipment	.0%	8.4%
Media Equipment	0.2%	.0%
Computer Equipment	0.5%	0.0%
Vehicles	0.0%	6.9%
Technical Assistance	4.2%	0.6%
Subtotal	4.9%	15.8%
GRAND TOTAL	1,914,256	13,725,124

TABLE 2

ESTIMATION OF THE EXPENDITURES FOR EPI VACCINE BY SOURCE  
IN 1987 IN U.S. \$\$

ANTIGEN	NUMBER OF DOSES	UNIT COST/DOSE	TOTAL COST TL	TOTAL COST \$\$	SOURCE
BCG (20)	156,800	56	8,780,800	10,210	TB ERAD. DEPT.
BCG (50)	324,750	31	10,002,300	11,631	TB ERAD. DEPT.
Subtotal BCG	481,550		18,783,100	21,841	
DPT	2,000,000	0.026	-----	51,000	UNICEF
	5,000,000	0.026	-----	130,318	MOSHA
	1,500,000	0.031	40,099,500	48,077	FOUNDATION
	383,320	0.026	-----	9,966	GD ISTANBUL
Subtotal DPT	8,883,320		40,099,500	239,361	
ORAL POLIO	6,000,000	0.034	-----	205,100	ROTARY
MEASLES	1,000,000	0.130	-----	130,000	USAID
TT	3,000,000	0.013	-----	40,000	MOSHA
TOTAL	25,729,740		117,765,200	857,504	

TABLE 3

DISTRIBUTION OF TOTAL RESOURCE COST AND PROGRAM EXPENDITURE  
BY SOURCE OF FINANCING FOR THE EPI IN TURKEY

ORGANIZATION	EXPENDITURE TO PROGRAM	FULL RESOURCE COST
MOHSA	52.4%	76.3%
OTHER MINISTRIES	14.0%	11.5%
TOTAL GOVERNMENT	66.4%	87.8%
TRT, FOUNDATION	3.5%	9.9%
UNICEF	30.5%	3.2%
WHO	1.7%	0.2%
TOTAL DONORS	32.2%	3.5%

#### 4.2 Full Costs of the EPI

The full costs of the EPI by type of cost are presented in Appendix D.1. As mentioned previously, these costs include non-monetary costs of the routine program, such as donated time and materials. For the PHC Directorate, salary costs were measured as a 15% of the total cost for health personnel involved in immunization in health facilities. Appendix D.2 shows the calculation of cost for the central, provincial, and health facility levels. Proportion of time for administrators were determined through multiple interviews with MOHSA officials.

Per diem and travel and transportation costs were calculated as 15% of the 1987 budget for per diem for the PHC Directorate to reflect the cost of supervisory visits at the central and provincial level. The per diem and transportation costs of training were based on detailed descriptions of training sessions held at the central, provincial, and local level in 1987. Appendix D.3 illustrates these results. Freight at shipping includes the cost of distributing vaccine (approximately 48,000 per year) from the central warehouse in Ankara. Details of the cost of operating the central warehouse for the EPI are found in Appendix D.4.

The full resource cost of vaccine and vaccination supplies is based on the numbers and types of doses administered in 1987 and reported to the National EPI in Ankara. For vaccine costs, an estimate of 50% wastage for BCG and 20% wastage for polio, measles, and DPT were used to reflect the total number of doses used in that year. These wastage rates are similar to those reported by the WHO, and are used in Turkey for the procurement of vaccine every year.

The full resource cost of media includes the production costs for films and documentaries, as well as the broadcasting time. The cost per second of 162,000 TL or \$188 of advertising was used to represent the opportunity cost of EPI television broadcasting, and 100,000 TL per minute was used to represent the opportunity cost of radio broadcasting. The total number of broadcasting seconds were provided by TRT for health. It was assumed that 20% of total broadcasting time for health was for EPI and CDD and that EPI had 6 times as much air time as CDD. Appendix D.5 illustrates the results for both EPI and CDD.

Other supply costs include those for paper, alcohol, and other small inputs into the program. Maintenance of vehicles and cold chain equipment costs were reported by provincial-level local administration and Health Foundation offices. Printing and reproduction costs, as well as building maintenance costs are equivalent to 15% of the PHC Directorate budget for these categories.

Cold chain equipment depreciation costs were based on the numbers and types of equipment currently in use in Turkey as reported to the PHC Directorate. Unit prices for these goods were estimated from "The Cold Chain Product Information Sheet, No. 1", WHO/Geneva, for 1986/87. The useful life of refrigerators and other cold chain equipment was estimated to be 25 years, at an inflation rate of 10% or 50%, depending upon the source of purchase (whether through UNICEF or the government). Refrigerated cold trucks and cold rooms have a useful life of 5 years for

depreciation purposes. The entire value of the depreciation of these materials was allocated to the EPI. A sensitivity analysis of these estimates are presented in Section 4.5 in this report.

Vehicle depreciation costs were estimated in the same manner as vehicles. An estimate of a total of 1,383 vehicles was used, with a useful life of 15 years, and a 15% allocation to the EPI. Computer and media equipment depreciation was estimated also using this same method.

Technical assistance represents the cost of consultancies and of technical staff from donor organizations supporting the on-going EPI in Turkey.

A similar method was used to determine the contribution of the TB Eradication Department to the overall cost of the EPI. For this analysis, 5% of salary time was allocated to vaccination of children less than one year with BCG, based on information gathered through interviews as well as extrapolations from the age distribution of doses administered in 1987. Per diem and transportation costs were also allocated to the EPI based on this 5% figure. The cost of distribution and freight was collected from records, as was the cost of BCG vaccine, syringes, and needles. Depreciation cost of cold chain was based on an estimate of one refrigerator per TB center (258), and depreciation costs of vehicles was based on 212 vehicles for the Department, allocated at 5% of time for BCG to children less than one year.

The full cost of the routine EPI was estimated to be approximately 13.7 million U.S. dollars or 11.8 billion TL. Recurrent costs accounted for 83% of the total, with major equipment depreciation accounting for the balance. Table 1 illustrates the breakdown of total cost by cost category. By far, the most important contribution to the EPI is personnel costs, at 65% of the total. The government is entirely responsible for this cost component. Media costs were the second most important category at 10% of the total, and these costs are also indigenous to Turkey. Cold chain equipment and vehicle depreciation costs represented 8% and 7%, respectively. Although the government bears the cost of vehicles, cold chain equipment costs are shared between UNICEF and MOHSA, as a result of the significant contribution of UNICEF in Turkey to the 1985 campaign. Should these equipment fall in disrepair, it is highly likely that the government will be required to replace this equipment at a cost of 1 million dollars or 860 million TL.

Table 3, which presents the sources of funding, shows that, in fact, the Government of Turkey, is bearing nearly 97% of the total resource requirements for the EPI (including the contributions of TRT and the Health Foundation). This represents the significant financial commitment that the GOT has to this program.

Again, the full cost contribution of the TB Eradication Department was approximately \$640,000 to the EPI in 1987. These costs represented 5% of the total government costs for the program-- costs which could possibly be avoided by integration vaccine procurement, distribution, and delivery into the routine EPI.

### 4.3 Cost-effectiveness

The cost-effectiveness analysis of the EPI is presented in Table 4. Two effectiveness measures were used. First, the total number of doses administered by public, primary health care facilities was estimated to be 95% of total doses administered and reported to the PHC Directorate (approximately 5 million doses of BCG, DPT, measles, and polio). Second, the number of fully immunized children was used as an outcome measure to represent the ability of the current EPI to maintain contact and to complete a child's vaccination history. From the 1987 cluster sample survey performed between January and February 1988 in 6 provinces and in 9 types of clusters (rural/urban and high and low-income areas), it was found that 57% of all children were completely vaccinated taking into account a child's vaccination history and documentation from cards. This figure also represents a weighted value for the survey to compensate for differences in population size. Therefore, the number of fully vaccinated children for the 12-23 month age group was estimated to be 803,586.

The expenditure per dose was \$0.36 or 312 TL; whereas, the cost per dose was \$2.60 or approximately 2,200 TL. The expenditure per fully vaccinated child was \$2.38 or 2,049 TL and the cost per fully vaccinated child was \$17.08 or 14,689 TL. These figures compare favorably with those of other countries (see Appendix D.6), though results from one study are not necessarily directly comparable to those of others because of differences in methodology, study design, strategy for delivering services, and date of the study.

### 4.4 Variable or Incremental Costs

From the results of the full cost analysis, the variable cost of vaccinating one child fully was determined to be \$1.28. This means that the remaining \$15.80 per child is attributable to the fixed costs of the EPI. Fixed costs, which are values that do not vary with each additional child, include personnel, vehicle and equipment depreciation, building maintenance, technical assistance, computer and video equipment, and media.

Based on these assumptions, the projected full cost of the EPI at an 80% coverage level (assuming that the magnitude of fixed costs would not change during an increase from 57% to 80% coverage) would be approximately \$1.4 million or 1.2 billion TL. This figure is in addition to \$12.7 million dollars of fixed costs for the program (as calculated for 1987). See Appendix D.7 for the details of this analysis.

TABLE 4  
COST-EFFECTIVENESS OF THE EPI

	US DOLLARS	TL
TOTAL DOSES	5,550,696	
PUBLIC DOSES	5,273,161	
PERCENT FVC (12-23)	57%	
POP CHILDREN (12-23)	2.7%	
NUMBER CHILDREN	1,409,800	
NUMBER FVC	803,585	
TOTAL EXPENDITURE	1,914,256	1,646,260,160
EXPENDITURE/DOSE	0.36	312
EXPENDITURE/FVC	2.38	2,049
TOTAL COST	13,725,124	11,803,606,640
COST/DOSE	2.60	2,238
COST/FVC	17.08	14,689

#### 4.5 Sensitivity Analysis

Table 5 illustrates the results of the sensitivity analysis performed on some key assumptions of the full cost analysis. This table shows that the most significant effect on the cost-effectiveness ratio occurs when a more conservative estimate of coverage of fully vaccinated children is used (37% based only on documented coverage rather than 57% based on documented coverage and vaccination history). In this case, Scheme B, the cost-effectiveness ratio changes by 35% to \$26.31 per fully vaccinated child. The cost per fully vaccinated child is therefore in the range between \$17 and \$26.

Changing the proportion of health worker time spent on vaccination, from 15% to 25% changes the cost-effectiveness ratio by 22% to \$22 per fully vaccinated child. Because results from the facility study in Istanbul and Ankara show a proportion of 15%, this figure was used for the national program. Future studies should attempt to determine this proportion for the EPI in facilities in other provinces.

Changing the inflation rate from 50% to 35% decreases the cost-effectiveness ratio only by 5%. Therefore, choosing a different inflation rate has limited effect on the overall outcome of the analysis. Adding building depreciation costs raises the cost-effectiveness ratio to \$19 per fully vaccinated child-- an increase of 10%. Therefore, the impact of this variable is also relatively limited.

#### 4.6 Cost of Upgrading National Capacity

The MOHSA is soon to make a major investment with an international firm (Institute Merieux) to begin establishing vaccination production capabilities in Turkey. It is unknown by this author whether the vaccines that will be produced will be less expensive than those procured on the international market. If not already undertaken, such a feasibility study should be performed before the development of this capability.

In addition, the national quality control laboratory is in great need of repair and upgrading. This laboratory was also the site of local DPT and tetanus toxoid production. However, the capacity to produce DPT was stopped in 1987. In 1987, the laboratory required approximately 100 million Turkish Liras for quality control of vaccine. To upgrade the facility to modern standards for quality control and vaccine production, it would require an investment of nearly 2 billion TL or 2.3 million dollars. Unless outside assistance is sought, the MOHSA will not be able to fund this type of investment cost under the proposed budget for 1988.

#### 5. Discussion and Conclusions

The cost and cost-effectiveness results should be interpreted as being estimates of the true value. The purpose of this type of study is to provide a sense of magnitude of the cost, rather than to pin-point the exact value. In some cases, it was difficult to quantify the inputs into the EPI, such as the exact number of broadcasting seconds, or the exact proportion of time spent administering vaccine. In these cases, assumptions were made based on expert advice and previous experience.

Expenditures for the EPI are not currently being monitored by the PHC Directorate as they are part of an overall budget for the year. Therefore, assumptions had to be made about the proportion of EPI-related expenditures relative to those for prevention of AIDS, and other activities within the PHC Directorate.

The major conclusion that can be drawn from the cost and cost-effectiveness analysis is that the Government of Turkey is financially committed to the EPI, and is bearing considerable financial burden for its implementation. Secondly, the cost per fully vaccinated child is within a range of measures which has been previously established in the literature.

However, this analysis has highlighted several areas of concern for the future. First, a significant proportion of vaccine and syringe expenditures are being financed by donor organizations (nearly 40% of all vaccine expenditures). Therefore, the government is still dependent upon donors for foreign exchange requirements for vaccine purchase and for the continuation of the program. The National Foundation for Health and Social Assistance may become a growing indigenous capability for Turkey either to procure all required vaccine internationally, or to produce required vaccine internally. Second, on-going training costs appear to be supported by outside technical and financial assistance. The costs of training on a routine basis need to be built into the budget for the PHC Directorate beginning in 1989 in order that the EPI become sustained by the government.

TABLE 5  
SENSITIVITY ANALYSIS FOR THE EPI

CHANGE	TOTAL COST	NO. FVC	COST/FVC	PERCENT DIFFERENCE
ORIGINAL	13,725,124	803,586	\$17.08	0
SCHEME A	13,725,124	521,626	\$26.31	35.1%
SCHEME B	13,096,566	803,586	\$16.30	-4.6%
SCHEME C	17,690,637	803,586	\$22.01	22.4%
SCHEME D	14,260,008	803,586	\$17.75	3.8%
SCHEME E	15,265,676	803,586	\$19.00	10.1%

SCHEME A= Number of fully vaccinated children is 37%, based on documented coverage.  
 SCHEME B= Depreciation of vehicles and cold chain based on 35% inflation.  
 SCHEME C= Percent of time for health workers increased from 15 to 25%.  
 SCHEME D= Percent of time for TB workers increased to 15%.  
 SCHEME E= Building depreciation costs added at 50% inflation rate.

## B. Program for Control of Diarrheal Diseases

### 1. Program description for 1987

The National Program for the Control of Diarrheal Diseases began in May, 1985 and is still in the initial phases of development. The overall goal of the program is to not only increase the proportion of children being treated with ORS, but to increase the proportion of mothers who are using ORS as a first line of treatment. ORS is distributed to health centers, health houses, MCH/FP centers and hospitals. Several facilities have established oral rehydration units for case management.

### 2. Data sources and methods

This study represents the first cost and cost-effectiveness analysis of this program since its inception. The methods used are similar to those for the EPI cost and cost-effectiveness analysis, and follow closely the draft WHO-recommended methodology for cost-effectiveness evaluation of CDD programs ("Estimating Costs for Cost-Effectiveness Analysis: Guidelines for Managers of Diarrhoeal Diseases Control Programs, 1988).

This analysis included calculation of recurrent and investment costs, as well as fixed and variable costs. Data sources included documents and statistics from the MCH/FP Directorate of MOHSA, interviews with MOHSA and Ministry of Youth, Education, and Sports officials, Turkish Radio and Television, and records from donor organizations. When data were not available on either the quantity of inputs or their associated costs, assumptions were made based on interviews with experienced individuals in the program.

For this analysis, the average exchange rate for 1987 of 860 TL per U.S. dollar was used (as provided by the Central Bank of Turkey). An inflation rate of 50% was provided by the World Bank and the American Embassy, although GOT reported rates are in the range of 25% to 35% for 1987.

#### 2.1 Joint costs

When available, direct expenditures and costs were allocated to the national CDD program. However, because this program is integrated into other MCH and primary health care activities at the central and health facility level, there are significant shared or joint costs. These joint costs were allocated on the basis of the proportion of time (5% on average) that health workers spend treating and managing diarrheal disease. This proportion was determined through interviews at the central level, as well as through analysis of survey data collected in Istanbul. Because diarrheal disease is highly seasonal in Turkey, with the peak month of incidence in August, between June and September, the proportion of time spent during those months, usually between 15% and 25%, was spread throughout the year.

### 3. Presentation of the Results

#### 3.1 Expenditures

The total expenditures for the CDD program in 1987 are presented in Appendix E. Out of a total of approximately \$800,000, 89% were recurrent expenditures. Table 6 compares the proportion of total expenditures among expenditure category with full costs. The greatest expenditure in 1987 was for procurement of ORS packets at 68%. UNICEF and Rotary International were responsible for over 40% of this figure. In addition, technical assistance and payment of per diem for training were financed by the WHO and UNICEF and are the second and third most important expenditures for the year, at 6% and 5%, respectively. Printing of CDD training materials and leaflets was also largely financed by UNICEF (90%, approximately).

Table 7 illustrates the breakdown of expenditures and full costs by source. Again, the government is financing the greatest proportion of total expenditures (51% when TRT and the Health Foundation are included). However, the program continues to rely on donor assistance from UNICEF (approximately 45% of all expenditures). USAID does not presently finance the CDD program.

### 3.2 Full costs of the CDD program

Full costs of the CDD program included the cost of media broadcasting, personnel time, and the depreciation costs of vehicles and other equipment purchased for the program, such as computer and video equipment. In addition, the full cost of ORS packets reflects the actual use of those packets, which is significantly less than the supply. Appendix F.1 presents the results of the full cost analysis. As mentioned previously, personnel costs were determined by estimating a proportion of time devoted to the program. A detailed analysis of personnel costs for central, provincial, and health facility personnel is found in Appendix F.2. Per diem, travel, freight, printing, and building maintenance for service delivery was estimated to be 5% of the MCH/FP 1987 budget for these items.

TABLE 6

COMPARISON BETWEEN DISTRIBUTION OF EXPENDITURES  
AND COSTS BY CATEGORY FOR THE NATIONAL CDD PROGRAM  
IN TURKEY

COST CATEGORY	EXPENDITURES TO PROGRAM	FULL RESOURCE COST
I. RECURRENT COSTS		
Salaries/Benefits	0.0%	73.6%
Per Diem	0.6%	0.3%
Per Diem-Training	4.9%	0.9%
Trans + Travel	3.1%	0.6%
Trans-Training	3.8%	0.7%
Freight	0.0%	0.0%
CDS packets	68.3%	2.9%
Media	0.0%	10.4%
Printing/Reproduc.	6.6%	1.2%
Building maint.	3.4%	0.6%
Subtotal	89.4%	91.2%
II. INVESTMENT COSTS		
Media Equipment	0.4%	.0%
Computer Equipment	1.6%	.0%
Vehicles	0.0%	1.8%
Technical Assistance	5.9%	1.1%
Subtotal	7.9%	3.0%
GRAND TOTAL	769,278	4,294,985

TABLE 7

DISTRIBUTION OF TOTAL RESOURCE COST AND PROGRAM EXPENDITURE  
BY SOURCE OF FINANCING FOR THE CDD PROGRAM IN TURKEY

ORGANIZATION	EXPENDITURE TO PROGRAM	FULL RESOURCE COST
MOHSA	48.5%	61.4%
OTHER MINISTRIES	2.0%	18.2%
TOTAL GOVERNMENT	50.6%	79.6%
TRT	0.7%	10.4%
UNICEF	44.6%	3.4%
WHO	4.1%	0.8%
TOTAL DONORS	48.8%	4.1%

Training costs (per diem and transportation) for the government was based on the number of personnel trained, the duration of the training, and location.

Media costs were estimated in the same way as for the EPI using the cost of advertising on radio and television per second or per minute and the total broadcasting time, which was provided by officials at Turkish Radio and Television. The cost of newspaper articles was not able to be included, as it was impossible to estimate the size of these articles.

Vehicle depreciation costs were estimated from the number of MCH/FP vehicles (198), using a useful life of 15 years, and 50% inflation. Five percent of that value was allocated to the CDD program. Computer and media equipment depreciation costs were determined in the same manner, using a useful life of 10 years.

The total full cost for 1987 was estimated to be approximately 4 million U.S. dollars or 3.5 billion TL. Table 5 shows the cost profile for full costs among different cost categories. Personnel was the most costly category at 78% of the total cost. Media broadcasting represented 11% of total cost, with ORS packets (3%) representing the third most important cost category.

Table 7 shows that more than 95% of the full cost of the program is being borne by the government. UNICEF contributions remain the highest of all donor organizations included in this analysis at approximately 4% of the total.

### 3.3 Cost-effectiveness

The cost-effectiveness analysis of the CDD program is presented in Table 8. The number of children treated was chosen as the measure of effectiveness for the analysis. Although one of the goals of the CDD program is to increase mother's knowledge and capability of treating children with ORS, there is a dearth of information on this program outcome at the present time. The number of children treated was determined from reported numbers through September 1987 sent to the CDD Program manager in Ankara. These numbers were projected forward for each province for the entire year, for a total of 444,465 children. Appendix F.3 contains a detailed analysis of the number of children treated and the coverage of the program in 1987.

The expenditure per child in 1987 was \$1.78 or 1,500 TL; whereas, the cost per child treated was \$9.66 or approximately 8,300 TL. The figure for cost per child is slightly higher than that reported for other CDD programs around the world (see Appendix F.4), probably as a result of the newness of the program and the low number of children treated, as compared to those other programs. However, direct international comparisons cannot be made, given the differences in study design, timing of evaluations, context of the programs, and different strategies employed to implement them.

TABLE 8  
COST-EFFECTIVENESS OF THE COO PROGRAM IN TURKEY

	US DOLLARS	TL
NUMBER CHILDREN TREATED	444,465	
TOTAL EXPENDITURE	799,270	678,779,080
EXPENDITURE/CHILD TREATED	1.78	1,527
TOTAL COST	4,294,985	3,693,687,100
COST/CHILD TREATED	9.66	8,310

These figures reflect the cost/case managed and not the cost per packet used.

### 3.4 Variable or incremental cost

Because the CDD Program is still in the process of development and coverage remains low, it is interesting to project the cost of treating an additional child with ORS. Based on the full cost analysis, the variable cost to treat a child (including the cost of the ORS packets, and costs related to services delivery) was approximately \$0.36. The difference between the full cost per child (9.66) and the variable cost (\$0.36) represents the fixed costs of the program at the present level of operation (9.30).

The cost to reach 50% of the population would be approximately \$1.3 million dollars or 1 billion TL. This cost projection assumes that there would be no change in the way services are provided between the present time and the time to reach a 50% coverage rate.

### 3.5 Cost of ORT units

An analysis of the recurrent cost of operating an ORT unit was undertaken as part of this study. Appendix G contains the results, which show the annual operating cost in a typical district health center to be approximately \$8,000. This analysis assumes a population of 200,000 per facility and 100% coverage of cases of diarrhea in children less than five years (13.3% of the population). To have one ORT unit in each province of this type, the projected additional cost for MCH/FP budget would be 584,000 or 502 million TL.

## 4. Discussion and Conclusions

The most significant conclusion that can be drawn from this study is that the GOT is financing a large part of the expenditures for the national program (as it is currently organized). However, donor organizations, particularly UNICEF and WHO are financing CDD training almost entirely. The MOHSA receives assistance from UNICEF and Rotary International for the procurement of ORS packets as well. Attention should be paid in the future to secure adequate resources for procurement of ORS packets and in financing on-going training of health workers and project managers.

The cost-effectiveness ratio of the national CDD program (\$9.66) is higher than what is found in other countries and may reflect the initial high program development costs and lag in program acceptors. This is clearly indicated by the low variable cost and the high uncovered population.

The additional cost to establish ORT units in each of the provinces represents approximately a 25% increase in current costs of the program. However, the benefits of these units would far outweigh the costs, if a greater proportion of the population could be reached and the cost per vaccinated child could be reduced to more comparable levels.

Expenditure and cost information are not being kept for the CDD Program. Because the MCH/FP Directorate has very limited resources (2.7% of the MOHSA budget) and many additional programs to implement, the necessary funding for a full-scale CDD effort may not be available unless

steps are taken now to determine how much resources will be required in the future. Therefore, a system of cost monitoring should be established in the MCH/FP Directorate.

#### **IV. FACILITY STUDY**

##### **A. General Information**

###### **1. Purpose**

In order to complement the cost and effectiveness measures collected at the national level for the EPI, a study was launched to examine the types of factors which influence the cost-effectiveness of the program at the facility level. The results from this study should be useful for project managers in their attempts to strengthen and also streamline the EPI.

###### **2. Sample selection**

The major part of the study was conducted in health facilities in Istanbul. This province was chosen for several reasons. First, it represents a significant proportion of the population of Turkey (close to 10%). Second, because this province is well-supplied with vaccine and other essential supplies and equipment, this setting should represent the best possible efficiency conditions for the implementation of the EPI. Third, Istanbul was selected as one of the sites of the coverage survey and Comprehensive Program Review, and therefore, the cost study would complement other managerial information collected.

Three types of health facilities were selected for the sample: district health centers (4), district MCH/FP centers (4), and village health centers (2). These facilities were selected in the same districts and villages as the coverage survey, which used a random selection method.

###### **3. Questionnaire development and testing**

A questionnaire was developed for the facility survey which was field tested in Van and Ankara provinces. This questionnaire underwent two modifications: 1) information about school vaccination and ORS were included on the final form; and 2) questions to which all of the answers were the same were deleted. A sample of the questionnaire in English and in Turkish is included in Appendix II.

Surveyors were trained in Ankara and Istanbul. In Istanbul, 2 teams of 3 persons each surveyed the facilities in three days.

###### **4. Limitations**

The numbers and types of health facilities chosen for this survey are not necessarily representative of all health facilities in Istanbul or for the rest of Turkey. Therefore, definitive conclusions about the cost

profiles of all health facilities in the country cannot be drawn. However, the analysis will highlight useful trends which may be of importance in the future implementation of the EPI.

## 5. Data Analysis

Data from the questionnaires were analyzed on Lotus 1-2-3 spreadsheets.

## B. Results

### 1. Characteristics of the sample

Out of the total sample, half (8) were district-level health facilities. Four of these were health centers, and the remaining four were MCH/FP clinics. The sample included four village health centers, and four city-level health facilities. The population for these centers ranged from 1,000,000 in a city health center to 7,427 in a village health center. The average population for the sample was about 160,000.

The population per physician ranged from 143,000 to 5,000, and the population per nurse ranged from 94,000 to 4,000. The population per midwife was as high as 333,333 and as low as 1,400. Figure 1 illustrates these variations in sample health facilities.

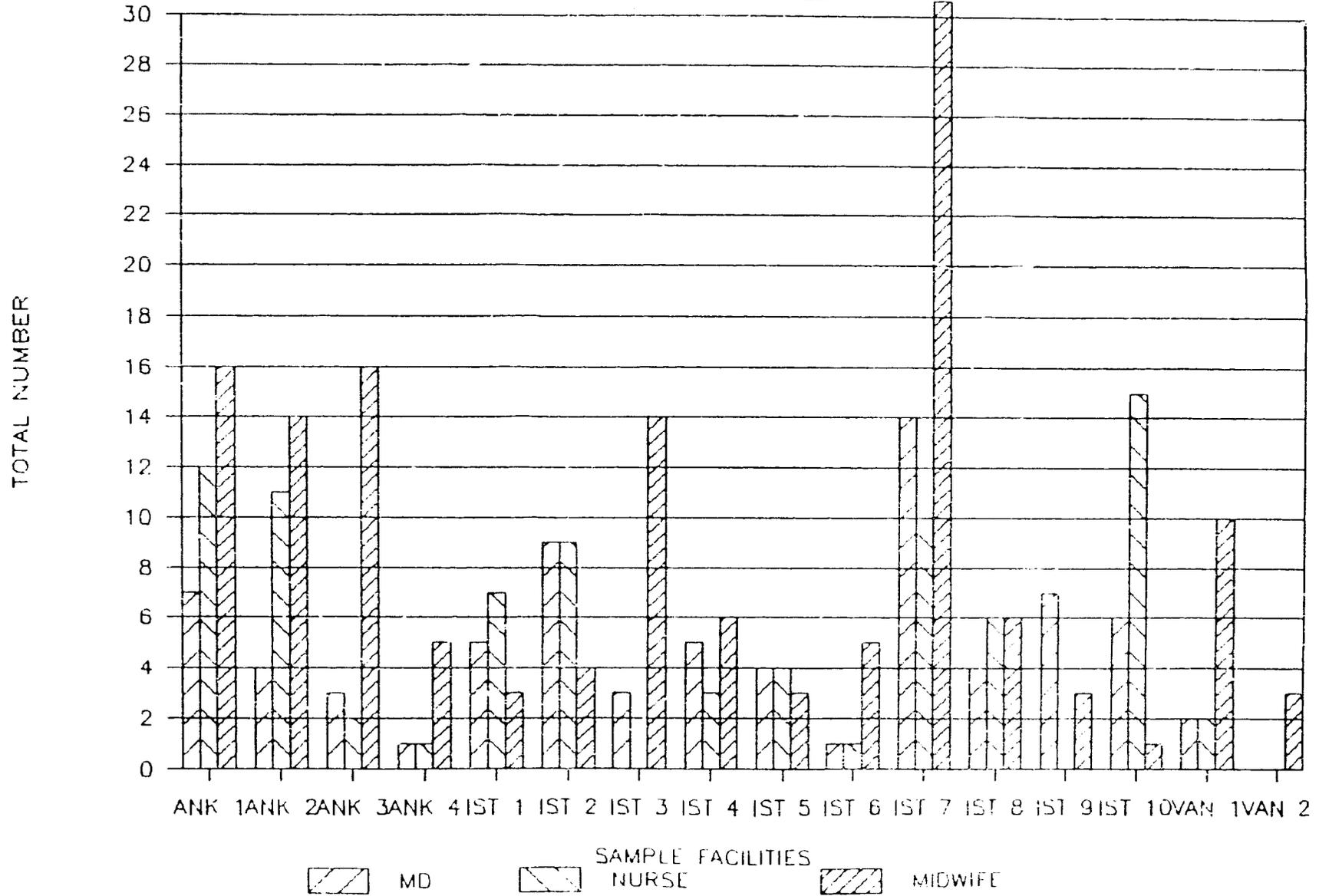
### 2. Cost structure of facilities

Table 9 presents the cost profiles for health facilities in Ankara, Istanbul, and Van provinces. One can see that the cost/dose varies from \$0.24 to \$8.15 in the sample. Several factors appear to have contributed to this variation:

A) No two facilities had the same numbers and types of health staff working on the EPI. Facilities used between 1 and 21 health staff for immunization, with the average being around 9 persons. Midwives tended to give vaccinations more frequently, followed by nurses, male nurses, and physicians. In addition, a high number of staff did not necessarily correlate with a high number of doses given for 1987. This relationship highlights possible inefficiencies in the delivery of services, as the number and type of personnel administering vaccines have implications for how human resources are allocated within the health facility. See Table 11 for the relationship between personnel and doses.

Figure 1

# COMPARISON OF FACILITY HEALTH PERSONNEL IN SAMPLE FACILITIES



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B) The amount of fuel consumed during the year for either outreach services or to replenish vaccine and syringe stocks had implications for the efficiency of service delivery. The average number of kilometers traveled per year was 712 in the sample. Facilities with the lowest cost per doses also had the lowest consumption of fuel for the year. The opposite relationship also appeared to be true. Several facilities had a high consumption of fuel, but a very low number of doses given during the year, implying that providing effective outreach services may not be the cause of the high fuel consumption. Problems with distribution of stock may be a contributing factor toward high fuel consumption in some facilities.

C) The numbers and types of equipment and vehicles available in the facilities varied tremendously, with some facilities having no vehicle and limited cold chain equipment (e.g., cold boxes or vaccine carriers). On average, the facilities had 10 vaccine carriers, two cold boxes, two refrigerators, and one vehicle each. Those facilities which were better-off in terms of equipment appeared to be also better able to deliver vaccination services, and tended to give more doses of vaccine.

### 3. Facility variations

Table 10 presents the average cost per dose by type of facility. From this table, one sees that the cost per dose is highest for village health centers at \$6.46 per dose; whereas, the cost per dose is lowest for city health centers (\$0.34). This represents a 19-fold difference in cost per dose between these two facility types. These data suggest that it is more expensive to deliver services to a more-dispersed population and that costs within a facility are a function of scale of activity, in part.

Table 11 provides additional information about variations among facility types. These data suggest that the average cost per dose is dependent upon the population size (i.e., the facility types with the largest population sizes have the lowest average cost per population and average cost per dose.)

The measure of the number of doses administered per kilometer traveled seems to suggest either 1) that MCH/FP clinics provide little outreach, but have significant vaccination activity (as shown in Table 11). Whereas, village health centers provide significant outreach with little vaccination activity; or 2) that there is a large consumption of fuel for village and district health centers which are not directly related to the delivery of vaccine. These figures highlight shortcomings of the present distribution system for vaccine and syringes which requires that individual centers be responsible for replenishing their own stock, at considerable expense.

TABLE 9  
COST PROFILES OF SAMPLE HEALTH FACILITIES

FACILITY	PERSONNEL	VACCINE	SYRINGES	FUEL	EQUIPMENT	RENT/UTILS	TOTAL	TOTAL DOSES	COST/DOSE
ANKARA 1	1,684	970	459	753	688	163	4,725	13,584	0.35
ANKARA 2	3,140	507	241	2,093	12,399	149	18,529	7,296	2.54
ANKARA 3	4,824	139	63	0	797	156	5,979	2,088	2.86
ANKARA 4	2,182	48	24	2,545	804	156	5,759	720	8.00
ANKARA TOTAL	11,830	1,672	787	5,391	14,688	624	34,992	23,688	1.4
ANKARA AVERAGE	2,958	418	197	1,348	3,672	156	8,748	5,922	3.44
ISTANBUL 1	4,712	877	440	698	941	134	7,802	14,652	0.53
ISTANBUL 2	1,166	503	242	1,605	1,097	524	5,137	7,764	0.66
ISTANBUL 3	4,803	798	384	1,340	722	221	8,268	12,804	0.65
ISTANBUL 4	942	789	425	167	291	110	2,724	11,448	0.24
ISTANBUL 5	3,217	240	102	1,395	760	658	6,372	3,408	1.87
ISTANBUL 6	2,422	35	15	516	778	182	3,948	504	7.83
ISTANBUL 7	1,362	1,672	745	141	4,454	348	8,722	24,846	0.35
ISTANBUL 8	241	390	219	628	775	348	2,601	7,290	0.36
ISTANBUL 9	224	227	140	0	536	348	1,475	4,676	0.32
ISTANBUL 10	717	571	352	670	2,346	609	5,265	10,292	0.51
ISTANBUL TOTAL	19,806	6,102	3,064	7,160	12,700	3,482	52,314	97,684	1.3
ISTANBUL AV.	1,981	610	306	716	1,270	348	5,231	9,768	1.33
VAN 2	930	43	18	3,488	195	156	4,830	593	8.15
GRAND TOTAL	32,566	7,817	3,869	16,032	27,583	4,262	92,136	121,965	35
GRAND AVERAGE	2,035	489	242	1,002	1,724	266	5,759	7,623	2.20

TABLE 10

COMPARISON OF COST-EFFECTIVENESS  
AMONG TYPES OF HEALTH FACILITIES

TYPE OF FACILITY	AVERAGE COST/DOSE	SAMPLE SIZE
Village Health Center	\$6.46	4
District Health Center	\$2.02	3
District MCH/FP	\$0.48	3
City Health Center	\$0.34	3

TABLE 11  
INDEX OF VACCINATION ACTIVITIES IN  
SAMPLE HEALTH FACILITIES

TYPE OF FACILITY/ INDICATOR	VILLAGE HEALTH CENTER	DISTRICT HEALTH CENTER	MCH/FP CLINIC	CITY HEALTH CENTER
SAMPLE SIZE	4	3	3	3
COST (1987\$)	\$5,227	\$10,925	\$5,221	\$2,934
AVERAGE POPULATION	15,732	46,091	114,000	470,000
TOTAL EPI DOSES	1,306	5,547	11,288	8,517
COST/DOSE	\$6.46	\$2.02	\$0.48	\$0.34
COST/POPULATION	\$0.33	\$0.24	\$0.05	\$0.01
DOSES/100 KM	74	20	2	7
DOSES/EPI STAFF	135	315	2,224	4,636
DOSES/1,000 POPULATION*	83	120	99	18

The number of doses administered per EPI staff in each facility type points to other interesting relationships. For example, Table 11 shows a direct relationship between EPI activity and population size. The most remote centers, the village centers have the lowest activity; whereas, the most urban centers have the highest activity per staff.

However, when the number of doses administered in 1987 is adjusted for population size, different trends are apparent. This "index of EPI activity" clearly shows that city health centers have the lowest activity for the year, as compared with their potential activity. These results may be due to the fact that there are a wider variety of health care providers in urban areas, other than health centers, which are vaccinating children. These data suggest that the EPI has its greatest activity per population at the level of the district health center.

Because of the small sample size it is difficult to make generalizations about how the EPI is being implemented in health facilities and what it is costing them to do so. However, this analysis has highlighted wide variations among facility types with respect to their average annual cost, the average cost per dose, the numbers of doses administered by staff member, and their "index of EPI activity". These data suggest that there is some inefficiency in the manner in which city health centers deliver their services, as they have the lowest index of activity at 18. Village health center services are the most costly, which reflects the higher costs of delivering services to more remote areas. This is an investment which the government will have to make if it is committed to universal coverage.

#### 4. School vaccination

Nine out of the total sample of 16 facilities reported data on vaccination of children older than five or six years with a booster dose of polio. Although definitive conclusions cannot be drawn from the results of this study, it appears that offering a booster dose of polio (polio 4) costs a health facility approximately \$1,000 per year. The cost-effectiveness ratios ranged from \$0.33 to \$6.77 in these facilities for this one dose of polio. The most significant factors contributing to the cost are fuel consumption (on average, 404 kilometers per year) and personnel time. Therefore, providing this additional dose may not be the most effective use of resources for the EPI in the health facility.

#### 5. ORT use

For the sample, the average number of children treated with OPS packets in 1987 was 382, and the average number of packets per child was 2.6. This average is higher than the recommended 2 packets per episodes.

### C. Discussion and Conclusions

The overall conclusion to be made from the facility study results is that there is a wide variation in the costs of delivering immunization services in these facilities. This variation in costs are in part a function of the level of vaccination activity in the facility, but are also an indication of the amount of inefficiency of delivery of services.

In addition, the variation in average cost per dose by facility type highlights the fact that the operation of the EPI costs more in rural and remote areas than in urban areas. However, when vaccination activity by facility type is examined more closely, one sees that the largest facilities have the lowest "index of activity". This suggests that the potential is greater for urban health centers to increase the intensity of their activity at a relatively lower cost than in other, more remote facilities.

## **V. FINANCING OF THE EPI AND CDD IN TURKEY**

### A. Donors future role

Donor contributions to both the EPI and CDD programs are likely to continue in the near future. UNICEF, the major source of outside assistance in planning to provide \$1.4 million over the next 3 years for the EPI, and \$316,000 over the next 3 years for the CDD program. The original contribution of \$1 million made by USAID to UNICEF in 1985 has been programmed through 1988, with \$137,000 for that year. Rotary International also makes contributions directly through UNICEF. A total of \$370,000 is programmed for 1988 and \$580,000 for 1989. Rotary funds will be used to procure oral polio vaccine for the government until 1989.

The Government of Turkey cannot rely on the same level of donor contributions into the far future for the EPI and CDD programs given other priorities in primary health care.

### B. Capacity of MOHSA

Budget allocations to the MOHSA from the Central Government have been declining since the early 1970s, to a low level of 2.9% in 1987. In 1987, the proportion of the MOHSA budget for hospital services was nearly 50% of the total. PHC received 26.8% and MCH/FP received only 2.7% out of a total MOHSA budget of 3 billion TL (\$350 million). The allocation for health may decrease in 1988 to approximately 2.73% of the government budget. This decrease may pose an increasing constraint on the ability of both the PHC and MCH/FP Directorates to improve the scope and delivery of their EPI and CDD programs.

In 1987, the greatest proportion of the PHC and MCH/FP budgets were for personnel costs, at 73% and 48%, respectively. Most of the Directorates' budgets were allocated to overhead and indirect costs, rather than direct service delivery costs, evidenced by the proportion of their budgets for medical supplies and materials (4% of the PHC Directorate budget and 33% of the MCH/FP budget). As mentioned previously, there are

no specific budgets for the EPI and CDD programs. Rather, all resources for these priority programs are part of a global budget for each of these Directorates. Because expenditures and costs are not monitored, the EPI and CDD programs are in competition for scarce resources with the other types of primary and maternal health care programs in Turkey. It is unlikely that major increases in the amount of resources available for the EPI and CDD programs will come through increases in the budgets for the PHC and MCH/FP Directorates, unless resources for these two child survival programs are earmarked and set aside.

#### B. Health Foundation contributions

In the summer of 1983 the Health and Social Assistance Foundation was created. The purpose of the organization was to provide financial support to the Ministry of Health and Social Assistance. All Foundation activities must be approved by the Undersecretary of MOHSA, who is the Director of the Foundation. Therefore, although the Foundation is an autonomous entity, it is directed by the health ministry.

There are 91 branches of the Foundation throughout the country covering most of the 67 provinces of Turkey. Provincial governors or district governors are the heads of these branches in their respective provinces or districts. Each of the branches collect revenues for health. 70% of these revenues remain within the province or district, and 30% is sent to Foundation headquarters in Ankara.

Revenues primarily come from donations made at health centers from patients. Although there is a health law established in 1961 that health services are offered free of charge, most centers receive donations from their patients for basic curative services. The health center is allowed to keep approximately 30% of their own revenues, sending the remaining balance to the Provincial General Director of Health, who then in turn keeps a certain percentage, sending the balance to Ankara. Figure 2 depicts the flow of funds through the Foundation system.

The Health Foundation began with a budget of 3.5 million TL and now it operates with a budget of 3 billion TL or approximately 3 million U.S. dollars. In addition to patient revenues, funds are raised for the Foundation from two other sources: 1) direct donations by companies or individuals; and 2) percentage of funds raised from regulation and authorization of pharmaceuticals sold in the market. Twenty to 25% of all Foundation revenues comes from pharmaceutical labeling.

Beginning in 1987, 30% of revenues which comes to Foundation headquarters in Ankara go toward several major capital investments:

A) The Foundation will be signing a contract with a German firm to produce disposable syringes (2, 5, and 10 cc) in Turkey. Their projected capacity will be 100-150 million syringes per year which will represent approximately 33% of the total market for syringes. The goal is produce syringes cheaply so that the price will be affordable in Turkey. Syringes will be donated or sold to MOHSA for the EPI and other health activities, as well as sold to the private market (pharmacies and private hospitals).

The majority of the shares of this syringe producing factory (51%) will be owned by the Foundation, with the German company and Red Crescent owning the remaining 49% of shares.

B) With Foundation resources, the Ministry of Health will make an agreement with the French company, Institute Merieux to produce vaccine in Istanbul. 51% of the shares of this factory will be owned by Merieux, 17% by the Foundation, and the remaining shares by Istanbul University and a bank. These vaccines will be sold to the government at a subsidized price.

3) The Foundation is also investing in X-ray machine production, with a private company and the Istanbul University Department of Cardiology.

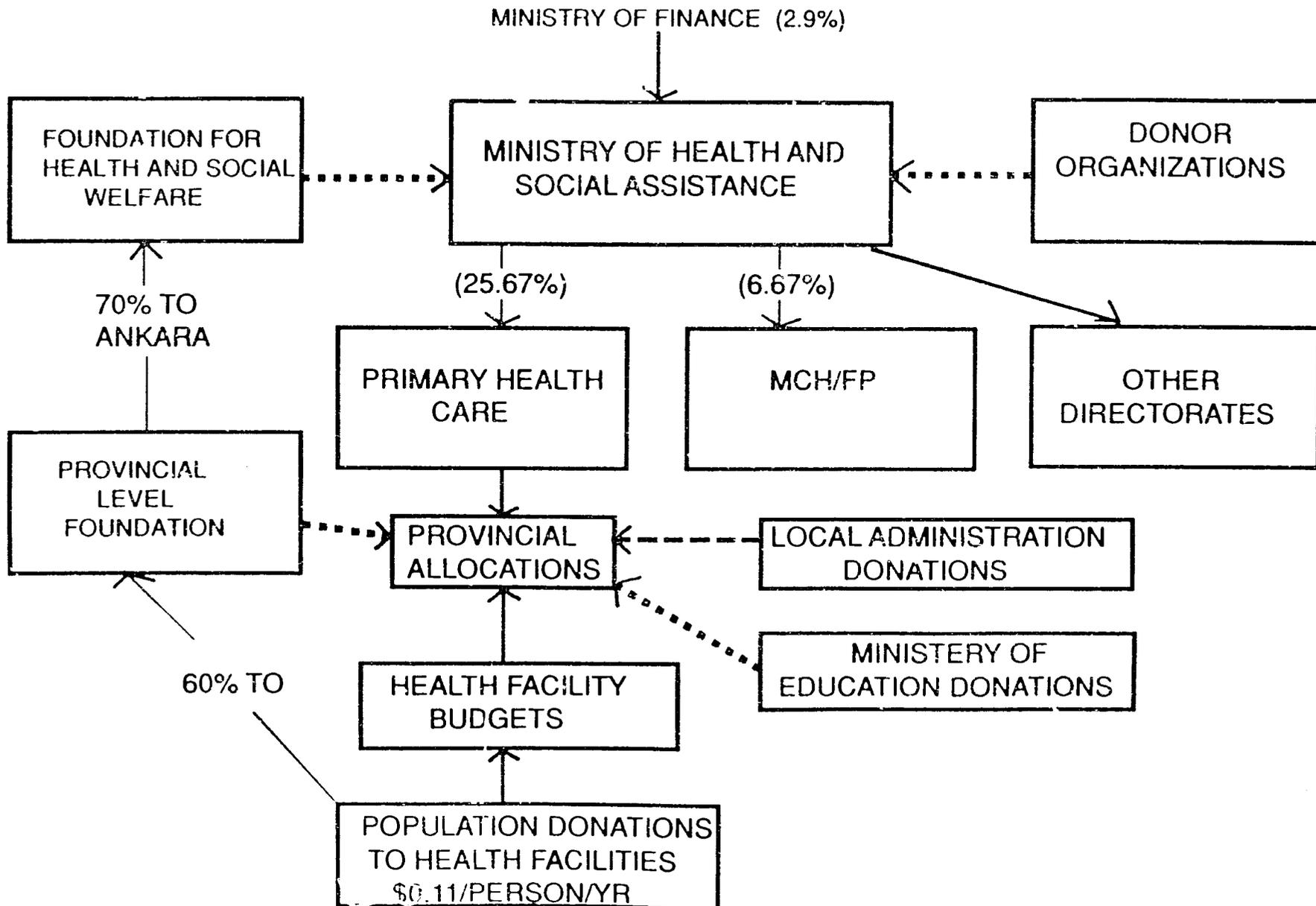
4) The Foundation will also be developing a spring water packaging and distributing plant in Ankara provinces. The Foundation expects to produce 30% of the drinking water needs in Ankara.

At the provincial level, the Foundation has been active in building health centers and health houses, furnishing medical equipment, and building hospitals. The Foundation has also updated the medical and technical equipment needed for the National Poison Control Center. Contributions from the Foundation have also been made to primary health care, including resources for fuel, syringes, and other medical equipment and supplies.

Although there are no restrictions or policies about how the resources which are generated at the health facility and sent to the Foundation are spent, there is a growing tendency to use these resources to improve the quality of tertiary and secondary health care services. Because most of the Foundation revenues come from patient donations at primary health care centers, a greater proportion of these resources should be used to improve primary and not tertiary or secondary care services at the provincial level. For example, many health centers are without vehicles which hampers their ability to perform outreach services to the peri-urban and rural populations and makes restocking of vaccine and ORS packets problematic. The Foundation could assist the Ministry of Health in bringing all health centers up to a basic standard of operation with funds generated by health center patients.

Figure 2

# FLOW OF FUNDS ANALYSIS FOR THE EPI AND CDD PROGRAMS



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Therefore, an enormous potential exists for the Foundation to contribute more resources to these two programs, especially in the supply of vaccine, syringes, fuel, cold chain equipment, vehicles, and maintenance of equipment. Though the investment policies of the Foundation aim to support the Ministry of Health in improving local capacity to produce, supply, and distribute vaccines and syringes in order to reduce reliance on international procurement, the government should be provided vaccines and syringes free for distribution to health centers.

### C. Health Center Donations

From the facility survey for the EPI, information was collected on the total amount of resources which were collected in sample health facilities, the proportion of resources kept at the facility, and the types and amount of expenditures for the year. These expenditures are made in addition to the annual budget allocation per facility which originates from the provincial level.

A total of 12 facilities provided data on revenue generation. Total donations ranged from \$688 to \$34,202, with an average donation of \$7,345 per facility in 1987. Figure 3 illustrates the variation in annual donation per person in the catchment areas of the population. For the year, individuals contributed approximately \$0.11 or 95 TL.

Facilities kept 50% of total revenues, between a range of 81% and 22%. This proportion is spent to varying degrees on medical supplies and equipment, office supplies and equipment, fuel, and miscellaneous items. Figures 4 and 5 illustrate the results in Ankara and Istanbul, and by facility type. These data seem to suggest that there are significant non-patient related expenditures for the facilities. These expenditures are for building maintenance, office supplies and equipment, and miscellaneous expenditures (e.g., supplies for brewing tea).

When revenues generated at health facilities are segregated by type of facility, some interesting observations can be made. First, Table 12 shows that village health centers, on average, collect the fewest resources (\$2,721 per year) than district health centers (\$7,486). However, village health facilities retain a larger share of these resources (75%) than any other type of health facility which retains approximately 40%. Further, villages tend to spend most of their revenues on an annual basis, as compared to city health centers, which spend approximately half of their revenues. City health centers had an average balance forward for the next year of \$1.151. These results are graphically depicted in Figure 5.

Figure 3

# AVERAGE DONATION PER POPULATION

FOR ANKARA AND ISTANBUL FACILITIES

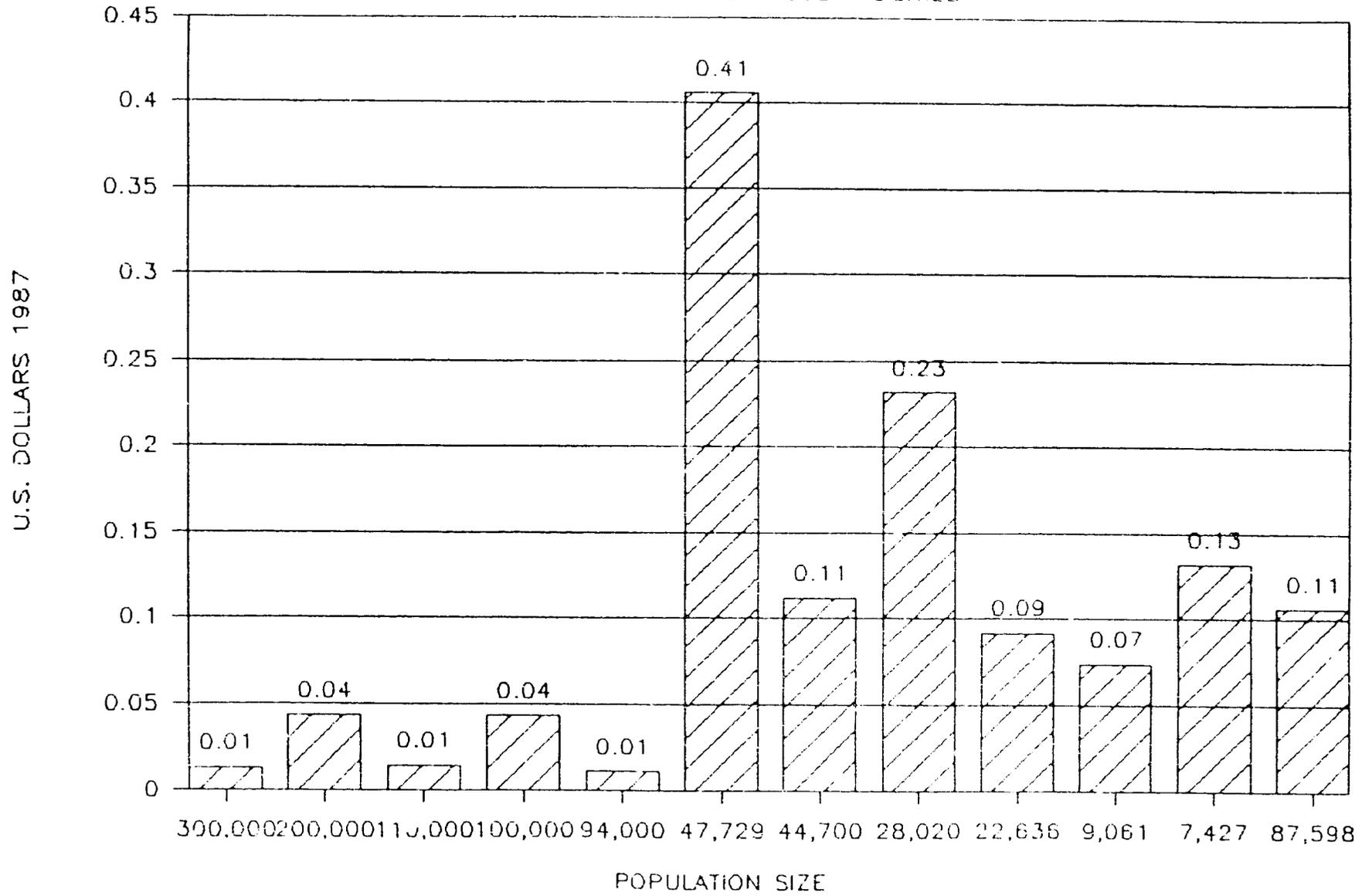
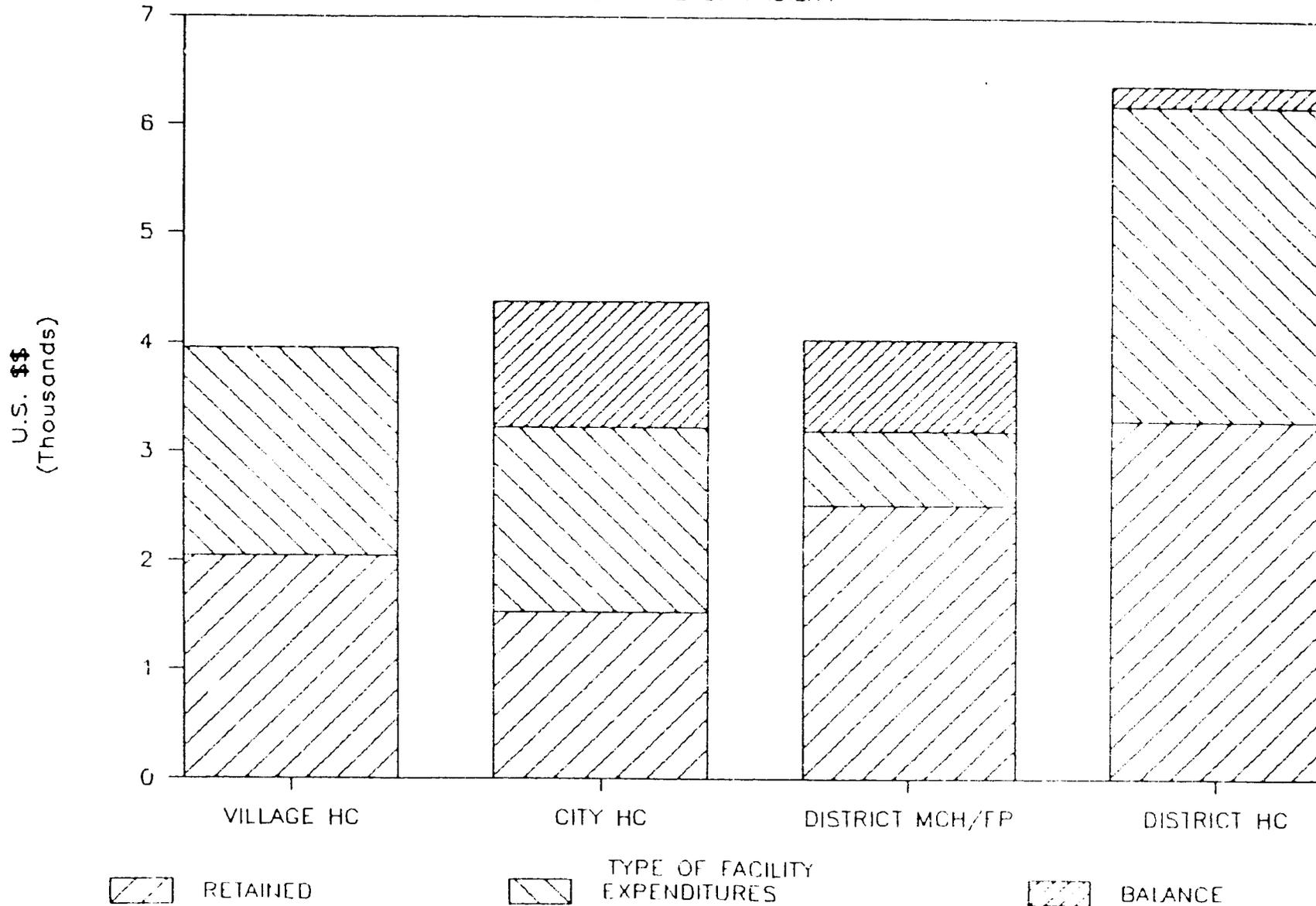


Figure 4

# COMPARISON OF REVENUES AND EXPENDITURES BY TYPE OF FACILITY



RETAINED



TYPE OF FACILITY  
EXPENDITURES



BALANCE

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TABLE 12

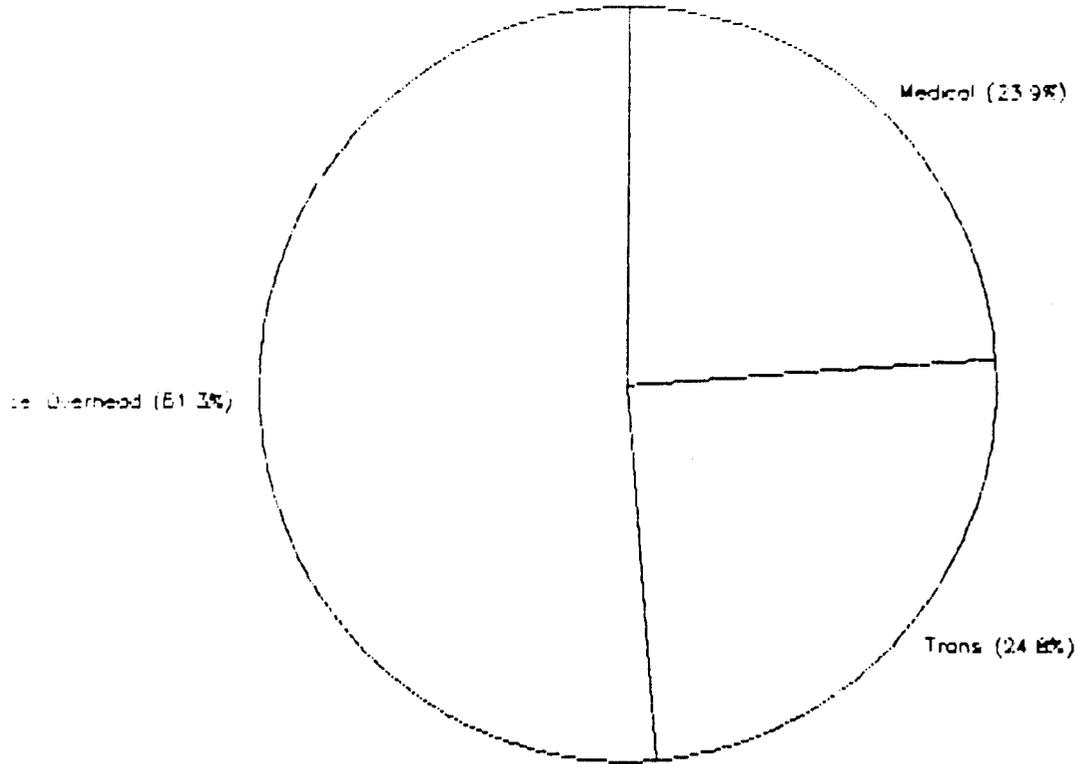
COMPARISON OF REVENUES AND EXPENDITURES  
 BY TYPE OF HEALTH FACILITY IN 1987 \$

TYPE OF FACILITY	TOTAL DONATIONS	PERCENT RETAINED	TOTAL RETAINED	TOTAL EXPENDITURES	BALANCE FORWARD
VILLAGE HC	2,721	75%	2,041	1,913	0
CITY HC	3,801	40%	1,520	1,705	1,151
DISTRICT MCH/FP	5,989	42%	2,515	674	846
DISTRICT HC	7,486	44%	3,294	2,895	195

Figure 5

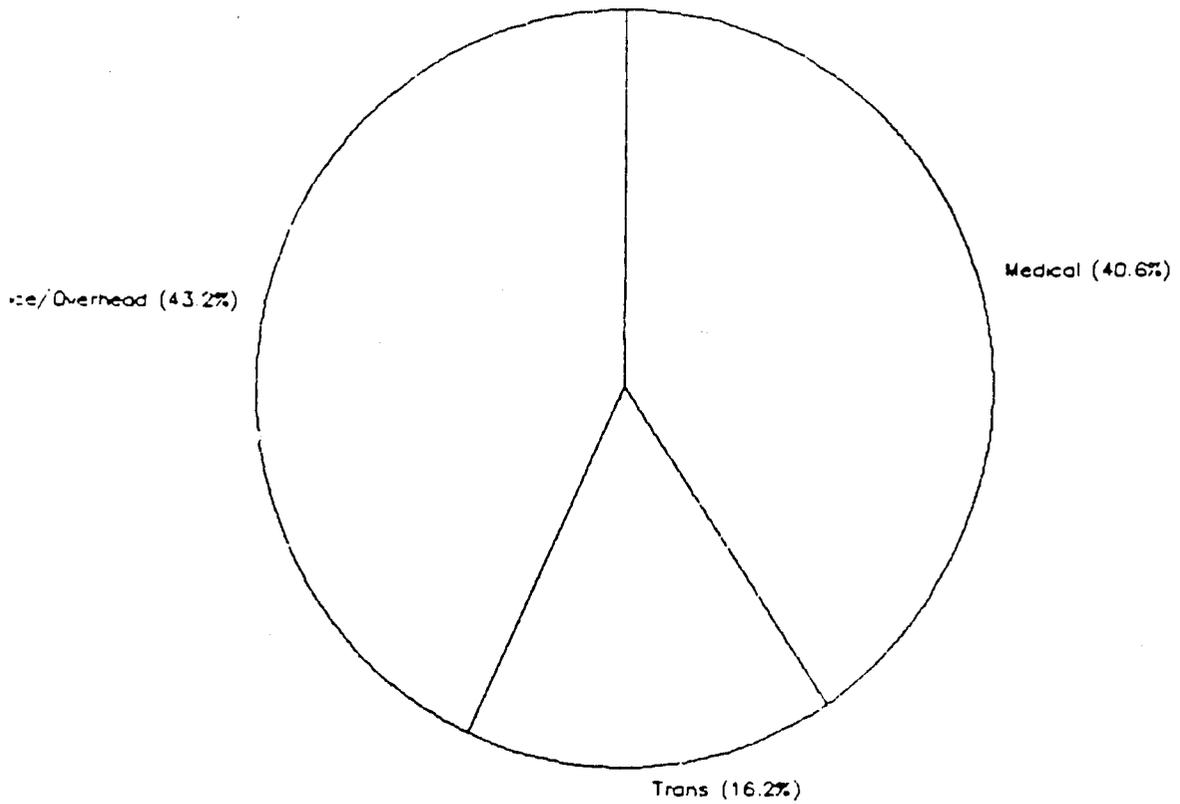
EXPENDITURES FROM DONATIONS BY TYPE

AT GULVEREN HEALTH CENTER, ANKARA



EXPENDITURES FROM DONATIONS BY TYPE

AT YESILEVLER HEALTH CENTER, ANKARA



Although revenues generated at the health center level potentially augment the pool of resources available for primary health care, the pattern of spending at the facility level does not offset those at the central level (highly administrative and indirect), but rather to reinforce these spending patterns. Further, retention of revenues at the facility level may both be an incentive for the facility to spend resources on non-patient related items, as well as a disincentive for the central government to provide necessary equipment and materials by virtue of the fact that the facility should have the resources to do so.

Therefore, it appears that district-level facilities have the greatest potential for generating resources for primary health care. These facilities also had the highest "index of activity" for the national immunization program. A policy providing guidance as to how donated revenues should be spent should be made in the near future. This policy could specify proportions of expenditures, such as 50% for patient-related expenses, 25% for fuel and transportation and 25% for other supplies. In this manner, more resources will be made available to priority health programs, such as the EPI and CDD programs.

## VI. MAJOR CONCLUSIONS and FUTURE STUDIES

Both the EPI and CDD programs are being financed largely by the Government of Turkey in their present state. There is some concern over the capability of present resources available within the Ministry of Health to finance completely improvements which have been suggested in the WHO Comprehensive Review document such as improved information, supervision, procurement, and distribution systems. Therefore, action needs to be taken now to identify and plan for needed resources in the short-term. Two areas which need to be addressed soon are costs of training and vaccine which are currently being financed, in large part, by the donor community but which will have to be paid for by the MOHSA in the future.

Expenditures and, if possible, full costs of both of these programs should be monitored over time through a management information system. In this way, fund shortages can be predicted and alternative plans made for essential program aspects, such as training and procurement of vaccines, syringes, ORS packets, and equipment.

There is evidence from the facility study to suggest that the greatest revenue potential and the greatest intensity of immunization activity occurs in district health centers. Therefore, future efforts to generate local resources for the EPI and CDD programs could be focused at this level. National program managers should examine why city health centers have low levels of activity.

This cost and cost-effectiveness analysis has highlighted several areas for future study and action:

- 1) Additional evaluations should be made of how much resources are generated in health facilities; what these funds are being used for; how these funds are being managed; and what percentage of facility operations

are being covered by revenue generation. Future evaluations should examine facilities in a wider variety of provinces to determine country variations and patterns;

2) Additional studies of the cost of delivering services in health facilities should be undertaken. These studies should draw a wider sample of facilities in different provinces to determine inter and intra-provincial variations. Further, facility studies should be complemented by facility-based coverage surveys in order to determine what it is costing to increase coverage from one point to another. The present survey, as designed, only measures costs in relation to outcomes at one point in time. These surveys could be improved to provide more information on a "micro level" about how much it costs in certain areas to increase coverage. This information may be better able to predict how much national resources are needed to finance UCI or improved access to the CDD program.

3) The MOHSA should establish "sentinel sites" for monitoring costs of service delivery over time. Costs could be collected following a standard methodology and compared to basic coverage or output data.

4) Further investigation should take place on the full cost of the training options available for both EPI and CDD programs. Training costs appear to be the most severely underfunded for both of the child survival programs and securing adequate funds for both of these programs will be crucial to their long-term sustainability and success. Therefore, attention should be paid to outlining different training options, such as training of school teachers, or holding regional or provincial workshops and to determining how much each option would cost and where those resources will come from in the near future.

5) As the private sector will become stronger in providing immunization and in possibly becoming a venue for distribution of ORS packets, future costing studies of these two national programs should attempt to quantify and measure the costs of delivering services through the private sector.

6) Integration of delivering BCG to children less than one year into the PHC Directorate (from the TB Eradication Department) could potentially represent a cost savings to the national EPI.

7) A future study should investigate the cost to the MOHSA of providing polio boosters to school-age children.

## VIII. APPENDIXES

- A. Scope of Work
- B. Local Administration Questionnaire
- C. EPI Expenditures
- D. EPI Full Cost Information
  - D.1 Full cost of the EPI
  - D.2 Salary estimates
  - D.3 Training costs
  - D.4 Central warehouse costs
  - D.5 Media costs
  - D.6 Country Comparisons
  - D.7 Projection of variable costs of the EPI
- E. CDD Expenditures
- F. CDD Full Costs
  - F.1 Full costs of the CDD program
  - F.2 Salary estimates
  - F.3 Effectiveness of the CDD program
- G. Recurrent costs of an ORT UNIT
- H. Facility Survey Questionnaires
- I. Budgets for the MOHSA, PHC and MCH/FP Directorates
- J. Persons Contacted

## APPENDIX A

### PRESENTATION ON COST AND COST-EFFECTIVENESS OF THE NATIONAL PROGRAMS OF IMMUNIZATION AND DIARRHEAL DISEASE CONTROL

Logan Brenzel, Technical Associate  
Resources for Child Health Project/USAID

February 12, 1988

#### I. PURPOSE

We have come together for this review to assess the national immunization and CDD programs and to make recommendations as to how to improve, sustain, and strengthen them in future years. These recommendations may involve significant additions or changes to the existing programs which may require additional financial resources for their implementation. In 1987, the Ministry of Health received 2.9% of the total government budget, or approximately 300 billion Turkish lira. Primary health care received 26.8% of this amount or 78.6 million liras. MCH/FP received approximately 2.7% of the Ministry budget. Given the decreasing trend in budget allocation to health, two questions arise: how much will it cost to operate the national immunization and diarrheal control programs and how will these programs be financed in the future?

For the past three weeks, Ministry of Health colleagues and I have begun work on several cost and cost-effectiveness studies. Cost information is being analyzed at the present time, so I will describe the range of studies that are being undertaken for the review.

The following types of studies are being performed for both the national immunization and CDD programs:

a) An estimation of the expenditures made in 1987 by the Ministry of Health, other ministries such as the Ministry of Education and the Ministry of Interior, donor organizations (such as UNICEF, WHO, and Red Crescent), and the national health foundation. The purpose of this type of analysis is to assess the magnitude and proportion of funds being spent by various organizations. This analysis will also estimate the proportion of expenditures for different types of activities in both programs, such as expenditures for training, transportation, vaccine, and ORS packets.

b) An estimation of the full resource cost of operating the program in 1987, which includes an estimate of non-monetary donations made to the program, such as radio and television broadcasting time, donated supplies, and the proportion of time spent by health workers and administrators on these programs. The purpose of this analysis is to estimate what the "opportunity cost" of each of these programs is to the health sector and to

the society at large.

c) An estimation of the recurrent costs (those that occur on a yearly basis) and of the variable costs (those that depend on the volume of services delivered). The recurrent cost analysis may help predict what the annual resource requirements should be to operate the programs as they are being implemented now. The variable cost analysis may help predict what the costs could be to achieve higher levels of coverage.

d) An estimation of the cost-effectiveness of each of the programs in 1997. For the national immunization program, the cost per fully immunized child will be calculated. For the national CDD program, the cost per child treated with OAS will be the measure of cost-effectiveness.

e) A study on the variations in the cost and cost-effectiveness of delivering vaccinations and managing diarrhea cases in health centers and health houses will be performed. A survey of 12 health facilities in Istanbul, 4 facilities in Ankara, and 2 facilities in Van have been included so far. The purpose of this survey is to determine what factors influence the cost and effectiveness of delivering services. For example, we might find that some health centers have a more efficient delivery of services because they use a more optimal number of staff to administer vaccines and manage diarrhea cases, or because they perform better outreach to their population. The organization of these facilities could serve as models for the program in other health centers; and,

f) Finally, yearly donations to health centers by the population will be analyzed to determine the proportion of revenues generated at health centers used for these two programs.

For the national immunization program, two special studies will be conducted:

a) First, a study of the cost and cost-effectiveness of school immunization;

b) Second, the cost of upgrading the national capacity to produce vaccine and syringes will be examined.

For the national CDD program, the operating cost of an oral rehydration therapy unit will be determined to predict the future cost of having these types of units in each province.

Preliminary results of these studies should be ready by February 21 for discussion with the Ministry of Health and members of the program review. The final analysis and report should be ready by February 26. If there are any questions regarding the scope of these studies or special interests that you have for cost and cost-effectiveness analysis, I would be pleased to discuss them with you.

APPENDIX B

QUESTIONNAIRE FOR LOCAL ADMINISTRATION DONATIONS TO  
PREVENTIVE HEALTH CARE IN THE PROVINCES

1. How much fuel was donated to preventive health care in your province in 1987? \_\_\_\_\_ liters. What was the value of the fuel that was donated? \_\_\_\_\_ T.L.

2. Were any vehicles donated or purchased for preventive health in 1987? How many and what type were they? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Did the local administration ever purchase any of the following vaccines in 1987 (BCG, Measles, DPT, polio, tetanus toxoid, or DT)? If yes, how many doses and what was the value of each?

BCG	_____ doses,	_____ T.L.
DPT	_____ doses,	_____ T.L.
Measles	_____ doses,	_____ T.L.
DT	_____ doses,	_____ T.L.
Polio	_____ doses,	_____ T.L.
Tetanus	_____ doses,	_____ T.L.

4. Did the local administration purchase disposable syringes for preventive health care in 1987? If yes, how many \_\_\_\_\_ and what was the value of this purchase \_\_\_\_\_ T.L.

5. Did the local administration ever pay per diems or transportation costs for preventive health care in 1987? What was the value of these donations? \_\_\_\_\_ T.L.

APPENDIX C.1

EXPENDITURES IN 1987 FOR THE NATIONAL IMMUNIZATION PROGRAM IN TURKEY IN U.S. DOLLARS

COST CATEGORY	MOSHA	TB ERAD. DEPT.	LOCAL ADMIN	TOTAL GOVERNMENT	TBT	HEALTH FOUNDATION	UNICEF	WHO	USAID	ROTARY	TOTAL DONORS	TOTAL EXPENDITURE
<b>I. RECURRENT COSTS</b>												
Salaries/Benefits	0	0	0	0	0	0	0	0	0	0	0	0
Per Diem	47,355	19,791	0	67,146	0	0	0	0	0	0	0	0
Per Diem-Training	8,595	0	0	8,595	0	0	5,450	6,833	0	0	0	67,146
Trans + Travel	198,795	5,349	7,465	211,609	0	1,355	0	0	0	0	12,283	20,878
Trans-Training	27,701	0	0	27,701	0	0	0	1,854	0	0	0	212,964
Freight + Shipping	44,084	814	0	44,898	0	0	14,300	0	0	0	1,854	29,555
Vaccine	140,284	21,841	0	162,125	0	48,077	51,000	0	130,000	22,800	37,100	81,998
Vaccination Supplies	406,977	200,930	0	607,907	0	101	36,100	0	0	205,100	386,100	596,302
Media	0	0	0	0	17,442	0	0	0	0	0	36,100	644,108
Other Supplies	0	0	733	733	0	9	27,400	0	0	0	0	17,442
Maintenance Vehicles	7,558	0	9,334	16,892	0	0	0	0	0	0	27,400	28,133
Maint.Cold Chain	0	0	0	0	0	84	0	0	0	0	0	16,892
Print/Trans/Repro	25,581	0	0	25,581	0	0	18,400	4,000	0	0	0	84
Building maint.	56,685	1,000	0	57,685	0	0	0	0	0	0	22,400	47,981
Subtotal	963,615	249,725	17,532	1,230,872	17,442	49,617	152,650	12,687	130,000	227,900	523,237	1,821,168
<b>II. INVESTMENT COSTS</b>												
Cold Chain Equipment	0	0	0	0	0	288	0	0	0	0	0	288
Media Equipment	0	0	0	0	0	0	3100	0	0	0	3,100	3,100
Computer Equipment	0	0	0	0	0	0	9600	0	0	0	9,600	9,600
Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
Technical Assistance	0	0	0	0	0	0	0	20,000	60,100	0	80,100	80,100
Subtotal	0	0	0	0	0	288	12,700	20,000	60,100	0	92,800	93,088
<b>GRAND TOTAL</b>	<b>963,615</b>	<b>249,725</b>	<b>17,532</b>	<b>1,230,872</b>	<b>17,442</b>	<b>49,905</b>	<b>165,350</b>	<b>32,687</b>	<b>190,100</b>	<b>227,900</b>	<b>616,037</b>	<b>1,914,256</b>

TB Eradication Department expenditures estimated to be 5% of total budget expenditures.

Local administration costs for Istanbul and Ankara provinces only.

Health Foundation expenditures represent Headquarters, Sinop, Urfa, and Istanbul provinces only.

APPENDIX D.1

TOTAL COST OF THE NATIONAL IMMUNIZATION PROGRAM BY SOURCE IN TURKEY IN 1982 (DOLLARS)

COST CATEGORY	MOHSAH	TD FANCI. DEPT.	MIN	LOCAL DOMIN	FEDERAL GOVERNMENT	SP1	WORLD FOUNDATION	UNICEF	WHO	UNEP	ROTARY	TOTAL (DOLLARS)	TOTAL COST
<b>I. RECURRENT COSTS</b>													
Salaries/Benefits	7,836,841	267,442	767,442	0	0,871,725	0	0	0	0	0	0	0	8,871,725
Per Diem	47,355	19,791	0	0	67,146	0	0	0	0	0	0	0	67,146
Per Diem Training	8,595	0	0	0	8,595	0	0	0	0	0	0	0	8,595
Trans + Travel	198,795	5,349	0	7,465	211,609	0	0	5,450	6,813	0	0	12,283	20,878
Travel Train	27,701	0	0	0	27,701	0	1,355	0	0	0	0	0	29,056
Freight/Shipping	44,084	914	0	0	44,998	0	0	0	1,014	0	0	1,054	29,555
Vaccine	27,835	68,949	0	0	95,884	0	0	14,300	0	0	22,800	37,100	81,998
Vaccination Supplies	199,232	141,288	0	0	340,520	0	9,547	10,118	0	59,431	64,345	133,894	239,325
Media	0	0	0	0	0	1,345,536	101	17,560	0	0	0	17,560	358,181
Other Supplies	0	0	0	733	733	0	0	0	0	0	0	0	1,345,536
Maintenance Vehicles	2,558	0	0	9,334	16,892	0	0	27,400	0	0	0	27,400	28,133
Maintenance Chain	0	0	0	0	0	0	0	0	0	0	0	0	16,892
Printing/Reproduc.	25,581	0	0	0	25,581	0	0	0	0	0	0	0	25,581
Building maint.	56,685	1,000	0	0	57,685	0	0	18,400	0	0	0	18,400	43,981
									4,000	0	0	4,000	61,685
<b>Subtotal</b>	<b>8,480,262</b>	<b>503,733</b>	<b>767,442</b>	<b>17,531</b>	<b>9,768,968</b>	<b>1,345,536</b>	<b>11,087</b>	<b>93,259</b>	<b>12,687</b>	<b>59,431</b>	<b>87,145</b>	<b>252,491</b>	<b>11,378,082</b>
<b>II. INVESTMENT COSTS</b>													
Cold Chain Equipment	1,010,057	1,858	0	0	1,011,915	0	144	134,297	0	0	0	134,297	1,146,356
Media Equipment	0	0	0	0	0	0	0	442	0	0	0	442	442
Computer Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicles	981,836	131,652	0	0	1,113,493	0	0	6,652	0	0	0	6,652	1,120,145
Technical Assistance	0	0	0	0	0	0	0	0	20,000	60,100	0	80,100	80,100
<b>Subtotal</b>	<b>1,991,893</b>	<b>133,515</b>	<b>0</b>	<b>0</b>	<b>2,125,408</b>	<b>0</b>	<b>144</b>	<b>141,391</b>	<b>20,000</b>	<b>60,100</b>	<b>0</b>	<b>221,491</b>	<b>2,347,043</b>
<b>(GRAND TOTAL)</b>	<b>10,472,155</b>	<b>637,248</b>	<b>767,442</b>	<b>17,531</b>	<b>11,894,376</b>	<b>1,345,536</b>	<b>11,231</b>	<b>234,619</b>	<b>42,687</b>	<b>119,531</b>	<b>87,145</b>	<b>473,982</b>	<b>13,725,124</b>

Local administration costs include Ankara and Istanbul provinces only.

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## APPENDIX D.2

## ESTIMATION OF SALARY COSTS FOR THE EPI FOR MOSHA

TYPE OF PERSONNEL	SALARY/MO	SALARY/MO \$	SALARY/YEAR	NUMBER	% TIME	TOTAL
<b>I. CENTRAL ADMIN</b>						
EPI manager	300,716	350	4,197	1	33%	1,385
Asst EPI manager	293,494	341	4,096	1	33%	1,352
Pharmacist	170,000	198	2,373	1	33%	783
Chief Officer	196,691	229	2,745	2	33%	1,812
Med Officers/Super Officers	164,000	191	2,289	8	33%	6,042
	97,847	114	1,366	10	33%	4,506
Subtotal	1,222,748	1,422	17,065	23		15,880
<b>II. CNTRL COLD STORE</b>						
Chief Officer	196,691	229	2,745	1	100%	2,745
Technician (3)	107,136	125	1,495	3	15%	673
Officers (6)	107,136	125	1,495	6	100%	8,971
Drivers (4)	83,718	97	1,168	4	25%	1,168
Loaders (4)	83,718	97	1,168	4	25%	1,168
Subtotal	578,399	673	8,072	18		14,726
TOTAL CENTRAL LEVEL	1,801,147	2,095	25,137	41		30,606
<b>III. PROVINCE ADMIN</b>						
EPI managers	227,682	265	3,178	67	100%	212,898
Asst manager	227,682	265	3,178	67	100%	212,898
Stockkeeper	82,422	96	1,150	67	30%	23,121
Statistician/Sec Officers	80,153	93	1,119	67	100%	74,948
	107,136	125	1,495	134	100%	200,358
Subtotal	725,075	843	10,119	402		724,223
<b>IV. HEALTH STAFF</b>						
Doctors	227,682	265	3,178	4,253	15%	2,027,135
Nurse	114,921	134	1,604	3,414	15%	821,337
Midwife	107,136	125	1,495	16,113	15%	3,613,850
Statistician/Office Drivers	80,153	93	1,119	2,257	15%	378,712
	83,718	97	1,168	1,375	15%	240,979
Subtotal	613,610	714	8,564	27,412		7,082,013
<b>V. TOTAL</b>	<b>3,139,832</b>	<b>3,652</b>	<b>43,820</b>	<b>27,855</b>		<b>7,836,841</b>

## APPENDIX D.3

COSTS OF TRAINING AND EVALUATION FOR MOSHA FOR THE NATIONAL EPI AND CDD PROGRAMS  
IN 1987

TYPE	DATE	NO. OF PARTICIPANT	NO. OF TRAINERS	COST OF SALARIES	COST OF PER DIEM	COST OF TRANSPORTATION	COST OF MATERIALS	TOTAL TL	TOTAL US\$\$	TOTAL EPI	TOTAL CDD
A		12	1	900,000	(central team)	(central team)	(unknown)	900,000	1,047	0	523
B		67	12	4,668,750	(WHO/UNICEF)	(WHO/UNICEF)	(WHO/UNICEF)	4,668,750	5,429	0	1,810
C	1987	3000	67	64,507,500	12,804,000	30,000,000	(unknown)	107,311,500	124,781	41,594	41,594
D		75	12	1,957,500	(UNICEF)	(UNICEF)	(UNICEF)	1,957,500	2,276	759	759
E		40	1	1,200,000	(UNICEF)	(UNICEF)	(UNICEF)	1,200,000	1,395	0	1,395
F		134	10	112,500	35,000	100,000	-----	247,500	288	0	288
G		20	12	1,125,000	180,000	2,400,000	-----	3,705,000	4,308	2,154	2,154
H	May 1987	8	0	5,850,000	1,800,000	15,245,000	-----	22,895,000	26,622	13,311	13,311
TOTAL				80,321,250	14,819,000	47,745,000	0	142,885,250	166,146	57,817	61,833
TOTAL TRAINING				73,346,250	12,839,000	30,100,000	0	116,285,250	135,215	42,352	46,368
TOTAL EVALUATION				6,975,000	1,980,000	17,645,000		26,600,000	30,930	15,465	15,465

- A= Training of trainers for ARI and CDD in Ankara. Training performed by WHO. 50% of all training costs estimated for CDD program.
- B= Provincial manager training for CDD/ARI which used central team for training. Training held in three cities: Ankara, Van, and Samsun.
- C= Provincial level training of physicians by provincial team.
- D= Provincial hospital pediatrician training. Training was held in Van, Ankara, Samsun, and Ryalik and was performed by the central team.
- E= Dean's meeting for CDD.
- F= School teacher's meeting on CDD, where the provincial directors of health and education held regional meetings in Van, Izmir, and Samsun. MONEYS budget will account for participation of 134 school teachers. MOSHA estimates for 10 trainers only.
- G= Evaluation of EPI and CDD Program meetings in the provinces.
- H= Evaluation tours for EPI and CDD which lasted 75 days between May and September, 1987.

APPENDIX D.4

CENTRAL COLD CHAIN COSTS FOR MOSHA

COST CATEGORY	AMOUNT	COST \$	COMMENTS
Travel	44,084	3,845	44084 kms traveled/yr
Depreciation	48,131	4,197	4 kms/liter, 300TL/liter
Utilities	250,000	21,802	
Salaries	14,726	1,284	
Subtotal	356,941	31,129	

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APPENDIX D.5

ESTIMATION OF THE COST OF MEDIA  
FOR THE EPI AND CDD PROGRAMS  
IN 1987

TYPE	UNIT COST	NO. OF UNIT	TOTAL COST	TOTAL 1987*
<b>EPI AND CDD</b>				
I. TELEVISION	162,000/sec			
A. SPOTS PROGRAMS	162,000	7,830	1,268,460,000	1,474,953
B. SUBTITLES	162,000	235	38,070,000	44,267
C. NEWS BROADCAST	162,000	110	17,820,000	20,721
D. LONG PROGRAM	162,000	5,446	558,252,000	649,130
SUBTOTAL		11,621	1,882,602,000	2,189,072
PRODUCTION COST			25,000,000	29,070
SUBTOTAL TELE			1,907,602,000	2,218,142
II. RADIO	100,00/min			
A. TALKS/INTER	100,000	60	6,000,000	6,977
B. SPOTS	100,000	150	15,000,000	17,442
SUBTOTAL			21,000,000	24,419
III. TOTAL			1,928,602,000	2,242,560
IV. PROPORTION FOR EPI AND CDD				
EPI		80%	1,542,881,600	1,794,048
CDD		60%	1,157,161,200	1,345,536
		20%	385,720,400	448,512

APPENDIX D.6

COST PER FULLY VACCINATED CHILD  
IN SELECTED COUNTRIES

COUNTRY	STRATEGY	COST/FULLY VACCINATED CHILD
INDONESIA	FIXED	2.86 (1982 \$)
ECUADOR	FIXED	4.77 (1985 \$)
PHILIPPINES	FIXED	4.97 (1982 \$)
MAURITANIA	FIXED	6.86 (1985 \$)
SENEGAL	FIXED	8 (1986 \$)
ECUADOR	CAMPAIGN	8.13 (1985 \$)
MAURITANIA	CAMPAIGN	8.97 (1985 \$)
THAILAND	FIXED	10.73 (1982 \$)
TURKEY	FIXED	17.08 (1987 \$)
MAURITANIA	MOBILE TEAMS	17.37 (1985 \$)
CAMEROON	CAMPAIGN	18.93 (1987 \$)
SENEGAL	CAMPAIGN	27 (1986 \$)

APPENDIX D 7

COST PROJECTIONS FOR EPI AND CDD

	EPI	CDD
PRESENT VARIABLE COST	1,027,022	161,505
VARIABLE COST/CHILD	1.28	0.36
PROJECTED COVERAGE	80%	50%
NUMBER OF CHILDREN	1,102,400	3,524,500
TOTAL COST: NEW COVERAGE	1,411,072	1,268,820
TOTAL COST (TL)	1,213,521,920	1,091,185,200

## APPENDIX E

## EXPENDITURES FOR THE NATIONAL CDD PROGRAM IN TURKEY IN 1987 U.S. DOLLARS

COST CATEGORY	MUSHA MCH/FP	LOCAL ADMIN	TOTAL GOV	TRT	UNICEF	WHO	ROTARY	TOTAL DONORS	TOTAL EXPENDITURE
<b>I. RECURRENT COSTS</b>									
Salaries/Benefits	0	0	0	0	0	0	0	0	0
Per Diem	4,360	7,268	11,628	0	0	0	0	0	11,628
Per Diem-Training	8,636	0	8,636	0	22,950	6,833	0	29,783	38,419
Trans + Travel	15,698	8,721	24,419	0	0	0	0	0	24,419
Trans-Training	27,817	0	27,817	0	0	1,854	0	1,854	29,671
Freight	0	0	0	0	0	0	0	0	0
ORS packets	313,953	0	313,953	0	182,000	0	42,900	224,900	538,853
Media	0	0	0	5,184	0	0	0	0	5,184
Printing/Reproduc.	6,977	0	6,977	0	30,450	0	14,600	45,050	52,027
Building maint.	5,577	0	5,577	0	17,000	4,000	0	21,000	26,577
Subtotal	383,018	15,989	399,007	5,184	252,400	12,687	57,500	327,587	726,778
<b>II. INVESTMENT COSTS</b>									
Media Equipment	0	0	0	0	3,100	0	0	3,100	3,100
Computer Equipment	0	0	0	0	12,500	0	0	12,500	12,500
Vehicles	0	0	0	0	0	0	0	0	0
Technical Assistance	0	0	0	0	26,900	20,000	0	46,900	46,900
Subtotal	0	0	0	0	42,500	20,000	0	62,500	62,500
<b>GRAND TOTAL</b>	<b>383,018</b>	<b>15,989</b>	<b>399,007</b>	<b>5,184</b>	<b>294,900</b>	<b>32,687</b>	<b>57,500</b>	<b>385,087</b>	<b>789,278</b>

APPENDIX F.1

COST OF THE NATIONAL COO PROGRAM IN TURKEY IN 1987 U.S. DOLLARS

COST CATEGORY	MOSHA MCH/FP	MOE	LOCAL ADMIN	TOTAL GOV	TRT	UNICEF	WHO	ROTARY	TOTAL DONORS	TOTAL COST
<b>I. RECURRENT COSTS</b>										
Salaries/Benefits	2,394,432	767,442	0	3,161,874	0	0	0	0	0	3,161,874
Per Diem	4,360	0	7,268	11,628	0	0	0	0	0	11,628
Per Diem-Training	8,636	0	0	8,636	0	22,950	6,833	0	29,783	38,419
Trans + Travel	15,698	0	8,721	24,419	0	0	0	0	0	24,419
Trans-Training	27,817	0	0	27,817	0	0	1,854	0	1,854	29,671
Freight	0	0	0	0	0	0	0	0	0	0
ORS packets	94,842	0	0	94,842	0	24,098	0	6,519	30,616	125,458
Media	0	0	0	0	448,512	0	0	0	0	448,512
Printing/Reproduc.	6,977	0	0	6,977	0	30,450	0	14,600	45,050	52,027
Building maint.	5,577	0	0	5,577	0	17,000	4,000	0	21,000	26,577
Subtotal	2,558,339	767,442	15,989	3,341,770	448,512	94,498	12,687	21,118	128,303	3,918,585
<b>II. INVESTMENT COSTS</b>										
Media Equipment	0	0	0	0	0	442	0	0	442	442
Computer Equipment	0	0	0	0	0	1,781	0	0	1,781	1,781
Vehicles	327,278	0	0	327,278	0	0	0	0	0	327,278
Technical Assistance	0	0	0	0	0	26,900	20,000	0	46,900	46,900
Subtotal	327,278	0	0	327,278	0	29,122	20,000	0	49,122	376,400
<b>GRAND TOTAL</b>	<b>2,885,617</b>	<b>767,442</b>	<b>15,989</b>	<b>3,669,048</b>	<b>448,512</b>	<b>123,620</b>	<b>32,687</b>	<b>21,118</b>	<b>177,425</b>	<b>4,294,985</b>

## APPENDIX F.2

## ESTIMATION OF SALARY COSTS FOR THE NATIONAL CDD PROGRAM

TYPE OF PERSONNEL	SALARY/MO	SALARY/MO +	SALARY/YEAR	NUMBER	% TIME	TOTAL
<b>I. CENTRAL ADMIN</b>						
CDD manager	340,000	395	4,744	1	5%	237
Asst CDD manager	226,655	264	3,163	1	33%	1,044
Trainers	190,000	221	2,651	4	25%	2,651
Physicians	200,000	233	2,791	3	50%	4,186
Statistician	152,000	177	2,121	1	25%	530
Subtotal	1,108,655	1,289	15,470	10		8,648
<b>II. CNTRL WAREHOUSE</b>						
Chief Officer	90,000	105	1,256	1	5%	63
Officer	90,000	105	1,256	1	5%	63
Loaders	110,000	128	1,535	4	5%	307
Subtotal	290,000	337	4,047	6		433
<b>TOTAL CENTRAL LEVEL</b>	<b>1,398,655</b>	<b>1,626</b>	<b>19,516</b>	<b>16</b>		<b>9,081</b>
<b>III. PROVINCE ADMIN</b>						
CDD managers	227,682	265	3,177	67	10%	21,286
Asst manager	227,682	265	3,177	67	10%	212,856
Health Ed Nurse	0	0	0	67	20%	0
Officers	80,153	93	1,118	134	50%	74,934
Stockkeeper	82,422	96	1,150	67	5%	3,853
Subtotal	617,939	719	8,622	402		25,133
<b>IV. HEALTH STAFF</b>						
Doctors/supervisors	227,682	265	3,177	4,253	5%	675,580
Nurse	114,921	134	1,604	3,414	5%	273,726
Midwife	107,136	125	1,495	16,113	5%	1,204,383
Statistician/Office	80,153	93	1,118	2,257	5%	126,213
Drivers	83,718	97	1,168	1,375	5%	80,311
Subtotal	613,610	714	8,562	27,412		2,360,213
<b>V. TOTAL</b>	<b>2,630,204</b>	<b>3,058</b>	<b>36,701</b>	<b>27,830</b>		<b>2,314,400</b>

APPENDIX E.3  
EFFECTIVENESS OF THE ODD PROGRAM IN 1987 IN TARGET PROVINCES

PROVINCE	Children Treated with ORS: 9/87	Adjusted 1987	Number Packets Used: 9/87	Adjusted 1987	Ratio: Packets/Child	Number Packets Sent Provinces	Ratio Used/Sent	Population <5	Projected Incidence	Ratio: Treated/Incidence
Adana	17,269	23,025	36,945	49,260	2.14	200,000	24.67%	243,515	487,031	4.73%
Adiyaman	6,835	9,113	16,195	21,593	2.37	45,000	47.99%	60,925	121,951	7.47%
Agri	2,279	3,039	6,189	8,252	2.72	40,000	20.63%	59,071	118,143	2.57%
Ankara	8,592	11,456	18,784	25,045	2.19	270,000	9.78%	465,915	931,830	1.23%
Bingol	532	709	1,432	1,909	2.69	25,000	7.64%	32,831	65,663	1.08%
Bitlis	2,329	3,105	4,741	6,321	2.04	30,000	21.07%	42,514	85,028	3.65%
Cankiri	3,148	4,197	8,487	11,316	2.70	25,000	45.26%	35,324	70,648	5.94%
Diyarbakir	13,374	17,832	29,514	31,352	1.75	113,000	27.75%	133,556	267,112	6.68%
Elazig	2,600	3,467	5,770	7,693	2.22	55,000	13.91%	66,746	133,492	2.60%
Erzincan	1,372	1,829	2,982	3,976	2.17	28,000	14.20%	40,873	81,747	2.24%
Gumushane	3,218	4,291	7,721	10,295	2.40	29,000	35.50%	32,144	64,288	6.67%
Hakkari	1,475	1,967	4,013	5,351	2.72	20,000	26.75%	25,882	51,765	3.80%
Kars	4,442	5,923	11,109	14,812	2.50	83,000	17.85%	97,286	194,572	3.04%
K.Maras	8,113	10,817	16,752	22,336	2.06	102,000	21.90%	117,669	235,338	4.60%
Mardin	7,716	10,208	18,734	24,979	2.43	84,000	29.74%	91,769	183,539	5.61%
Mus	2,634	3,512	8,689	11,585	3.30	35,000	33.10%	47,265	94,530	3.72%
Sirt	7,912	10,549	19,956	26,611	2.52	55,000	48.36%	74,435	148,870	7.09%
Tunceli	560	747	2,159	2,879	3.86	15,000	19.19%	19,888	39,777	1.88%
Urfa	13,784	18,379	44,273	59,031	3.21	95,000	62.14%	117,776	235,551	7.80%
Van	5,569	7,424	15,147	20,196	2.72	60,000	33.66%	77,360	154,721	4.80%
Total	113,752	151,669	273,594	364,792	51	1,409,000	6	1,882,797	3,765,594	1
Average	5,688	7,583	13,680	18,240	2.54	70,450	28.03%	94,140	188,280	4.35%

Figures on ORS use and numbers of children treated furnished by MCH/FP Directorate, Ministry of Health and Social Assistance. The population of children less than five years of age was extrapolated from data furnished by MOSHA on total population in 1985 and 1987, using 13.3% of children less than five years. The number of expected episodes per child was estimated to be two per year.

## APPENDIX F.4

COST/CHILD TREATED FOR THE NATIONAL CDB PROGRAM  
IN SELECTED COUNTRIES

COUNTRY	COST/CHILD TREATED
INDONESIA	1.50 (1985 \$)
GAMBIA	1.45 (1985 \$)
HONDURAS	4.53 (1985 \$)
EGYPT	5.56 (1985 \$)
TURKEY	9.66 (1987 \$)

APPENDIX G

PROJECTION OF RECURRENT COSTS OF  
OPERATING AN ORT UNIT  
(in a district health center)

Category of Cost	No. of Units	Unit Cost	Total Cost	Total Cost \$
<b>Salaries</b>				
Physician	0.25	2,732,184	683,046	794
Nurse	0.25	1,379,052	344,763	401
Midwife	0.25	1,285,632	321,408	374
Subtotal	0.75		1,349,217	1,569
<b>Supplies</b>				
ORS packets	13,600	135	1,836,000	2,135
Chairs	10	25,800	258,000	300
Beds	5	100,000	500,000	581
ORS cups	7,000	500	3,500,000	4,070
Table	1	50,000	50,000	58
Mixing supplies			10,000	12
Subtotal			6,154,000	7,156
Fuel	60	3,000	45,000	52
<b>Total Recurrent</b>			<b>7,503,217</b>	<b>8,725</b>

Assuming 100% coverage of the population less than five years  
out of a total population of 200,000.



7. How many children were vaccinated in this health center during May and November, 1987?

MAY	NOVEMBER
BCG -----	-----
POLIO 1-3 -----	-----
DPT 1-3 -----	-----
MEASLES -----	-----
POLIO BOOSTER -----	-----
DT -----	-----

8. How often is vaccine stock replaced in this facility? -----  
 ----- How many doses of each are replaced each time?

BCG ----- Polio ----- DPT -----  
 Measles ----- DT ----- TT -----

9. Does the cold chain operate with fuel? Y N. If yes, how often does fuel need to be replaced? -----

10. How many kilometers are travelled each month by health facility staff for vaccination purposes (i.e. to replace vaccine stock, to buy needed supplies, to do outreach activities)?  
 -----

\* \* \* \* \*

11. The following questions relate to school vaccination. How many school children were vaccinated for the following antigens in 1987? polio booster ----- DT -----

12. How many schools were visited? -----

13. How many kilometers were travelled to do school vaccination?  
 -----

14. How many vaccination teams were there and what type of staff participated in school vaccination? -----  
 -----  
 -----

\* \* \* \* \*

The following questions are about treatment of children with diarrheal disease in the health facility.

bb



## SAĞLIK KURULUŞLARI ARAŞTIRMASI ANKETİ

Bu çalışmanın amacı değişik illerdeki sağlık kuruluşları arasından seçilecek örneklemi, ulusal bağışıklama ve ishaller hastalıklarının kontrolü programlarında harcanan kaynakların (maddi ve diğer) miktarları açısından incelemek ve karşılaştırmaktır.

Bu araştırmadaki soruları yanıtlayabilmek için bazı istatistikî ve finans bilgilerine gerek duyulmaktadır.

1. Sağlık kuruluşunun türü: Sağlık ocağı - il -----  
ilçe -----  
köy -----  
Sağlık evi -----

2. Kuruluşun hizmet verdiği nüfus: Toplam -----

(çocuk yarı) bir yıldan az -----  
beş yıldan az -----

3. Sağlık personelinin sayısı ve türü/tipi: Toplam Aşıkamayla pür

doktor	-----	-----
hemşire	-----	-----
ebe	-----	-----
- ebe hemşire	-----	-----
yüksek hemşire	-----	-----
sekreter	-----	-----
istatistikçi	-----	-----
şöför	-----	-----
hizmetli	-----	-----

4. Sağlık kuruluşunda aşılama belirli bir takvime göre mi yapılıyor ?  
Evet Hayır

Cevap Evet ise, çocuklara her tip aşı ne zaman haftanın hangi gününde yapılmaktadır ? -----  
-----

5. Sağlık kuruluşunuz günde kaç saat hizmet vermektedir ? -----  
Haftalık toplam hizmet verdiğiniz süre ne kadardır?

6. Kuruluşunuzda, aşağıda belirtilen araç ve gereçlerden şu anda çalışır durumda bulunan kaç tane var ve bunların tipleri nelerdir ?

ulaşım araçları	-----
buzdolapları	-----
derin dondurucular	-----
soğuk kutular	-----
aşı taşıyıcıları	-----
şırıngalar	-----
sterilatorler	-----

7. Sağlık kuruluşunuzda Kasım 1987 de kaç çocuk aşılandı ?

	Mayıs	Kasım
BCG	-----	-----
Polio 1-3	-----	-----
DPT 1-3	-----	-----
Kızamık	-----	-----
Polio rapel	-----	-----
DT	-----	-----

8. Sağlık kuruluşunuzda aşı stoku tedariki hangi sıklıkta yapılmaktadır ? -----

Aşağıda belirtilen aşılarından her ay kaç doz tedarik edilmektedir ? (Periyodunu belirtiniz)

BCG-----	Polio-----	DPT -----
Kızamık -----	DT -----	Tetanoz -----

9. Soğuk zinciriniz yakıtla mı işliyor ?

Evet Hayır

Evet ise, yakıtın hangi sıklıkta tedarik edilmesi gerekiyor ? -----

10. Sağlık kuruluşu personeli aşılama amacıyla ayda kaç km yol katetmektedirler? (aşı stokunun tedariki, gerekli ihtiyaçların satın alınması, gezici hizmetlerin yapılması gibi) -----  
-----

Aşağıdaki sorular okullara dönük aşılama hizmetleriyle ilgilidir:

11. Aşağıda belirtilen antijenlerle karşı, 1987'de kaç çocuk aşılandı ?

Polio rapel ----- DT -----

12. Aşılama yapmak amacıyla kaç okula gidildi ? -----

13. Okula dönük aşılama hizmetleri için kaç km. yol katedildi? -----

14. Okula dönük aşılama faaliyetlerine kaç aşılama ekibi ve ne tür personelle katılındı ?

-----  
-----  
-----

Aşağıdaki sorular ishalleri çocuklara sağlık kuruluşlarında verilen tedavi ile ilgilidir.

15. Geçtiğimiz ayda kaç çocuğa ağızdan sıvı tedavisi verildi? (1987'de kaç çocuk CR T verildi)

16. Şu anda elinizde kaç adet AŞTE paketi var ? -----

Şu anda elinizde kaç adet serum şişesi var ? -----

17. Sağlık kuruluşunuzda ORT (AST) birimi/merkezi var mı ?  
Evet Hayır

18. İshalin, AŞTE ile tedavisi ile ilgilenen kaç ve ne türde elemanınız mevcut?

19. Bu kişilerin zamanlarının ne kadarı, çocukların AŞTE ile tedavisine gitmektedir.



## APPENDIX I

### COMPARATIVE BUDGET ANALYSIS FOR MOSHA, PNC, AND MCH in 1987

(in 1000's)

CATEGORY	MOSHA TOTAL	% OF TOTAL	TOTAL \$	MCH TOTAL	% OF TOTAL	TOTAL \$	PNC TOTAL	% OF TOTAL	TOTAL \$	FB TOTAL	% OF TOTAL	TOTAL \$
PERSONNEL	177,000,000	59.36%	205,814	3,800,000	47.96%	4,419	58,000,000	72.62%	67,442	4,600,000	51.42%	5,349
PER DIEMS	742,025	0.25%	863	75,000	0.95%	87	271,500	0.34%	316	340,400	3.80%	396
COMMUNICATIONS	652,400	0.22%	759	30,000	0.38%	35	250,000	0.31%	291	21,160	0.24%	25
ADVERTISING FEE	36,300	0.01%	42	1,000	0.01%	1	5,000	0.01%	6	920	0.01%	1
SPARE PARTS	214,450	0.07%	249	60,000	0.76%	70	260,000	0.33%	302			
PRINTING	1,363,250	0.46%	1,585	120,000	1.51%	140	440,000	0.55%	512			
FUEL/OIL	2,230,000	0.75%	2,593	270,000	3.41%	314	1,100,000	1.38%	1,279	92,000	1.03%	107
OTHER MATERIALS	18,615,000	6.24%	21,645	2,600,000	32.81%	3,023	2,900,000	3.63%	3,372	2,760,000	30.85%	3,209
<b>TOTAL BUDGET</b>	<b>298,159,100</b>	<b>100%</b>	<b>346,697</b>	<b>7,924,000</b>	<b>100%</b>	<b>9,214</b>	<b>79,868,100</b>	<b>100%</b>	<b>92,870</b>	<b>8,946,448</b>	<b>100.00%</b>	<b>10,403</b>
PERCENT OF MOSHA	100%			2.66%			26.79%			3.00%		

NB: The figure for total budget is not the sum of the cost categories presented in the table. These categories are those which are related to CDD and EPI expenditures, and therefore are included here.

Personnel= MOSHA line item 100, which includes salaries, contracted labor, social fees, medical care for employees, special allowances, and insurance.

Per diems= MOSHA line item 210, which includes in-country travel only.

Communications= MOSHA line item 320, which includes expenses for telephone, telegrams, and postage.

Advertising fee= MOSHA line item 340, which includes the advertising fee for procurement contracts for vaccines and OPS, etc.

Spare parts= MOSHA line item 360, which includes spare parts for vehicles and equipment.

Printing= MOSHA line item 410, which includes publishing, printing, and supplies for reproduction.

Fuel/Oil= MOSHA line item 430, which includes fuel and oil for vehicles.

Other materials= MOSHA line item 490, which includes budget for vaccine, OPS packets, drugs, and syringes, etc.

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## APPENDIX J

### Persons Contacted

#### ANKARA

##### Ministry of Health and Social Assistance (MOSHA)

Dr. Ender Aydiner, General Director, PHC  
Dr. Nilufer Unver, Deputy General Director, PHC  
Dr. Mehmet Ali Biliker, Head of Communicable Diseases and  
National EPI Manager, PHC  
Mrs. Nimet Cobanoglu, Pharmacist, PHC  
Dr. Nese Yemenicioglu, Medical Officer, PHC  
Dr. Cihangir Ozcan, General Director, Health Education  
Mr. Koksal Aydin, Supply Officer, PHC  
Dr. Guler Bezirci, General Director, MCH/FP  
Dr. Levant Akin, Deputy General Director and National CDD  
Manager, MCH/FP  
Dr. Dilek Haznedaroglu, Head of CDD Planning and Evaluation,  
MCH/FP  
Mr. Gani Sinik, Director, Research Planning and Coordination  
Department  
Mrs. Guno Demirbilek, Economist, PHC  
Dr. Cemil Ozcan, Director, TB Eradication Department

##### Gulveren Health Center

Dr. Kadriye Yurdakok, Pediatrician  
Dr. Tezer Kutluk, Pediatrician  
Dr. Tuna Yauuz, Practitioner  
Dr. Ece Baris, Practitioner  
Dr. Nurettin Boran, Practitioner  
Dr. Agah Oktaysezer, Practitioner

##### Yesilevler Health Center Yenimahalle

Dr. Selma Taskin

##### Cubuk Rural Health Center

Dr. Berman Boztok

##### Ministry of National Education, Youth, and Sports (MONEYS)

Dr. Yusef Ekinici, Director, Department of In-Service  
Training  
Mr. Hasim Ayaokur, Director, Health Education Department  
Mr. Cemil Cetin, General Director to Primary Education

##### Ministry of Interior

Mr. Erol Tezcan, Deputy Undersecretary  
Mr. Ahmet Karabilgin, Local Administration Deputy  
Mr. H. Ibrahim Actinok

##### Turkish National Radio and Television (TRT)

Mr. Teoman Ertan

##### Hacettepe University Hospital

Dr. Ergul Tuncbilek, Director, Institute of Population  
Studies

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The Central Bank of Turkey

Dr. Haluk R. Tukel, Director, Research and Planning

UNICEF

Mr. Gary Gleason, Senior Program Officer  
Dr. Serap Maktav, Program Officer  
Ms. Zuhul Orun, Program Officer  
Dr. Nefise Bazoglu, Senior Program Officer  
Mr. Ilhan Inan, Interpreter

United States Embassy

Mr. Ogden Miller, Economic Section

World Bank

Mr. Sven Kjellstrom

World Health Organization

Dr. Tomassi, Representative

Program Review Team Members

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Dr. Penny Burton, WHO/Geneva, CDD  
Dr. Pierre Claquin, REACH Project, AID/W  
Dr. Alasdair Wylie, REACH Project, AID/W  
Dr. Francesco Castenelli, WHO/Geneva, CDD  
Dr. Paul Sato, WHO/Geneva, EPI  
Dr. Sema Basak, Medical Officer, PHC  
Dr. Rana Olgunturk, Gazi University  
Dr. Ender Pehlivanoglu, Marmara University  
Dr. Aysel Sinik, PHC

ISTANBUL

General Directorate of Health

Dr. Temel Dagoglu, Director General of Health  
Uz. Dr. Fevzi Comert, Deputy Director of Health, EPI Manager  
Dr. Toygun Bilman, Deputy Director  
Dr. Olcay Neyzi, CDD Program  
Dr. Mustafa Oragli, Deputy Director of Health, Infectious  
Diseases  
Dr. Agser Tekin, Deputy Director of Health, CDD Manager

Provincial Governor's Officer

Mr. Erdogan Izqui, Deputy Governor

Cappa University Medical Center

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Uskudar Health Center  
Kadikoy Health Center  
Avcilar MCH/FP Center  
Bakikoy District Health Center

Silivri Kestanelik Village Health Center  
Dr. Ismail Bilgin

Silivri Buyukcekmece Village Health Center  
Dr. Salih Kanil  
Dr. Ibrahim Halil Ozdemir  
Adil Polat  
Ali Senopul

Alibeykoy MCH/FP Center  
Dr. Mete Barun  
Dr. Tulay Ariksoy  
Emine Zavrak, Nurse

Beykoz District Health Center  
D. Ibrahim Ozhan

Beykoz-Kanlica District MCH/FP Center  
Dr. Ayse Tumay Cetiner

Zetinburnu District MCH/FP Center  
Dr. Ates Saplat  
Dr. Aysepul Telci  
Dr. Fulya Erman  
Ms. Sultan Tolon