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RESULTS OF A VACCINATION COVERAGE SURVEY IN NINE PROVINCES IN THE REPUBLIC OF TURKEY

January-February, 1988

Resources for Child Health Project

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TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

LIST OF TABLES

LIST OF GRAPHS

LIST OF GRAPHS (Cont.)

ACKNOWLEDGMENTS

The present work is the result of the sustained efforts of a team of people, both Turkish nationals and a few internationals, who together designed the surveys, trained each other, implemented and supervised the field data collection often under harsh winter conditions, analyzed the results, wrote the reports, discussed the tables and the graphs and edited them.

Many people were involved and although not all of them can be mentioned here by name, at least some deserve a special mention. Our thanks and gratitude should go first to the people surveyed who opened their homes to the interviewers, a testimony to the classical Turkish hospitality, and collaborated fully with them making the data collection possible; to the interviewers, the always forgotten unsung heroes, who did their best to find the assigned villages and households in the cold and the snow; to the provincial authorities who extended their full support and hospitality to the teams of supervisors; to the supervisors who debated vigorously during the training sessions and demonstrated discipline, creativity and humor; to the central team of medical officers who showed leadership and infinite patience; to the data analysis team, particularly Dr. Osman Turkoglu, Ed Wilson from REACH and Michel Thomas from ORSTOM.

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A. METHODOLOGY OF THE COVERAGE SURVEY

I. INTRODUCTION

Expanded Program on Immunization (EPI) coverage surveys using the World Health Organization (WHO) 2-step 30-cluster sampling method have been implemented worldwide for more than 10 years. Despite some of its limitations, this method offers several advantages: 1) it is easy to implement, and 2) it provides the opportunity to compare results between surveys within a country or between countries. Recently, WHO has supported efforts to extract more operational information from the data collected during EPI coverage surveys by providing a test version of a computer program called "COSAS" (Coverage Survey Analysis System), version 0.2.

The first part of the 1988 Comprehensive Program Review in Turkey consisted of an EPI vaccination coverage survey. A detailed analysis of the coverage profile of the Turkish EPI was completed within 2 weeks in order to provide valuable information for the joint WHO/UNICEF/AID Program Review. The analysis was performed by a team combining the Ministry of Health and Social Affairs (MOHSA) and the Resources for Child Health Project (REACH), an AID centrally-funded project for the Technical Assistance was provided to the MOHSA in the data collection and analysis. The survey also provided an opportunity to test COSAS and provide feedback to WHO.

II. SELECTION OF THE SAMPLE PROVINCES

The selection of provinces was performed in September 1987 by a joint MOHSA/UNICEF/WHO/REACH team.

The provinces of Istanbul, Ankara and Izmir were selected because they contain the greatest population (approximately 12.3 million people according to an 1987 estimate or 23% of the total population of Turkey [3 million]). Furthermore, in Ankara it was decided to undertake three surveys: one in rural areas, one in an urban setting, and one in the peri-urban areas of Ankara known as gecekondus. The experience of the MOHSA and UNICEF, as well as the vaccination coverage estimates of 1985 and 1986, had shown that the gecekondu areas had less access to health services and that they were priority areas of intervention (as specified in the joint MOHSA/UNICEF Plan of action for 1986-1992). For the same reason, it was decided to undertake two surveys in Istanbul: one in a higher income area, the other in a lower income area.

The remaining 64 provinces were stratified by infant immunization coverage for measles (as per data on July 1987) and divided into three almost equal groups. In each of these three groups, two provinces were randomly selected, based on proportion of population size. Thus, Bursa and Tokat were selected in the first group, Icel and Gaziantep in the second and Van and Ercincan in the third. The total sample covered 30% of the total population.

III. TRAINING

In each of the nine provinces, two senior health managers were selected for training in Ankara from January 18th to 21st. They were joined by colleagues from the MOHSA central Primary Health Care (PHC) team. About 30 people participated in the training exercise, which included one and a half days of initiation to the cluster survey method, one day of practical survey exercises (the Ankara urban survey was performed by the trainees) and a day of discussion of the results. Morale was high and the discussions were often lively. A significant amount of resources were invested by the MOHSA and UNICEF in the translation from English to Turkish of 1) the WHO module on EPI vaccination coverage surveys and 2) the data collection forms before the beginning of the training session.

Following the Ankara training, the senior health managers returned to their respective provinces. In the Eastern half of Turkey, they began training of the interviewers (midwives and non-EPI health personnel) on Monday, January 25, 1988. They were assisted by a member of the central PHC team. The training of the interviewers in the Western half began the following week.

IV. DATA COLLECTION

Data was collected using the WHO/EPI vaccination coverage survey form, which includes the source of vaccination and the sex of the child in addition to information on the antigens received and the presence of a vaccination card. On the reverse side of the form was a questionnaire on the reasons for non-vaccinations. Because the coverage for tetanus toxoid (TT) was believed to be low and because a special neonatal tetanus mortality survey is planned for May 1988, it was decided not to include questions on TT vaccination. All selected clusters were visited with two exceptions: in Ercincan one cluster had to be changed because of its inaccessibility due to bad weather, and in Van 10 clusters had to be changed due to the closing of roads by snow. In the latter case, the closest village was selected by the supervision team as a substitute. Forms were checked and tallied by provincial supervisors. A copy of the forms was kept at the provincial level and the original copies were brought back to Ankara for data entry and analysis.

V. DATA ANALYSIS

5.1 Software

The test version .02 of COSAS was modified in December 1987 in Dakar, Senegal, and then in Ankara by a joint REACH/ORSTOM team which produced the present version, 1.0. In its present form COSAS performs the following types of analyses:

1) Vaccination coverage for the six antigens of EPI plus TT as well as vaccination coverage for children completely vaccinated. The results are calculated in two ways: a) for "dates only + BCG scars" and b) "history + dates + BCG scars."

2) Vaccination Age Profiles: results are given for each antigen and for the category "completely vaccinated children" for two sets of data. First, "uncleaned data" (data directly from the forms), which allowed the identification of out-of-range vaccinations was used. Second, the "cleaned data" (which removes wrong dates and intervals) was used to show the EPI profile and to allow measurement of the EPI performance. A particularly useful indicator is the cumulative percent of children vaccinated at exactly 52 weeks of age (12 months).

3) Vaccination Interval Profiles: The results are again calculated from two data sets: "cleaned" and "uncleaned."

4) A profile of Vaccination doses over real time: for each antigen, the distribution of doses over the calendar year was calculated. These tables should help EPI managers to identify periods of slack, clumping, and vaccine shortage among other things.

5) Vaccination by type of providers: COSAS produces a table of the distribution of antigens by type of providers (up to 9 categories).

6) "Missed Opportunities": COSAS calculated the vaccination missed opportunities" during vaccination sessions in the following manner. For each of the vaccination sessions a child has attended (defined by vaccination dates on the survey form) the program assesses whether or not the child received ALL of the vaccinations his age and his vaccination status entitled him to receive. The "missed opportunities" measure is, in fact, the percentage of satisfactory encounters the child has had with the EPI. Two types of calculations are performed: a) the percentage of satisfactory sessions and b) the percentage of children having had at least ONE satisfactory encounter and the percentage of children having had ALL satisfactory encounters.

This analysis demonstrates that this indicator should provide useful information to the EPI managers. First, in addition to efforts to expand the number of opportunities for vaccination during the consultations for non-EPI reasons, this analysis demonstrates more efforts should be made to offer better vaccination services to the children already attending vaccination sessions.

In its present form, however, COSAS has one limitation in that it assumes that vaccinations for all antigens are available at each vaccination session. This is generally the case, but in Turkey there are sometimes separate channels for the administration of BCG and other vaccines, COSAS would produce an over estimation of unsatisfactory encounters in this case.

A **fundamental caveat** should be kept in mind when interpreting the tables calculated by COSAS. The 30-cluster sampling method is an **approximate** method and results are expressed with a confidence interval of +/- 10%. Additional information provided by COSAS is **qualitative** and should be considered of **operational use only** and certainly not of statistical value.

5.2 Data Entry

Data were entered at the MOHSA by two persons under the supervision of a medical officer in PHC and a REACH collaborator. The time required to enter each of the 12 surveys was 5 to 6 hours for a total of 60-72 hours of data entry.

5.3 Data Analysis

Data analysis was performed by the joint MOHSA/REACH team. Since the version of COSAS used was being field-tested, many modifications of the software program were made while in Turkey. Many modifications were made after the analysis of the first survey, when it was found that the range of some indicators could be improved. On average, data analysis required one day for each survey with the calculation of "missed opportunities" requiring the most time.

5.4 Results

All provincial results were ready by February 9, 1988 and were distributed to each of the Program Review Provincial teams several days before their departure to the field. Detailed explanations on the survey results were given during a plenary session of the National Program Review, as well as during individual briefings.

VI. FEEDBACK OF THE RESULTS

Too often, survey results are analyzed in detail long after the survey itself and the findings are rarely fed back to the field in time for them to be useful as guidelines for program action. This time, following the suggestions of the UNICEF Senior Program Officer, things were organized differently.

6.1 At the Provincial Level

Each team had the opportunity to discuss the survey results with the Provincial health director and the the EPI manager. In almost all cases, the original survey tables were condensed for presentation and only the main findings discussed. The complete set of tables was however left with the provincial authorities.

6.2 At the Central Level

A report of the survey results was prepared during the third week of February and the working draft distributed to the MOHSA, UNICEF and EPI epidemiologists from the Program Review team for review. Their comments were incorporated in the final version of the report.

B. VACCINATION COVERAGE SURVEYS RESULTS

I. COVERAGE RESULTS BY ANTIGEN AND BY CHILDREN COMPLETELY VACCINATED

1.1 Sample Profile

2,526 children born in 1986 were surveyed between January 20 and February 5, 1988. Because of insufficient information, 7 children had to be dropped from the analysis for a final total of 2,519 children. The distribution of birth dates, shown in Graph 1, follows the expected flat curve. Boys represented 51% of the total sample and girls 49%. Table 1 shows the respective population weight of each of the provinces surveyed in relation to the total population of Turkey.

1.2 Card Holders

Graph 2 shows the percent of cardholders for the different surveys, which ranges from 90% in Izmir to less than 10% in Van. An average of sixty-seven percent of the children surveyed had a card. While 78% of the urban children had a card, the figure fell to 48% for rural areas.

Because of the absence of a card and therefore an absence of dates of vaccination in 33% of the cases, results were presented by:

a) "injection" coverage which takes into account the history of vaccination according to the mother of the child, the date (when available) and a BCG scar (equivalent to WHO "history + dates + scar"); and

b) "documented" coverage, which takes into account only the dates of vaccination and the BCG vaccination scars (equivalent to WHO " dates + scar").

As observed on the two sets of tables from Table 2, the difference between the two methods of estimating the vaccination coverage is important. It was therefore important to attempt to validate the vaccination history obtained from the mother. In Van, which had less than 9% of cardholders among the children surveyed, "documented" vaccination coverage among cardholders was found to be identical to the "injection" coverage (history plus dates plus BCG scars) among the total sample.

As an experiment, a review of vaccination records in health centers was performed for the children having a history of vaccination (obtained from their mothers) but no card. At the time of the review, the reviewers had only the name of the village and the name of the children but did not know about the vaccination status by antigen to avoid bias. Out of all alleged vaccinations, 82% did correlate . Therefore, in Van, vaccination history could substitute for presence of a vaccination card.

1.3 Injection Coverage

Table 2 shows the results for each province and for the total cumulated sample weighted by population size. Graphs 3, 4, 5, and 6 present these same results.

BCG coverage is higher than 80% except in Van and Ercincan. Seven survey sites had a coverage for DPT/Polio 3 above 80% with Van having a coverage less than 50%. With the exception of Van, all provinces have a measles coverage above 60%, with only Tokat, Istanbul peri-urban and Ankara urban above 70%.

The weighted cumulative results are shown in the following table:

ANTIGEN	WEIGHTED COVERAGE RATE
BCG	87%
DPT/POLIO 1	98%
DPT/POLIO 2	94%
DPT/POLIO 3	86%
MEASLES	67%
COMPLETELY VACCINATED	57%

The provinces surveyed were grouped into several categories based on the percent of completely vaccinated children. The group of more than 60% included Istanbul urban and Istanbul peri-urban and Ankara urban. The group in the range of 50-60% included Izmir, Bursa, Icel, Tokat and Ankara peri-urban; and the group which had less than 50% coverage included Gaziantep, Ankara rural (45%), as well as Van and Ercincan, which were both under 20%.

In interpreting these results, it should be kept in mind that the injection coverage is optimistic because history as well as dates are taken into account.

1.4 Documented Coverage

The coverage levels are less if one considers only documented vaccinations. Table 2 summarizes the results and Graphs 7, 8, and 9 analyze the differences by province for DPT 3, measles, and children completely vaccinated. There is no difference for BCG since the coverage rate is based on scars in both cases.

1.5 Weighted Coverage

Table 2 summarizes the results. The weighted, cumulative results based on the rates show an access rate of 98% which is impressive. The drop-out rate between DPT 1 and DPT 3 was only 12%. The coverage rate for measles was 67% and for completely vaccinated 57%. While these results may not be extrapolated to the national level, they nevertheless hold valid for 16 million people. There are still specific problems which need to be

addressed immediately, particularly in the Eastern part of the country; however, one can say that overall the EPI appears to be well established in Turkey.

II. AGE PROFILES OF CHILDREN

2.1 Age By Antigen

The goals of the EPI are not only to protect children from diseases but to protect them as early as possible. To bring the mean age of vaccination for a cohort of children as close as possible to the age of eligibility is the difficult challenge that the EPI in Turkey, which already has a high coverage level, must address in the future.

For each province, COSAS calculated the distribution of age at the time of vaccination for each antigen. As explained in the methodology section, each set of data (uncleaned and cleaned) provides different types of information. Since the results are specific to each province and pertain to operational activities, they have not been reproduced in the present report. However, as an illustration, the distribution of cumulated doses of measles is shown in Graph 10, and the interval between the first and the second dose of polio vaccine in Table 3. The doses which are out of range appear clearly.

2.2 Vaccination Status at 12 Months of Age

Classically, in vaccination coverage surveys the results obtained among the 12-23 month age group are used as a proxy for the vaccination coverage rate at 12 months. COSAS calculates for each antigen the vaccination coverage rate at 52 weeks or 12 months of age. The results are found in Table 4, which shows the provincial results as well as cumulated results (non-weighted). By their first birthday anniversary, only 53% of the children have received their third dose of DPT and 20% of the children are completely vaccinated. This is clearly a priority area for the year to come: to protect children as early as possible.

III. PROFILE PER ANTIGEN

Each province received a set of tables showing the distribution of doses for each antigen in real time by calendar weeks. The EPI manager was encouraged to identify seasonal variations in vaccination activities and to compare the monthly distribution found in the survey with the cumulative records of monthly doses which he had been keeping.

As an illustration, Graphs 11 and 12 show the distribution of DPT 1-3, BCG and measles for the entire sample. Both graphs show that vaccination activities for all antigens decline in August. October and November 1986 had higher rates of activity.

IV. PROVIDERS OF VACCINATION SERVICES

In order to obtain a better understanding of the respective role of the different types of providers in each of the nine provinces surveyed, the coverage figures have been stratified into the following eight categories: health center, hospital, outreach activity, private practitioner, MCH/FP center, antituberculosis center, others, and unknown.

4.1 Combined Surveys

The results for the cumulated surveys (non-weighted) are shown in Table 5 for all antigens and in Graph 13 for BCG, DPT/Polio and measles. Health centers play the major role in delivering vaccinations (48% of all doses), followed by outreach activities (22%) and MCH/FP services. Private practitioners provide 5% of all doses only.

The role of each group of providers varies according to the antigen considered. For BCG, the main source of vaccination is the hospital which accounts for 34% of all doses. Hospitals are probably giving BCG soon after vaccination. Anti-tuberculosis centers (28%) were the second highest provider of BCG, followed by the outreach activities and health centers. Private practitioners play an insignificant role at 1%.

DPT, polio and measles follow a similar pattern. The main providers are health centers (52%), followed by outreach activities (23%) and MCH/FP centers (17%). The private sector is responsible for 6% of these doses.

4.2 Urban, Peri-urban and Rural Differences

The provincial surveys were regrouped by socio-economic strata for source of vaccination for BCG and DPT/Polio and the results are shown in Table 6. Because of their exclusive contribution to BCG vaccination, the anti-tuberculosis centers were not included among the categories of vaccine providers.

The results show some differences between the urban, peri-urban and rural areas in the role of health centers, hospitals, private practitioners and outreach activities. Health centers are responsible for 20% of all BCG doses given in rural areas, whereas the role of hospitals in delivering BCG is more prevalent in urban and peri-urban areas. The private sector is mainly active in urban areas, where it provides 17% of all doses of DPT and polio. Only in rural areas are the outreach activities of significant importance for BCG and DPT/polio vaccinations.

4.3 Provincial Differences

This analysis shows marked differences between provinces. As an illustration, the results of several provinces are shown in Graphs 14-20.

In Gaziantep, the antigens, with the exception of BCG, are almost exclusively administered by health centers. In Tokat, more than 50% of the BCG doses are given by outreach activities and the other antigens are given by health centers and outreach activities only. In the higher income areas of Istanbul, the hospital provides almost 50% of BCG vaccinations; whereas the private sector provides between 20 and 30% of all DPT/polio and measles

vaccinations. The role of the private sector is less in the lower-income part of Istanbul, as expected. In rural Ankara, health centers and MCH/FP centers provide almost 90% of the DPT/polio and measles vaccinations.

V. "MISSED OPPORTUNITIES"

The concept of "missed opportunities" at the time a child receives a vaccination has been explained earlier in the methodology section of this report. Although COSAS needs to be refined to account for different channels of vaccination for different antigens, at the provincial level, the results are useful to draw the attention of EPI managers to potential problems. In the present analysis, BCG vaccination has been considered as an integral part of the national EPI program and as a potential source of vaccinations. This approach has introduced a bias in some cases since a child going to an anti-tuberculosis center is unlikely to receive the other vaccinations (s)he might be eligible to receive on that day at these centers. For each province, the results in Table 7 should therefore be interpreted with caution.

VI. URBAN ISSUES

In Turkey, 55% of the total population lives in urban and peri-urban areas. Immigration from rural areas (particularly from the Eastern provinces) has been a continuous trend in the last 20 years and has led to the creation of peri-urban settlements (gecekondus). In metropolitan areas and big cities approximately 50% of the population live in these peri-urban settlements which are not supplied with basic services such as water, sewage and electricity. The health status of the children from these lower-income families was found in the recent past to be much worse than the urban children of similar ages.

6.1 Rural/Urban Comparisons

Four of the twelve surveys were performed in the two major urban and peri-urban centers of the country where 14% of the total population of the country reside. The results shown in the following table include both documented dates and vaccination histories provided by the mother:

Vaccination Coverage Survey of Children 12-23 months

Name of the locality	DPT 3	Measles	Completely Vaccinated
Ankara - Urban	87 %	71 %	61 %
Ankara - Gecekondu	83 %	64 %	58 %
Istanbul - Urban	89 %	71 %	63 %
Istanbul - Lower Income	90 %	72 %	64 %

Recent information on the vaccination coverage of other urban or peri-urban centers were not available. In all cases, the peri-urban or lower income areas had lower coverage.

Although these figures were not weighted by respective populations, the figures of the following table from the 88-NVCS compares the coverage between the urban and rural areas of the sample. Again, urban areas coverage is higher in all cases.

VACCINATION COVERAGE FOR CHILDREN 12-23 MONTHS OF AGE ACCORDING TO DATES AND HISTORY FROM THE MOTHER

ANTIGEN	URBAN N = 1345	RURAL N = 971
BCG	86	63
DPT/POLIO 1	97	96
DPT/POLIO 2	94	88
DPT/POLIO 3	86	76
MEASLES	68	64
COMPLET. VACC.	55	40

Two additional indicators were used to compare the quality of the contacts between the EPI and the target population: 1) the percentage of children with cards, and 2) the percent of children entirely vaccinated at 12 months of age. The results of the following table show the absence of differences between the four urban areas.

LOCALITY	% CHILDREN WITH CARDS	% CHILDREN VACCINATED BY 12 MONTHS OF AGE DPT 3	MEASLES	COMP. VACC.
ANKARA - URBAN		81	65	42	30
ANKARA - GECEKONDU		85	66	37	30
ISTANBUL - URBAN		86	73	42	24
ISTANBUL - LOWER INCOME		89	71	33	25

The role of the private practitioners in delivering vaccinations was also compared. The results of the next table show the marginal role of private practitioners in delivering vaccinations in low socio-economic areas. The difference is more important in Ankara than in Istanbul.

Percentage of vaccinations administered by a private practitioner:

LOCALITY	BCG	POLIO	DPT 3	MEASLES
ANKARA - URBAN	11	14	14	13
ANKARA - GECEKONDU	0	3	3	1
ISTANBUL - URBAN	5	21	27	23
ISTANBUL - LOWER INCOME	2	14	13	12

6.2 Achievements

Compared to rural areas, the urban and peri-urban areas of the sample population of the 88-NVCS appear to have higher coverage rates. Interestingly, the children living in the gecekondus of Ankara and the lower income areas of Istanbul appear to have vaccination coverage rates almost identical to the rates of the children from neighborhoods of higher income. However, a possible sample bias cannot be completely ruled out, because sections of the gecekondu population might not have been included in the initial cumulative list of population from which the sampling frame was drawn. The results are encouraging, particularly if they are compared with the pre- and post- 1985 campaign results, although the age groups taken into account are different (see the MOHSA/UNICEF document "National Plan of Action for the EPI in Turkey 1986-1992").

Comparison of Immunization-Coverage rates by Settlement Type

	DPT 3			MEASLES		
	1985 (1)		1988 (2)	1985	1988	
Settlement Type	Before Campaign	After Campaign		Before Campaign	After Campaign	
Urban	52	82	86	35	65	68
Peri-Urban	39 78 83 29 70 64					
Rural	31	72	77	27	64	64

(1) Age group = 2-59 months
(2) Age group = 12-23 months

The results can be explained in several different ways.

A. The gecekondus areas have been the object of attention of the MOHSA EPI services since the 1985 mass campaign;

B. The awareness of the needs for vaccination has been widely spread in the urban and peri-urban areas through the mass media (radio and television) to which the gecekondu dwellers are largely exposed; and,

C. The inhabitants of more affluent urban areas use private practitioners more often as a source of vaccination.

6.3 Problems

Although the MOHSA services must be commended for the accomplishments in the lower income areas, there is room for improvement.

Despite an increase in vaccination coverage, the survival of the children born in the gecekondus probably remains precarious. More information is needed on the impact of the increased vaccination coverage rates on the infant mortality rates (IMR) in the urban and peri-urban areas. These rates are also affected by the incidence of acute respiratory

infections (ARI) and diarrheal diseases among other things. The literacy level of the mothers, the environmental level of hygiene and sanitation, and the income level of the family also affect disease incidence rates.

The progress observed concerns only Ankara, Istanbul and probably Izmir. Although the three large cities represent 20% of the total population of Turkey, little information is available on the situation of the gecekondus of the other urban centers of the country where the situation could probably be improved.

More time is needed to appreciate the long-term vaccination picture in the urban and peri-urban settings of Turkey, as two years is too short a time span to measure trends. The present level of coverage might only reflect the awareness of a group of parents still sensitized by the massive media coverage in 1985.

Of particular concern is the issue of the registration of the gecekondu children. A significant number of them probably belong to the "forgotten people of development," at least during the first years of their lives. Not registered, they may or may not benefit from health and vaccination services; as noted earlier, a fraction of them was probably not included in the sample of the 1988 National Vaccination Coverage Survey (NVCS).

6.4 Recommendations for Urban EPI

1. The targeting of the urban and peri-urban areas by the EPI over the last two years should continue. Vaccination of children of the peri-urban areas must remain a high priority, as clearly articulated in the MOHSA/UNICEF document "National Plan of Action for the EPI in Turkey 1986 - 1992."

2. More information should be collected on vaccination coverage levels of the peri-urban children of other cities. The 30-cluster sample survey technique has now been mastered by many provincial health medical officers and they should conduct their own surveys before the end of 1988.

3. More attention should be paid to the registration of all children in the peri-urban areas (gecekondus) to allow all health workers to have a better knowledge of their target population (and denominators).

VII. OTHER ISSUES

7.1 Vaccination Coverage by Gender

The differential mortality and morbidity by sex among children has been documented in some parts of the world, particularly in the Indian subcontinent. Recently, the possibility has been raised that there are different levels of vaccination coverage for boys and girls. The following table (Table 8) summarizes the non-weighted findings for the cumulative surveys in Turkey.

ANTIGEN	GIRLS	BOYS
BCG	78	77
POLIO/DPT 1	97	97
POLIO/DPT 2	93	90
POLIO/DPT 3	84	80
MEASLES	68	64
COMPL. VACC.	51	48
% CARDHOLDERS	67	68
NO. IN SAMPLE	1230	1293

Table 8: Vaccination coverage of the 88-NVCS by gender

No significant difference in the vaccination coverage between boys and girls in the 12-23 months of age group can be observed.

7.2 Impact of Present Coverage on Morbidity

The Rapid Assessment Report of the 1985 vaccination campaign attempted to measure the impact of the post-campaign vaccination rates on morbidity from diphtheria, pertussis, measles and poliomyelitis. This report found that the reduction in cases for the age group considered was likely to be significant. Graphs 21 - 24 present the surveillance morbidity data for the last 3 years in the 9 provinces surveyed during the 88-NVCS as well as for the national level. The reduction in morbidity is significant: between 1985 and 1987, the incidence per 100,000 population fell from 5.3 to 0.9 for pertussis; from 0.3 to 0.1 for diphtheria; from 0.2 to 0.0 for polio (no cases were reported in the last 2 years) and from 29.2 to 7.2 for measles. These encouraging results show that control of EPI-preventable diseases is on its way in Turkey and that eradication of poliomyelitis should actively be pursued. However, as examples from countries like the United States have taught us, there is always the possibility of outbreaks once a sufficient number of susceptibles have accumulated in geographical pockets.

7.3 Correlation of Survey Coverage Results with Routine Determination of Coverage Based on Doses Given

In Turkey, a monitoring system for vaccination coverage, based on monthly cumulated doses, has existed at the provincial level since 1986. Graph 25 provides an example of the monitoring form. The system uses the number of live births per year as the denominator and the number of doses given to the children born in the year as the numerator to calculate the coverage. The advantage of such a system is obvious since, on a monthly basis, the provincial EPI manager can assess the progress (or lack thereof) and take appropriate measures in time, using the diagonal of the graph (the 100% coverage level) as the reference point. In addition, should the system be entirely operated at the provincial level, the delays between data collection, interpretation and corrective intervention could be kept to a minimum. The precision of such a monitoring system is satisfactory for operational purposes.

There are presently some discussions between the provinces and the EPI central level on the reliability and accuracy of the denominator data still provided by the central level to the provinces. The discrepancies between central and provincial denominator figures explain the difference in reported coverage by the central level and the provincial levels. Hopefully, an agreement will soon be reached.

It was tempting to compare the coverage rates found during the survey with those reported by the routine system. At first glance (as shown on graphs 26 - 34) they seem to differ notably. Coverage rates from the 88-MVCS are consistently higher. This held true whether the 1986 or 1987 coverage rates reported by the routine system are compared to any of the three types of coverage rates: the 88-NVCS injection, documented, or 12 months of age coverage rates. However, it should be kept in mind that the methods of calculating each rate are different.

The routine system for a given year does not count the vaccinations given to children born during that year beyond the last day of the year. The yearly coverage figure is therefore an estimation of the coverage rate at the end of the year. The survey, on the other hand, though focusing on the same age group, includes vaccinations given in 1986 but also in 1987 and 1988. The discrepancies, therefore, cannot but increase with the type of doses given, as long as the percentage of children completely vaccinated before their first birthday remains low. The coverage figures will progressively become reconciled, as the percent of children completely vaccinated rises.

COSAS might provide some useful information on the number of doses given by the end of the year under consideration, although it should be kept in mind that the degree of completion of the information on age (or dates of vaccination) depends upon the percent of cardholders (see uncleaned data, age profile tables). Graphs 35 - 37 compare the 1986 coverage data obtained from the routine monitoring system and the 1986 coverage data obtained from the survey by computing the cumulative percentage at 52 weeks. The discrepancies between the figures can be explained in several different ways:

1. The absence of dates among the children surveyed who had no cards but had a history of vaccination excluded them from the cumulative percentage at 52 weeks. This is particularly obvious on Graph 35 in the case of the DPT 1 rate for Van;

2. In the routine reporting of doses, there might be an over-reporting due to a staff practice of repeating a first or a second dose of DPT if the interval between doses has been judged too broad; or

3. The reported doses of measles are not exclusively those given to the children born during the reported year; this is obvious from the figures reported during the January-September period where, normally, no child born during the year is yet eligible.

In conclusion, although the coverage rates obtained from several different analyses of the 88-NVCS could not exactly match the coverage results obtained from the routine coverage system based on doses, it does not undermine the validity of the present routine reporting system. Nevertheless, the current reporting system could be strengthened in the following ways:

1. By increasing the rate of cardholders, particularly in Icel, Ercincan, Tokat, Gaziantep, Ankara and Van (to suggest only the provinces visited during the survey) but probably in many other provinces. The card is the only reliable source of documented vaccination activity which is easily accessible at the time of surveys;

2. By vaccinating children as soon as they are eligible and therefore lowering the mean age of vaccination for each antigen, and by stressing the advantages of getting protection from diseases as early as possible;

3. By retraining the vaccination staff to abandon the practice of restarting a first dose of DPT if the child comes for a second dose more than 6 months after the first; and

4. By slightly modifying the reporting matrix in order to report the doses given to a particular age cohort (children born in 1986 or 1987, for example) over a 2 year period. This would provide accurate data.

If such modifications were implemented, the discrepancies between the two systems would be greatly reduced.

C. DISCUSSION

I. LIMITS OF VACCINATION COVERAGE SURVEYS RESULTS

Vaccination coverage surveys are useful tools for EPI managers as well as for funding agencies. However, unless their limitations are clearly understood, their results can be (and sometimes are) misinterpreted.

In the case of the 1988 surveys performed in 9 provinces of Turkey (and in 12 sites) three specific topics are worth mentioning: the validity of the combined results; the absence of calculated confidence interval values for each survey and for the combined results; and the validity of vaccination coverage surveys as a tool to measure changes of coverage rates over time.

1.1 Combined Results

At the time of the surveys' design it was decided that 6 of the 12 total survey sites (half of the surveys) would be selected in 3 provinces (predominantly urban) where 23% of the total population of Turkey lives. The rationale was that information on vaccination coverage rates was needed in different strata of the population of the 3 provinces.

Information was also needed on the coverage rates of the three coverage strata of the rest of the country: high, medium and low. Two provinces in each stratum were randomly selected, as described in Part A of this document.

It should be clear that the 12 sites selected are not representative of the whole Turkish population (and were not intended to be) and therefore the "combined" results **cannot** be understood as "national results". If the purpose of the survey(s) had been to assess the national vaccination coverage, a different sampling frame would have been used and it is conceivable that a sample of 210 children only would have provided the needed results. However the purpose of the 1988 surveys was different: the surveys were to provide, for each site, results which would stand by themselves, and therefore would be of practical use to the provincial EPI managers as well as to the other MOHSA or donor agencies involved in the implementation of EPI.

It was felt by the members of the EPI/CDD Review team that it would be useful to calculate the overall coverage results **for the population of the 12 sites surveyed**. The results of each site had to be **weighted** to respect the proportional population importance of each survey site. The **combined weighted** results which are presented are only valid for the 9 provinces surveyed.

1.2 Confidence Intervals

Confidence intervals are generally necessary to interpret the results of scientific or epidemiological studies. Some might also like to know the exact values of the confidence intervals for the vaccination coverage surveys results obtained following the WHO 2-step 30-cluster sampling methodology. It should be remembered that, for the sake of simplicity, the

confidence interval of the WHO method has been estimated at +/- 10% for the results of a given survey, an estimation satisfactory for most practical purposes.

In the case of the combined results, discussions with the senior epidemiologist in the team led to the conclusion that the likelihood of finding large confidence intervals would not justify the several days of calculation needed to obtain values which would be of dubious use because of the difficulty interpreting the results. It was therefore decided not to proceed further but to clarify the issue in the report.

1.3 Measuring Coverage Rates Variations Over Time

The main reason for not calculating the CIs for the individual surveys in Turkey was because the process is time consuming unless software is written to do the calculations on a computer. Also considered was the fact that there was no provision made to collect information on the number of individuals encountered in each cluster in the surveys done in Turkey, so the estimates of "p" could not be appropriately weighted -- the estimates of "p"¸are also used in the calculation of the variance -- to obtain the best estimate of the proportion(s) with an attribute(s). Another point to consider is the fact that the EPI type cluster surveys do not correspond to the "rules" for cluster surveys -- thus, the formulae that are used to calculate the variance are at best only approximations. Because it was not possible to weight the clusters it was decided not to bother developing the software in Ankara to compute the variance (and thus obtain the basic information for CIs).

The major reason for not calculating the CIs for the combined surveys is that to do so, one needs to compute the variance for each of the individual surveys, and then weight and combine those estimates. Thus, the same limitations stated above would apply to the combined estimate. If the simpler means of estimation of the variance (based on the assumed DE) is used, an estimate of the variance can be quickly calculated -- all that need be done is to incorporate the weights for each of the populations surveyed in the individual surveys. (However, if one were to attempt to compute a national estimate with a confidence interval, the computation becomes more complex, because there were different sampling fractions taken at different stages in the sampling.)

II. SIGNIFICANT IMPROVEMENTS

EPI in Turkey has made significant strides towards its target of sustained high levels of coverage. What is particularly outstanding is that the present high coverage rates have been obtained without spectacular campaigns but through the persistent routine activities of the institutional EPI over the last two years.

In each of the 12 coverage surveys, 90% of the children had received at least one immunization. This implies that, at least in the areas surveyed, access to immunization services has not been a major problem. This must be considered a major achievement.

The 1986 Rapid Assessment had identified the peri-urban areas of the major cities as high risk areas and documented the low vaccination coverage rates in the pre-campaign period. Immunization coverage in the poorer peri-urban areas of Ankara and Istanbul was as high as in the corresponding urban areas.

The Eastern part of Turkey still deserves special attention: integration of BCG immunization to the other antigens delivery channels as well as well-designed pulse activities between May and October should be able to increase the still insufficient protection given to children.

Missed opportunities, particularly **during vaccination sessions**, should be a target for improvement during the year to come.

Last but not least, the monthly routine reporting system of doses given should be improved in order to provide provincial and central EPI managers with the reliable information which is essential for them to efficiently monitor their activities.

CITY	POPULATION	WEIGHT
BURSA	1324015	0.082058
IZMIR	2317829	0.143652
VAN	547216	0.033914
TOKAT	679071	0.042087
ERCINCAN	299985	0.018592
GAZIANTEP	966490	0.0599
ICEL	1034086	0.064089
ISTANBUL HI	4726609	0.292942
ISTANBUL LI	1435483	0.088967
ANKARA R	569118	0.035272
ANKARA U	1470184	0.091118
ANKARA P	764846	0.047403
TOTAL	16134932	0.999994

TABLE 1: WEIGHT FACTOR FOR CUMULATIVE SURVEY RESULTS

COVERAGE FROM HISTORY, DATES AND BCG SCARS

PROVINCE	BCG	DPT/ POLIO 1	DPT/ POLIO 2	DPT/ POLIO 3	MEASLES	CV
VAN	18	91	71	50	57	14
ERCINCAN	34	97	89	77	64	19
ICEL	84	95	92	87	63	53
ANKARA RURAL	74	96	90	74	64	44
ANKARA GCK	94	99	92	83	64	58
ANKARA URBAN	92	99	95	87	71	61
TOKAT	83	100	98	91	74	57
GAZIANTEP	81	94	87	72	62	45
BURSA	94	100	98	91	65	60
ISTANBUL LOW-INCOME	90	98	95	90	72	64
ISTANBUL URBAN	94	98	95	89	71	63
IZMIR	92	100	96	93	64	58
CUMULATIVE	78	97	91	82	66	50
CUMULATIVE WEIGHTED	87	98	94	86	67	57

COVERAGE FROM DATES AND BCG SCARS

PROVINCE	BCG	DPT/ POLIO 1	DPT/ POLIO 2	DPT/ POLIO 3	MEASLES	CV
VAN	18	9	7	4	6	1
ERCINCAN	34	57	51	41	32	11
ICEL	84	64	60	54	36	29
ANKARA RURAL	74	46	44	36	33	22
ANKARA GCK	94	85	80	73	53	48
ANKARA URBAN	92	78	75	67	54	43
TOKAT	83	58	56	50	73	24
GAZIANTEP	81	51	49	39	32	22
BURSA	94	88	86	78	55	49
ISTANBUL LOW-INCOME	90	93	89	83	67	54
ISTANBUL URBAN	94	90	87	79	63	49
IZMIR	92	91	89	84	56	49
CUMULATIVE	78	67	64	57	43	33
CUMULATIVE WEIGHTED	86	78	76	69	53	42

TABLE 2. VACCINATION COVERAGE SURVEY RESULTS FOR HISTORY+DATES AND DATES ONLY
TURKEY, 1988

INTERVAL BETWEEN DOSES (WEEKS)	POLIO 1-2 (%)	POLIO 2-3 (%)
0-3	2	3
4-8	67	62
9-12	20	19
>13	11	16

TABLE 3: INTERVAL BETWEEN THE DOSES OF POLIO AMONG THE CHILDREN WITH DOCUMENTED VACCINATION

PROVINCE	DPT 1	DPT 2	DPT 3	MEASLES	COMPLETELY VACCINATED
ISTANBUL	89%	86%	78%	49%	24%
ICEL	60%	56%	48%	26%	19%
GAZIANTEP	48%	43%	30%	21%	12%
ANKARA	76%	74%	65%	42%	30%
BURSA	87%	83%	73%	33%	28%
ERCINCAN	53%	46%	32%	20%	6%
VAN	7%	6%	3%	2%	1%
TOKAT	56%	56%	46%	21%	15%
IZMIR	89%	86%	78%	38%	31%
TOTAL	64%	61%	51%	27%	12%

TABLE 4: VACCINATION STATUS AT 12 MONTHS BY PROVINCE AND ANTIGEN AMONG CHILDREN WITH DOCUMENTED VACCINATION

FACILITY	BCG	POLIO	DPT	MEASLES	TOTAL
HEALTH CENTER	13%	52%	52%	54%	48%
HOSPITAL	34%	1%	1%	1%	5%
OUTREACH	15%	23%	23%	20%	22%
PRIVATE	1%	6%	6%	5%	5%
MCH/FP	8%	17%	17%	17%	16%
ANTI-TB	28%	0%	0%	0%	3%
OTHERS	0%	2%	2%	2%	2%
UNKNOWN	1%	0%	0%	0%	0%
TOTAL	100%	100%	100%	100%	100%
NO OF VACCIN.	1961	6925	6922	2078	17886

TABLE 5: DISTRIBUTION OF VACCINE PROVIDERS FOR DPT/POLIO, BCG AND MEASLES FOR THE CUMULATIVE SURVEYS

	HEALTH CENTER		HOSPITAL		PRIVATE PRACTITIONERS		OUTREACH	
	BCG	DPT	BCG	DPT	BCG	DPT	BCG	DPT
URBAN	5%	44%	46%	3%	2%	17%	6%	3%
PERIURBAN	8%	47%	55%	2%	1%	7%	1%	2%
RURAL	20%	57%	19%	0%	0%	1%	26%	38%
CUMUL. SURVEYS	13%	52%	34%	1%	1%	6%	15%	23%

TABLE 6: ROLE OF HEALTH PROVIDERS IN ADMINISTERING BCG AND DPT BY SOCIO-ECONOMIC STRATA

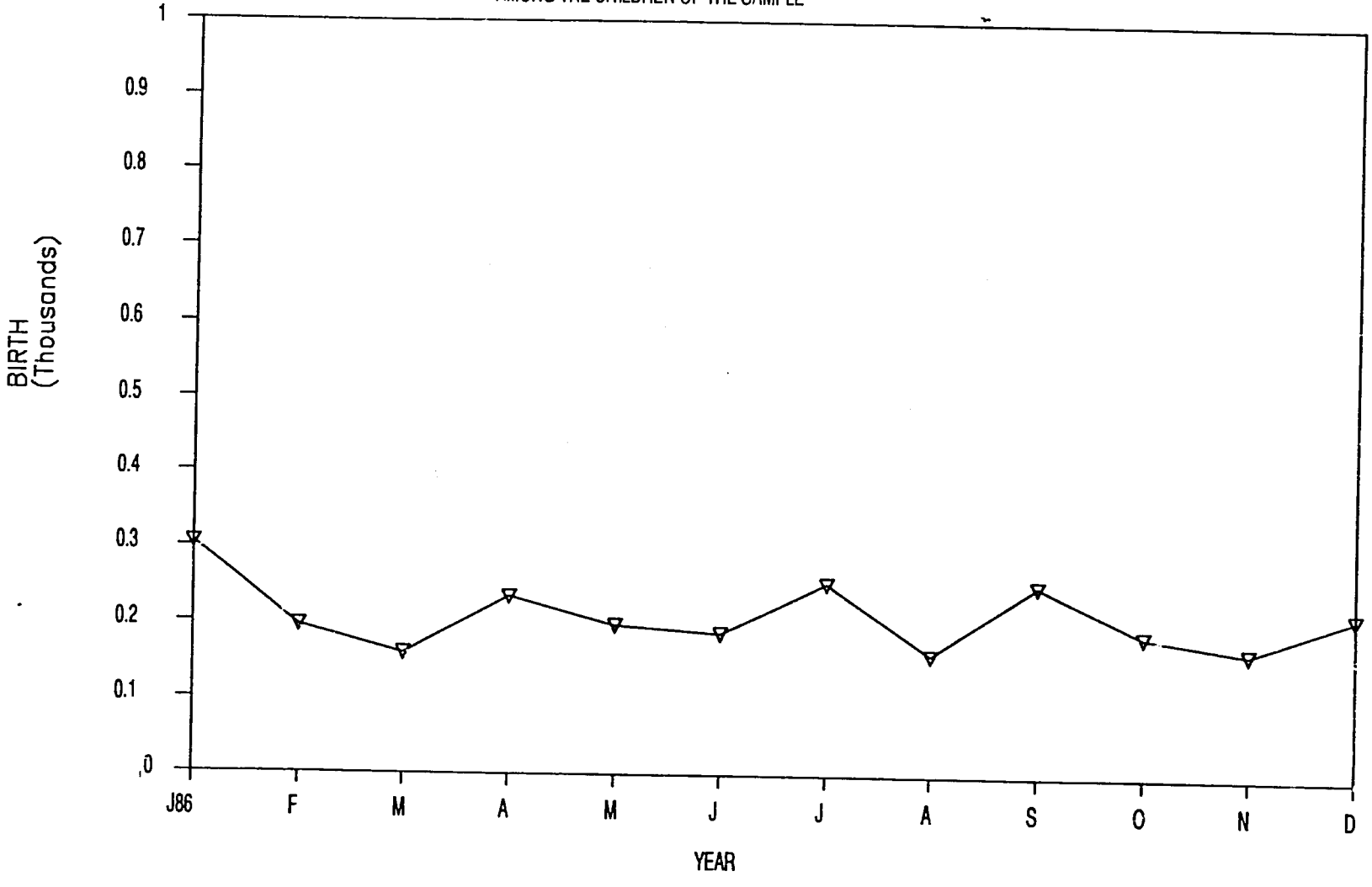
1. URBAN = ANKARA URBAN, ISTANBUL HIGHER INCOME, IZMIR CLUSTERS
2. PERIURBAN = ANKARA GECEKONDU, ISTANBUL LOWER INCOME CLUSTERS
2. RURAL = OTHER 7 CLUSTERS

TABLE 7: ANALYSIS OF THE DEGREE OF COMPLETION OF VACCINATIONS FOR CHILDREN ATTENDING VACCINATION SESSIONS

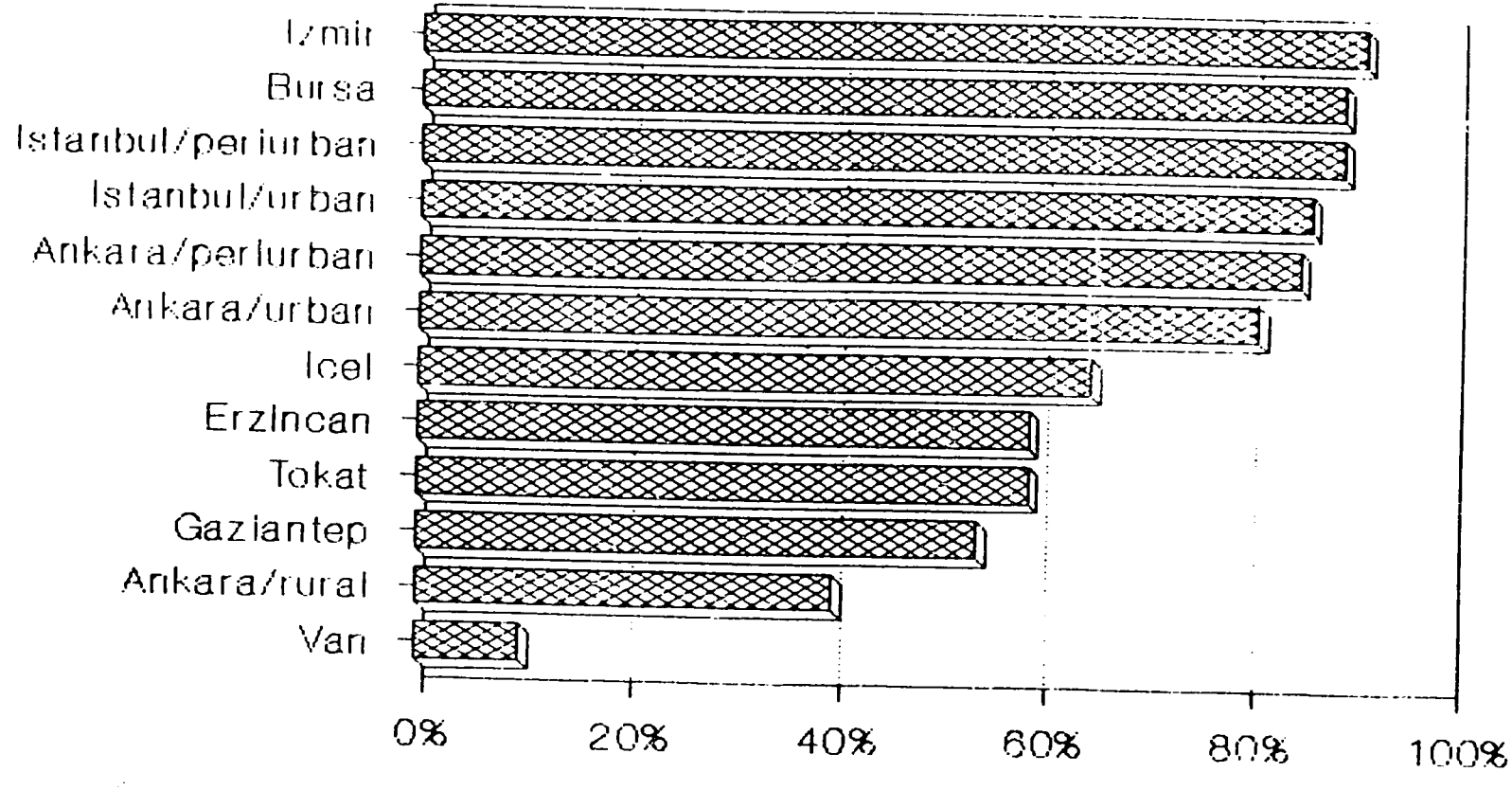
LOCATION	% OF SATISFACTORY VACC. SESSIONS	PERCENTAGE OF CHILDREN WITH SATISFACTORY SESSIONS	
		AT LEAST 1	ALL
ANKARA RURAL	41	75	39
ANKARA GCK	47	92	15
ANKARA URBAN	43	90	19
ISTANBUL LI	42	91	3
ISTANBUL HI	43	94	6
VAN	51	73	63
GAZIANTEP	42	85	37
TOKAT	39	86	37
ERCINCAN	23	49	11
ICEL	41	90	31
BURSA	43	93	11
IZMIR	39	92	5
TOTAL	41	86	20

GRAPH 1: BIRTHDATES DISTRIBUTION

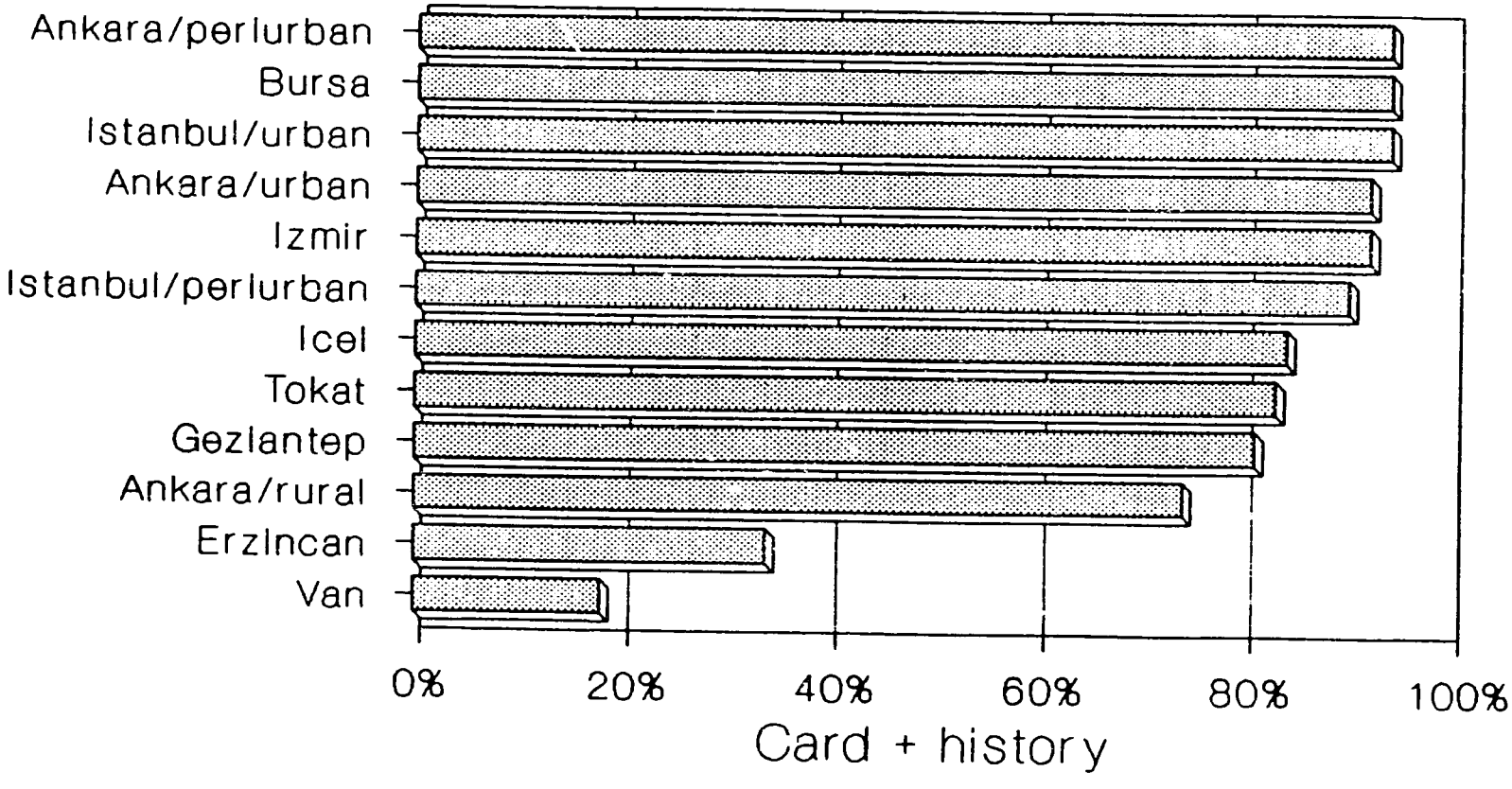
AMONG THE CHILDREN OF THE SAMPLE



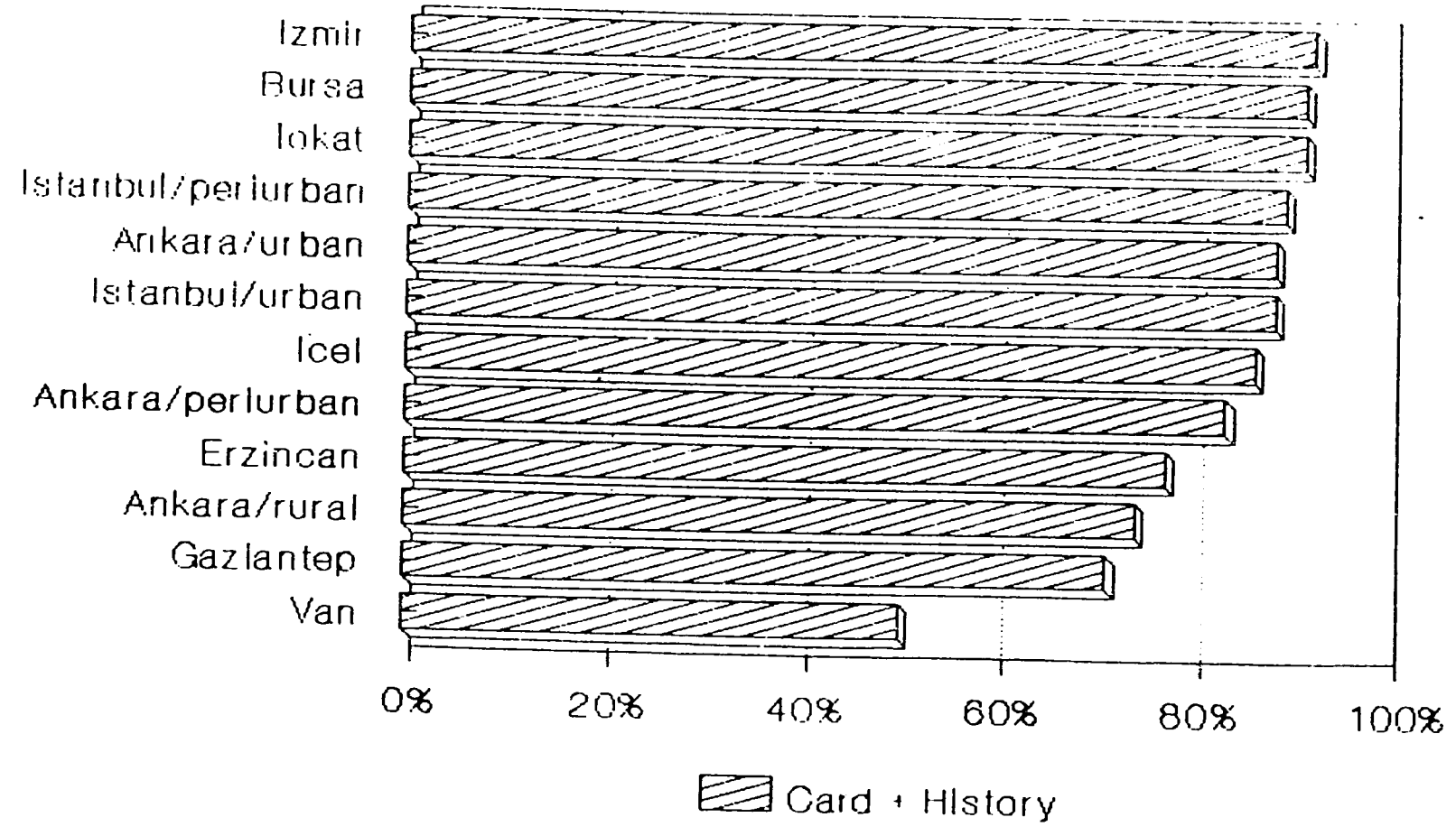
GRAPH 2: Immunization coverage survey
Percent Cardholders, Turkey, 1988



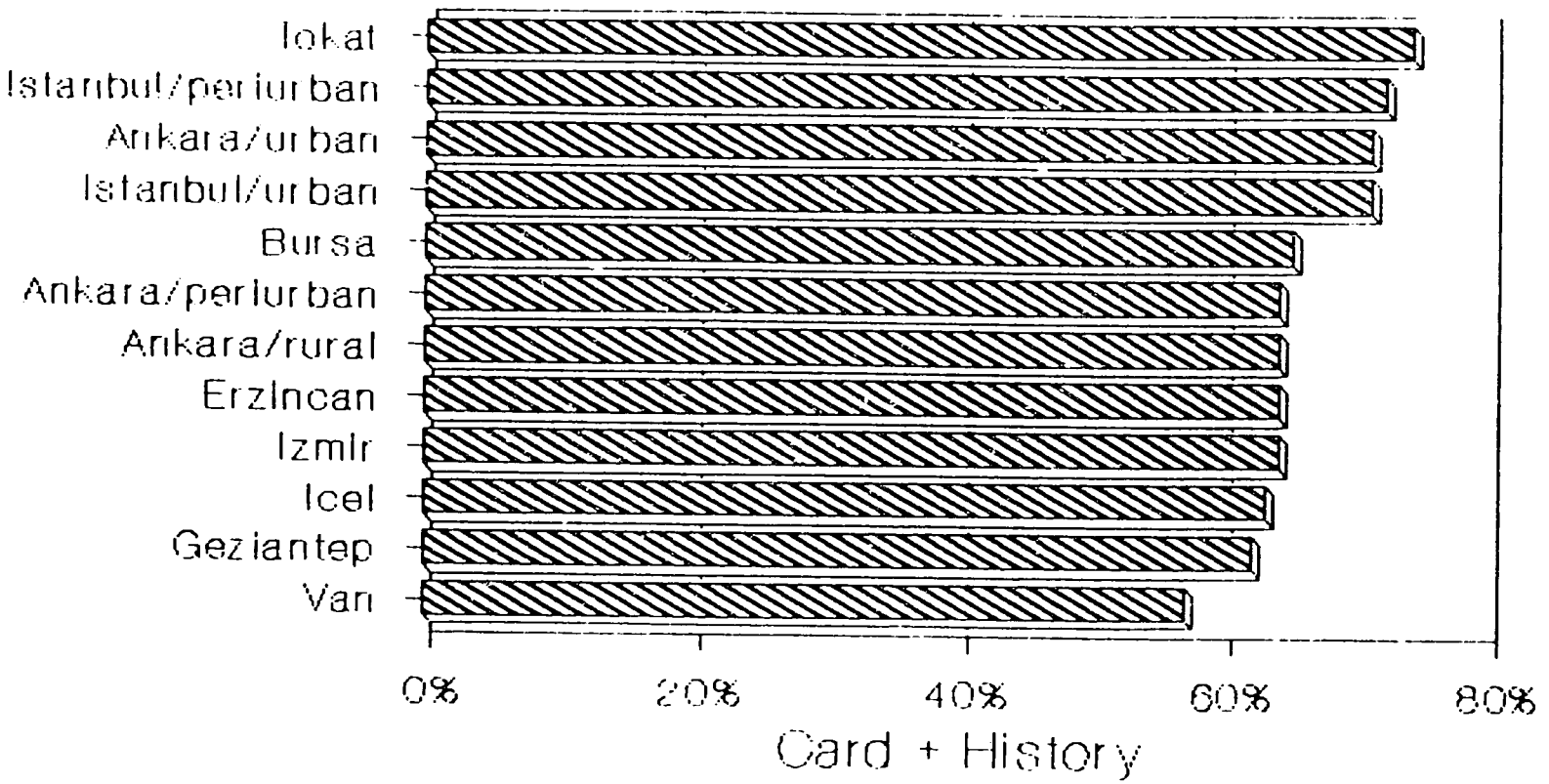
GRAPH 3: Immunization coverage survey Percent BCG, Turkey, 1988



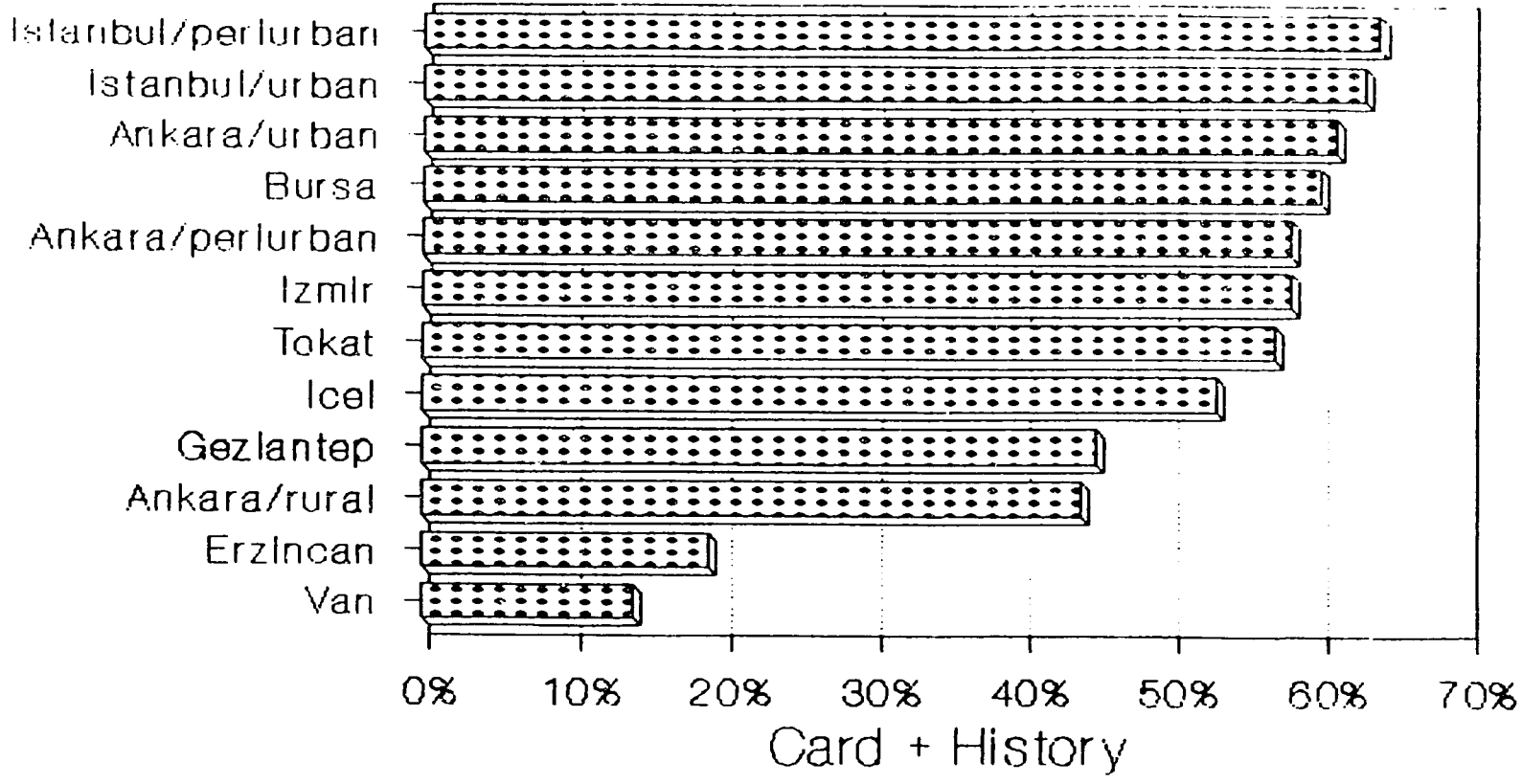
GRAPH 4: Immunization coverage survey
Percent OPV3/DPT3, Turkey, 1988



GRAPH 5: Immunization coverage survey Percent Measles, Turkey 1988

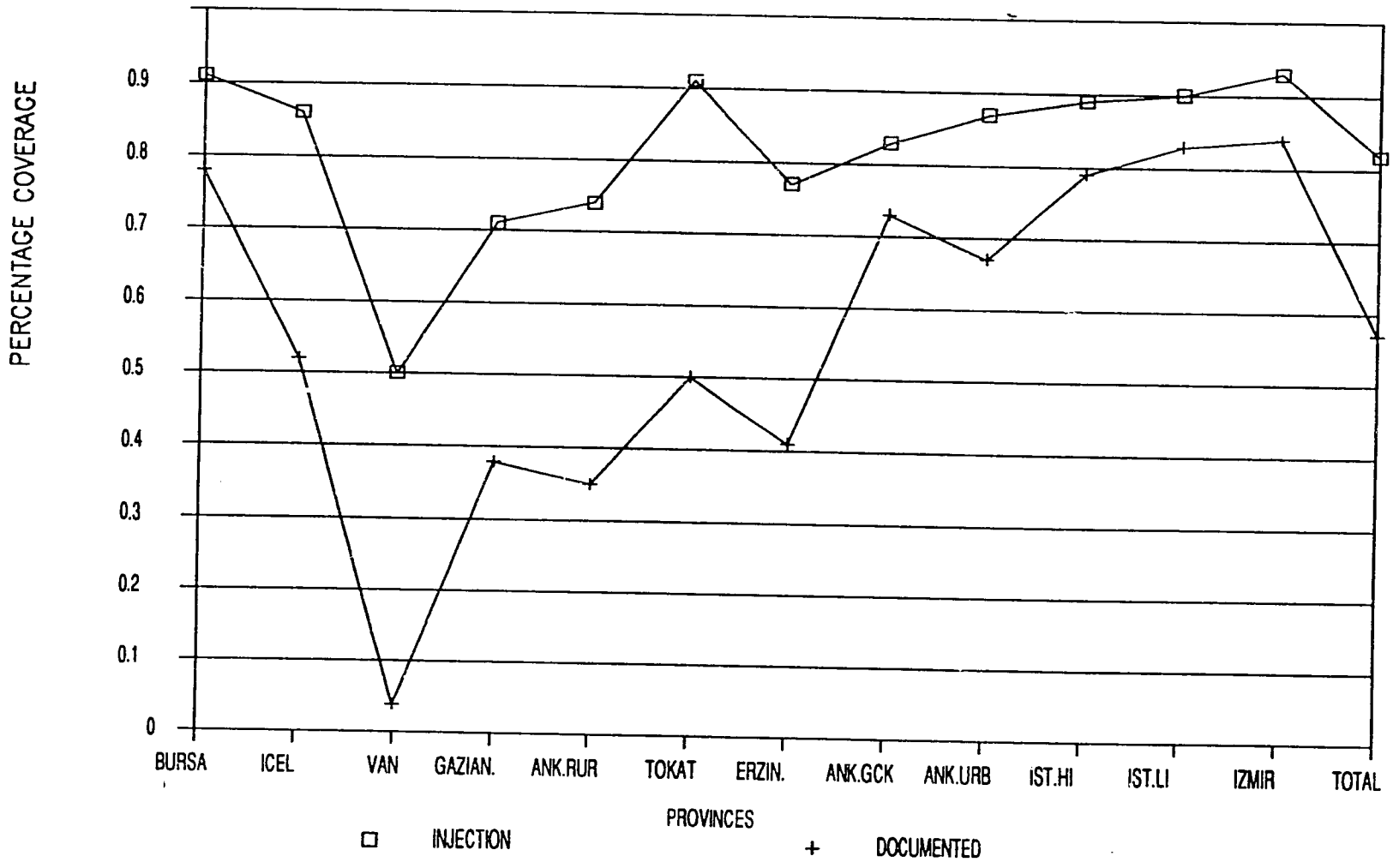


GRAPH 6: Immunization coverage survey
Percent Fully Immunized, Turkey, 1988

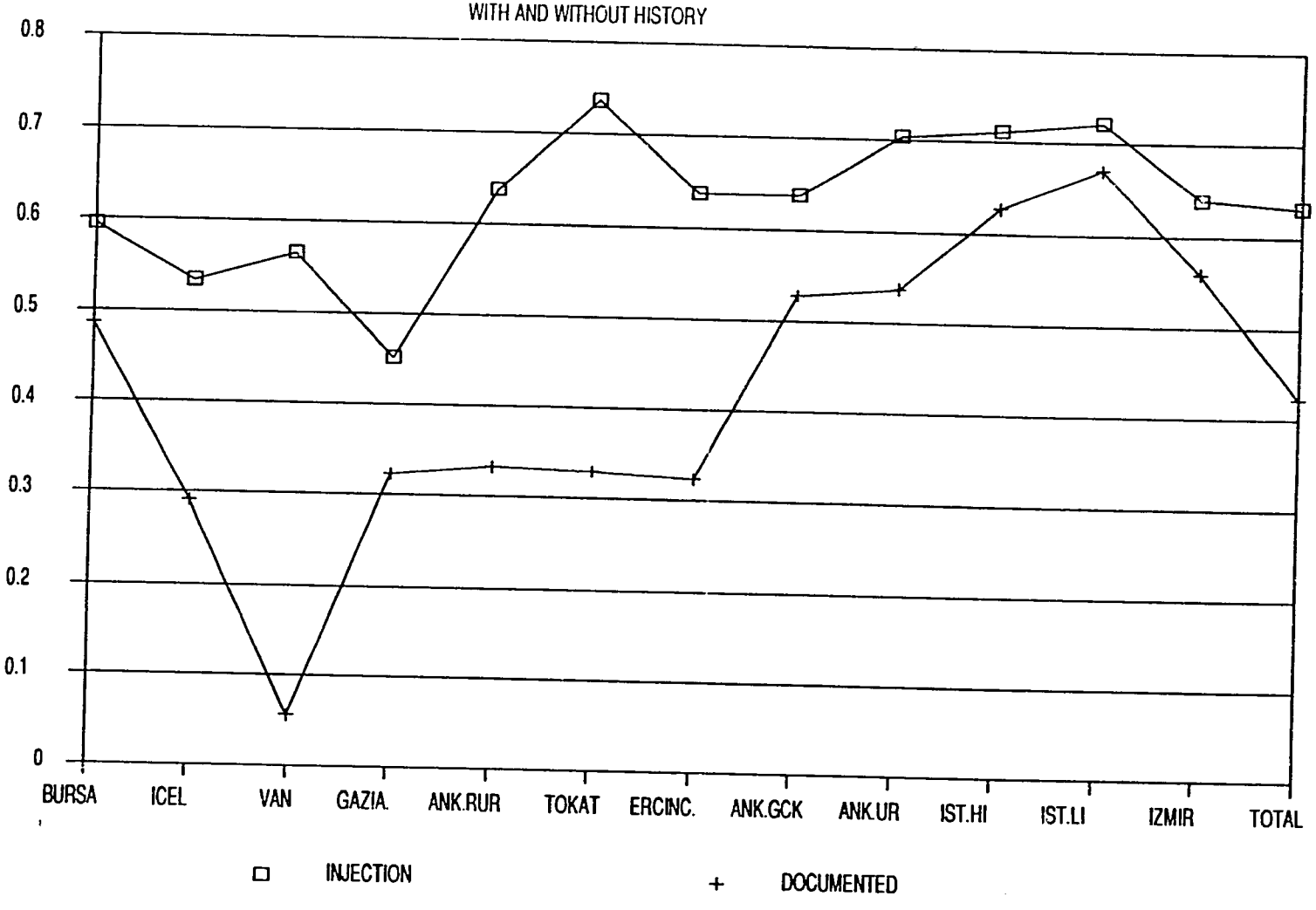


GRAPH 7: COMPARISON DPT 3 COVERAGE

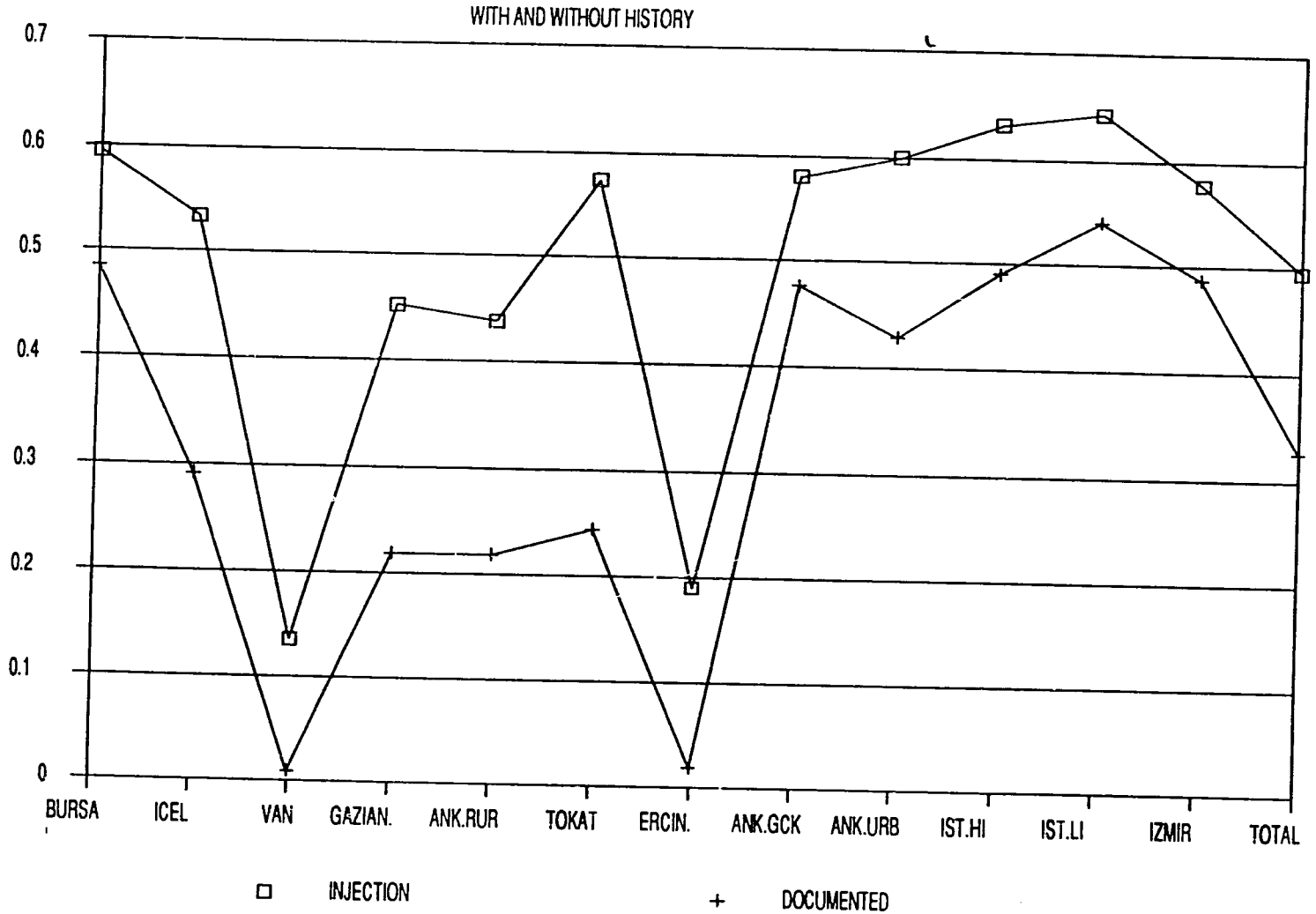
WITH AND WITHOUT HISTORY



GRAPH 8: COMPARISON MEASLES COVERAGE

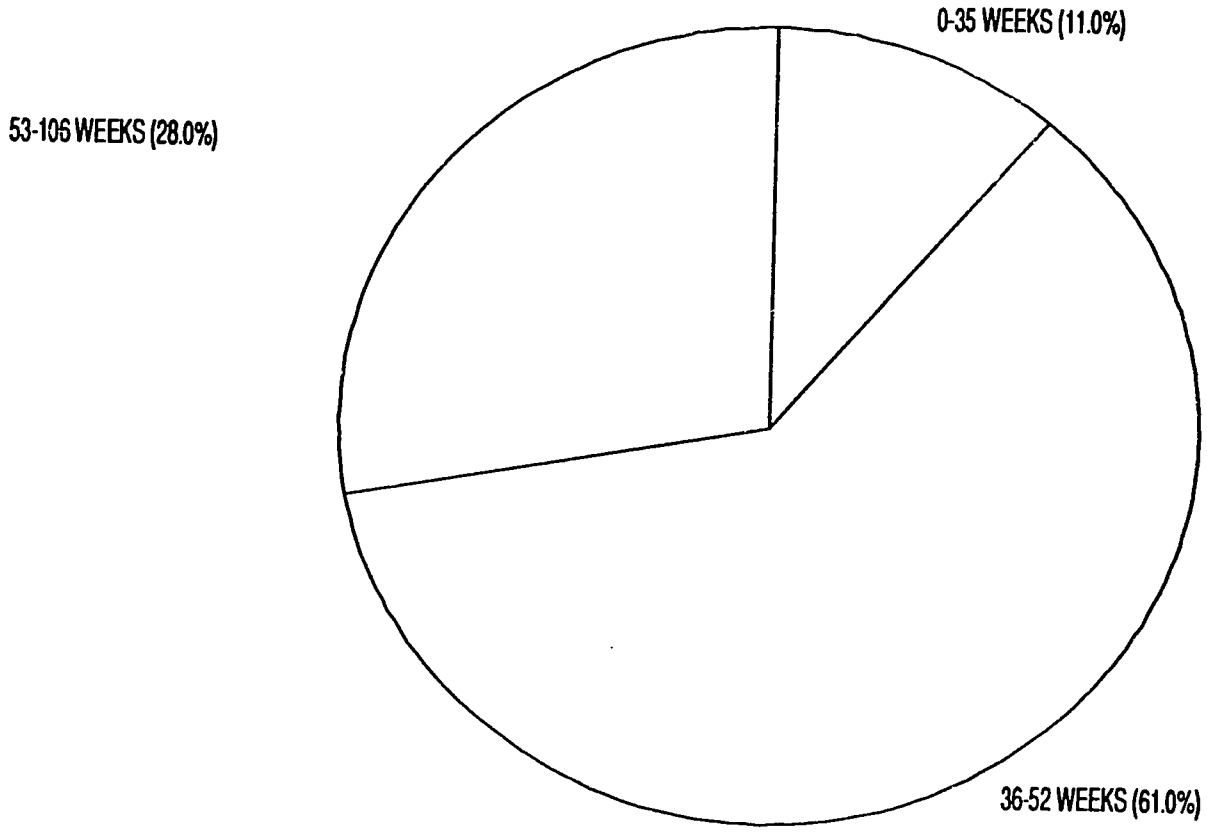


GRAPH 9: COMPARISON C.V. COVERAGE

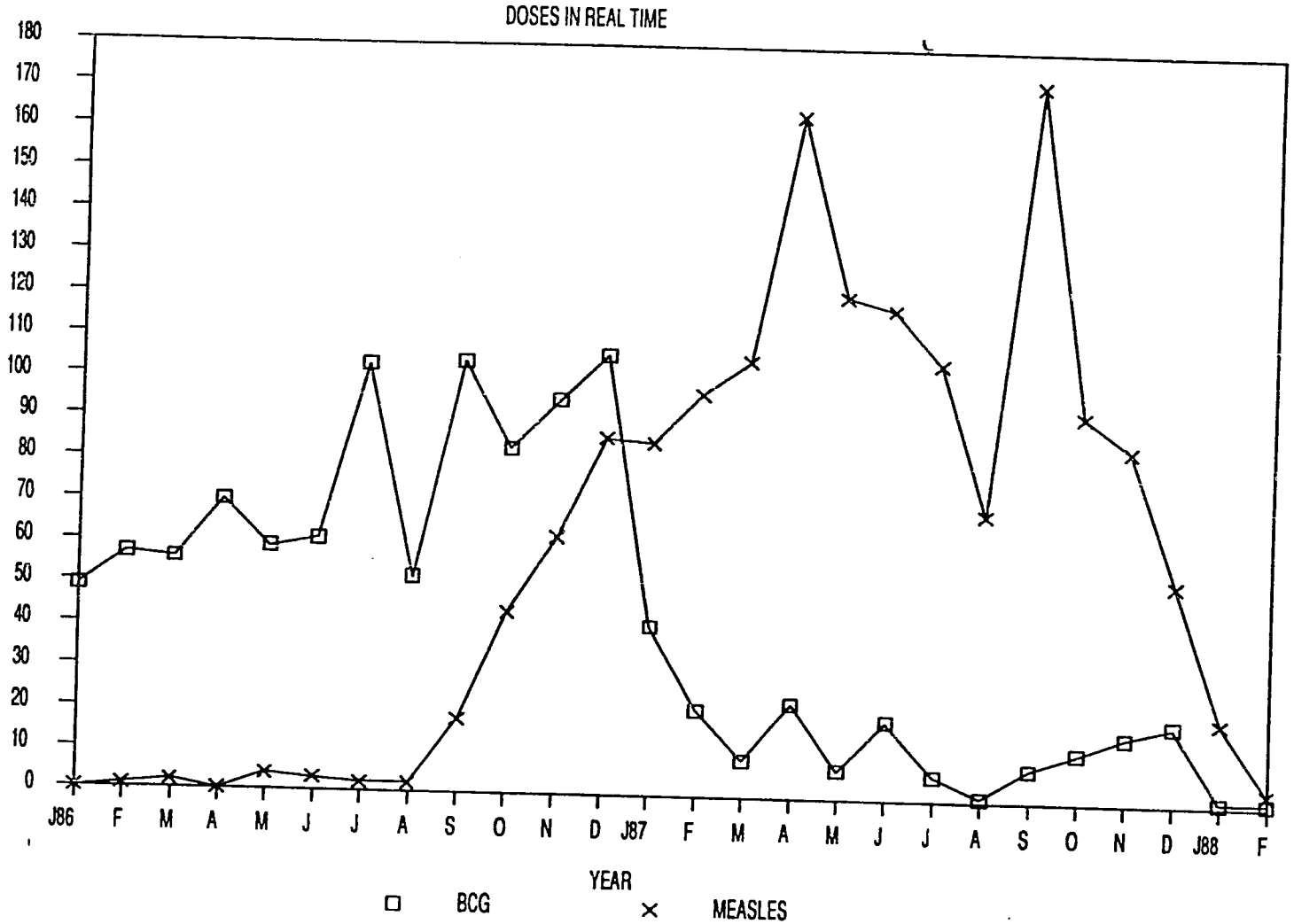


GRAPH 10:DISTRIBUTION OF MEASLES DOSES

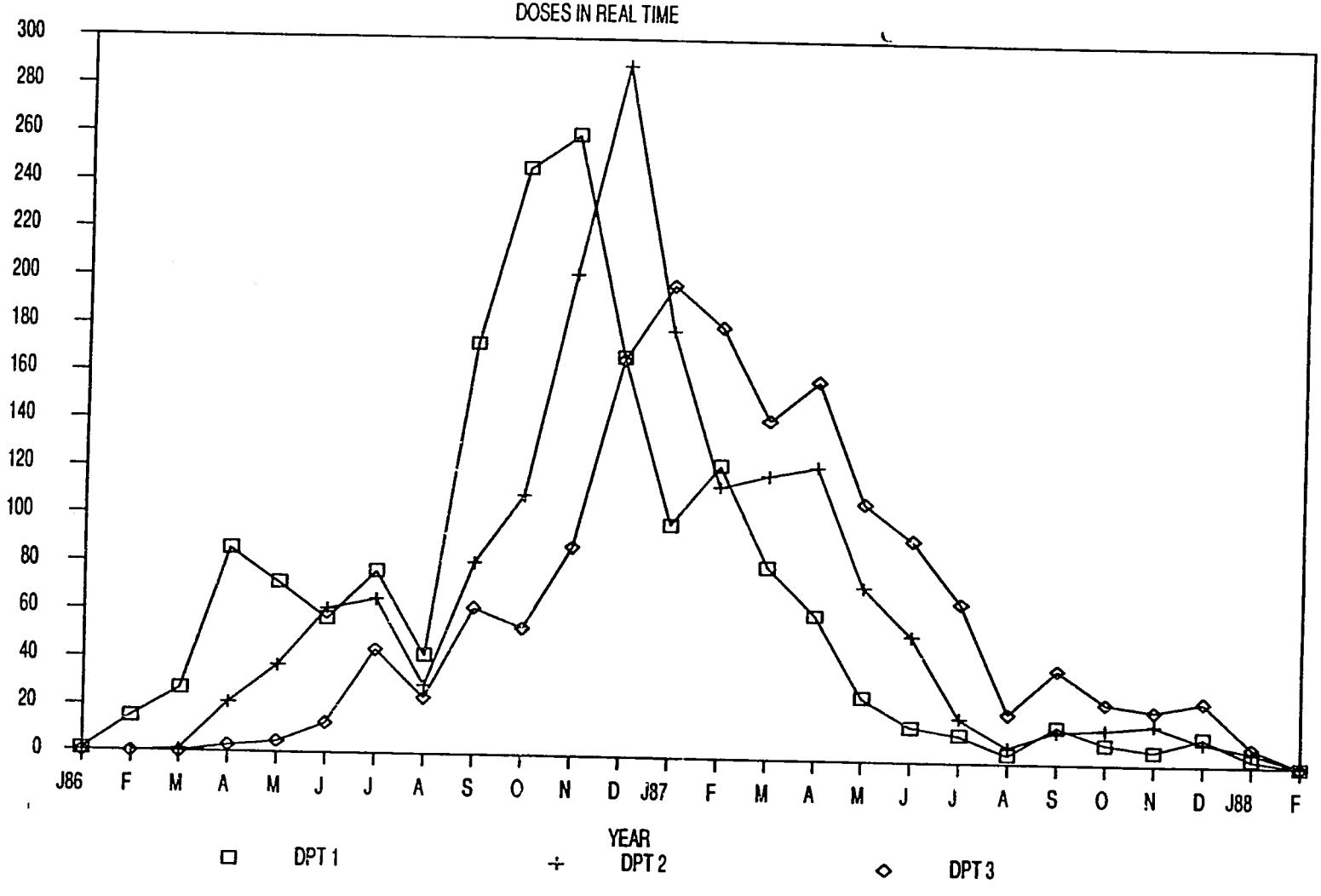
BY AGE AT VACCINATION



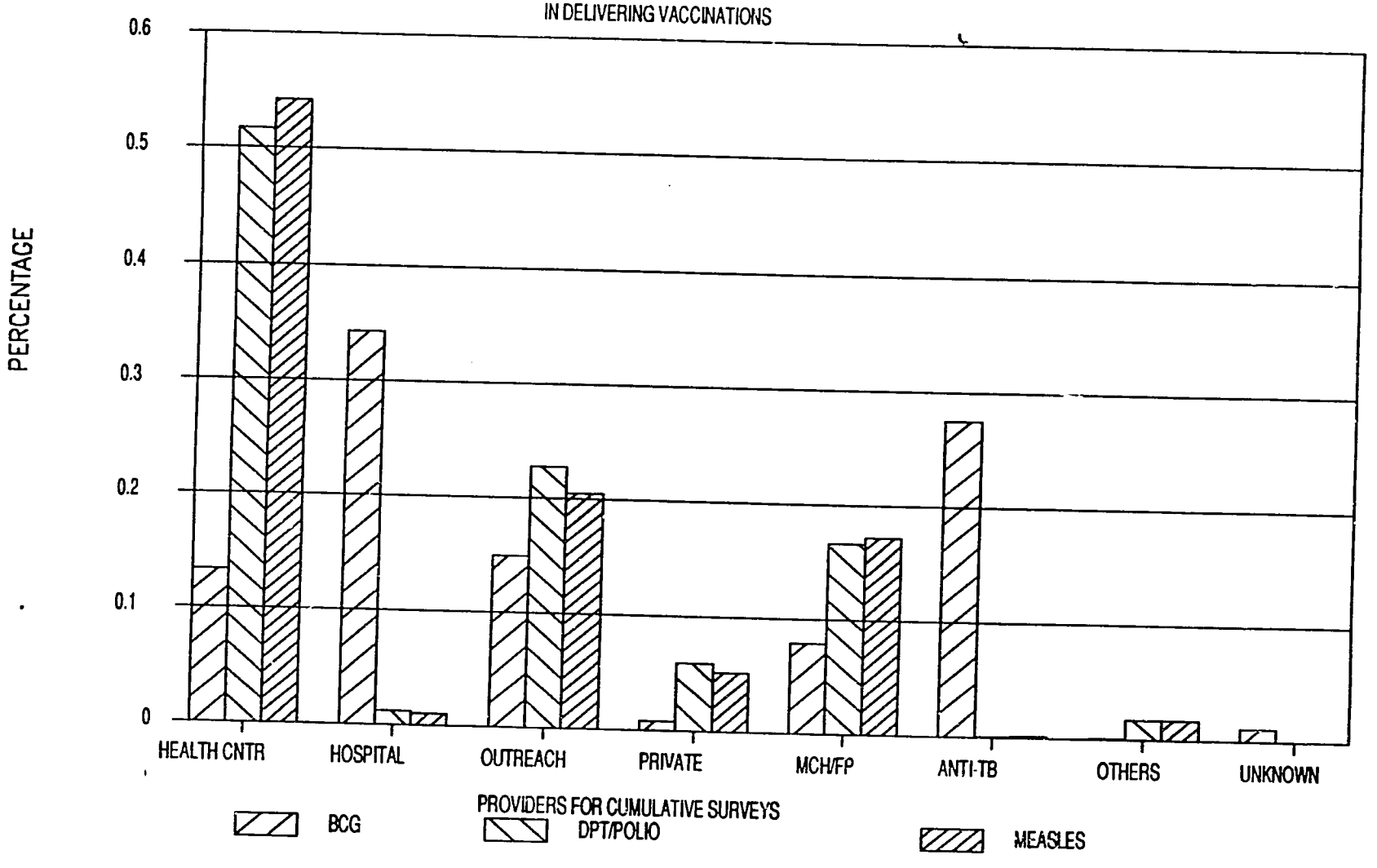
GRAPH 11: DISTRIBUTION OF BCG & MEASLES



GRAPH 12: DISTRIBUTION OF DPT

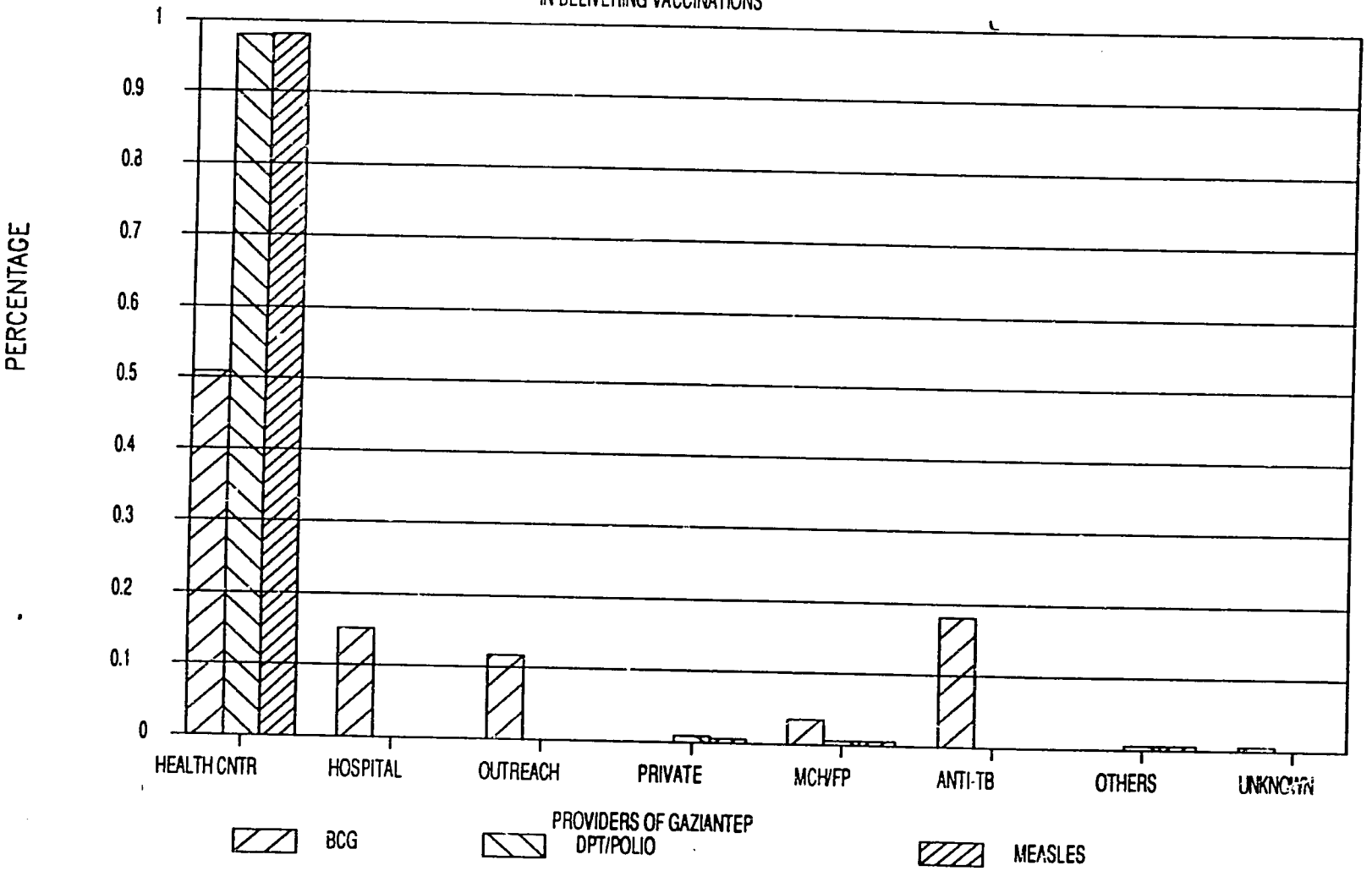


GRAPH 13: ROLE OF PROVIDERS



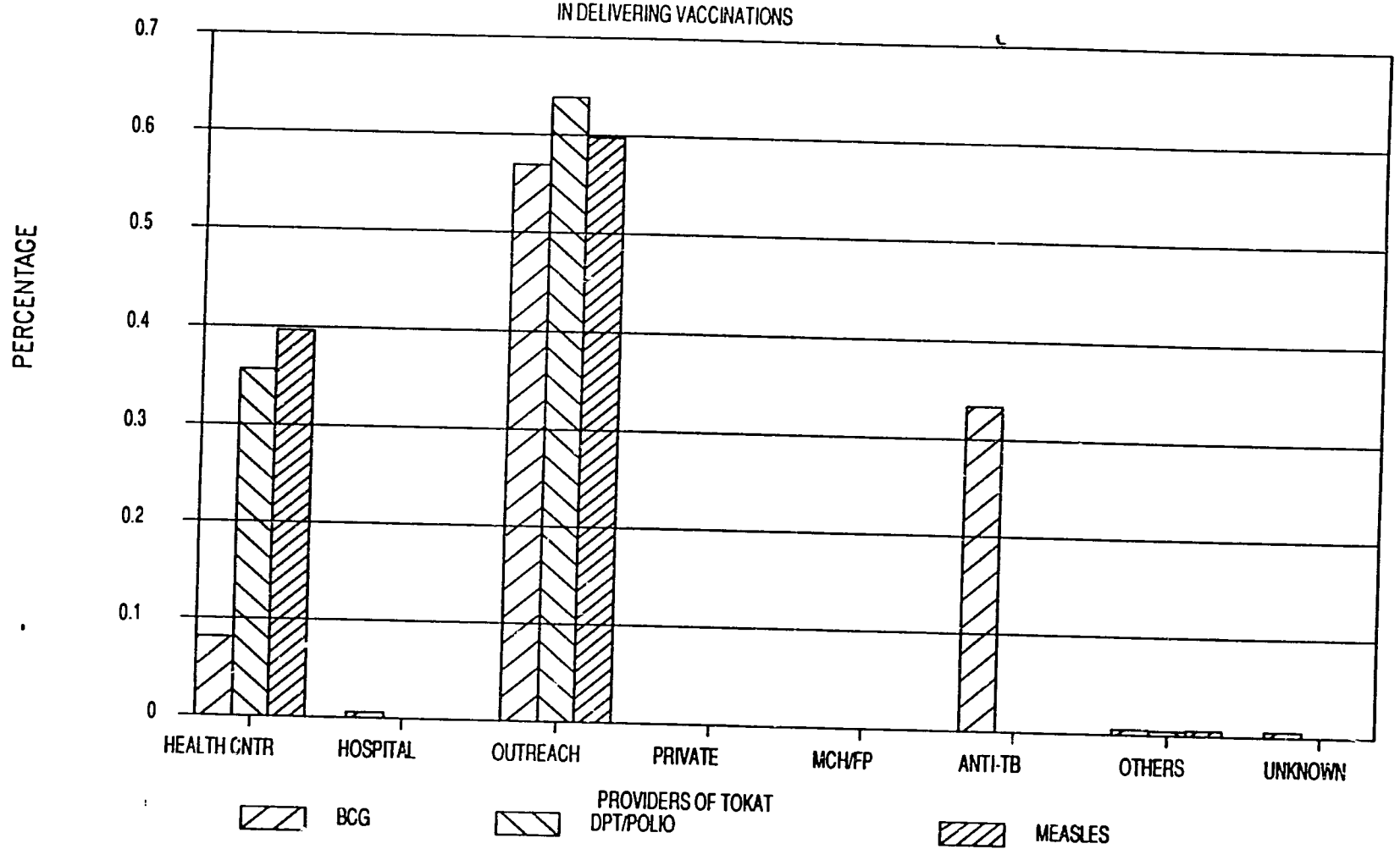
GRAPH 14: ROLE OF PROVIDERS

IN DELIVERING VACCINATIONS



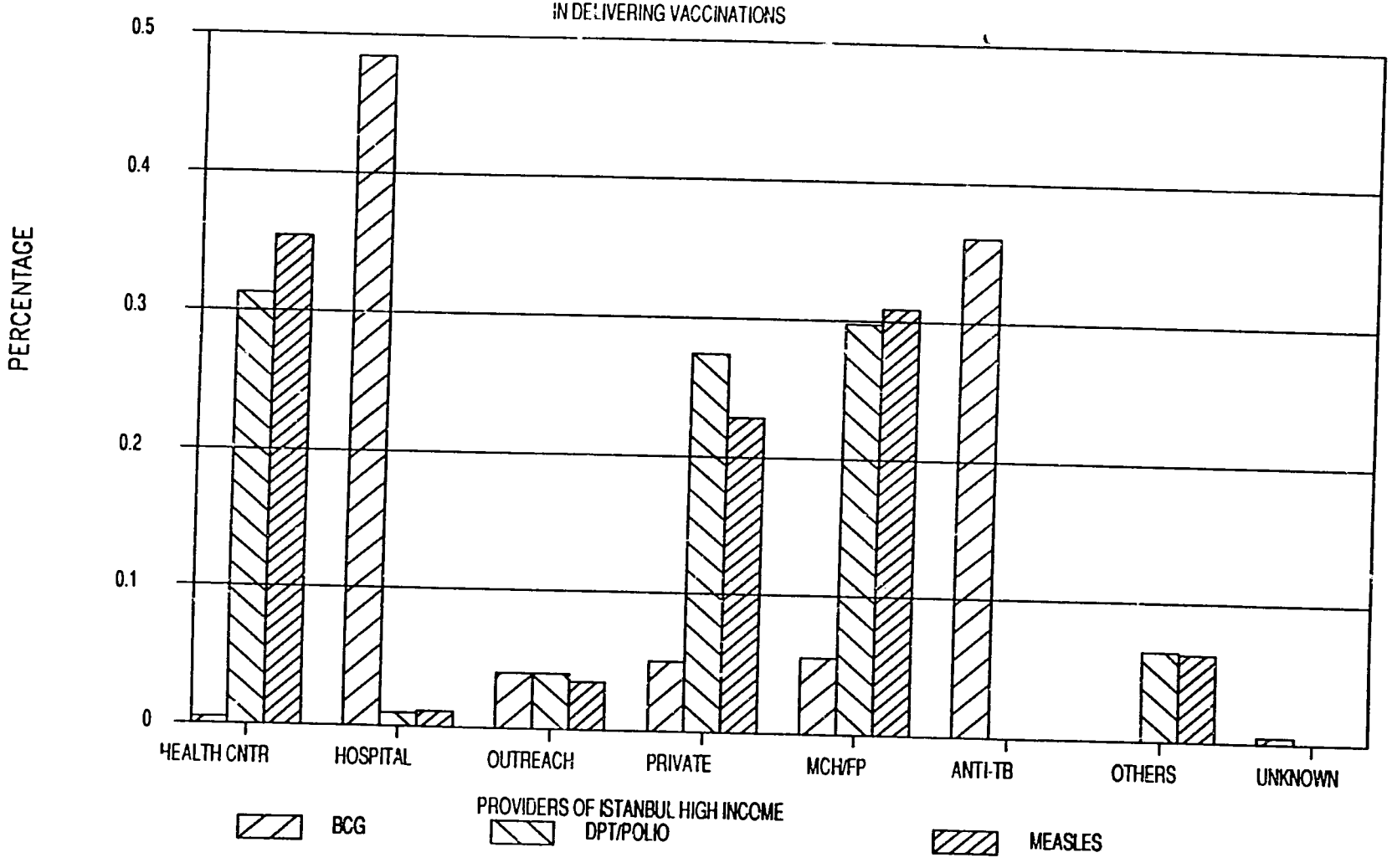
GRAPH 15: ROLE OF PROVIDERS

IN DELIVERING VACCINATIONS

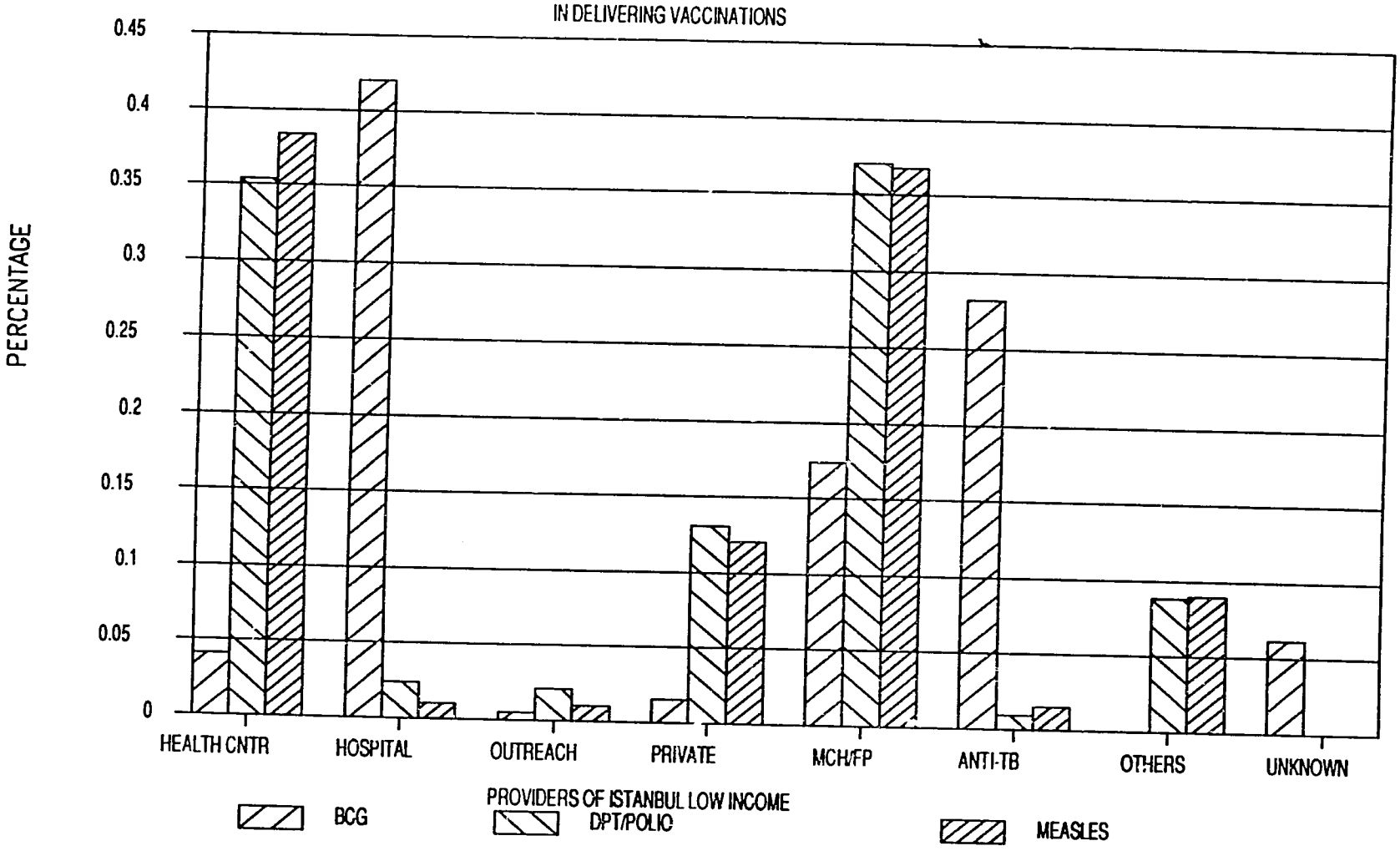


GRAPH 16: ROLE OF PROVIDERS

IN DELIVERING VACCINATIONS

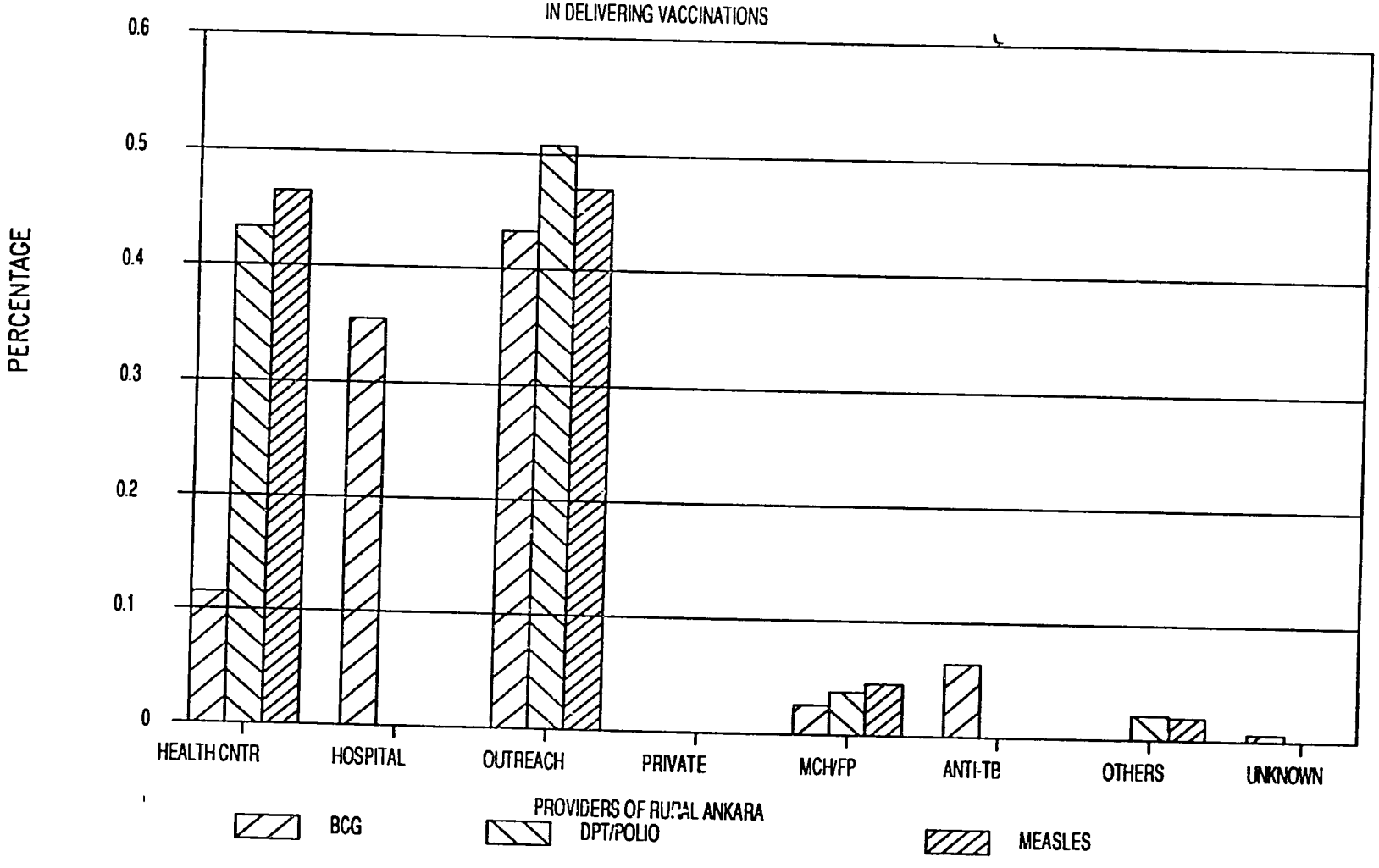


GRAPH 17: ROLE OF PROVIDERS



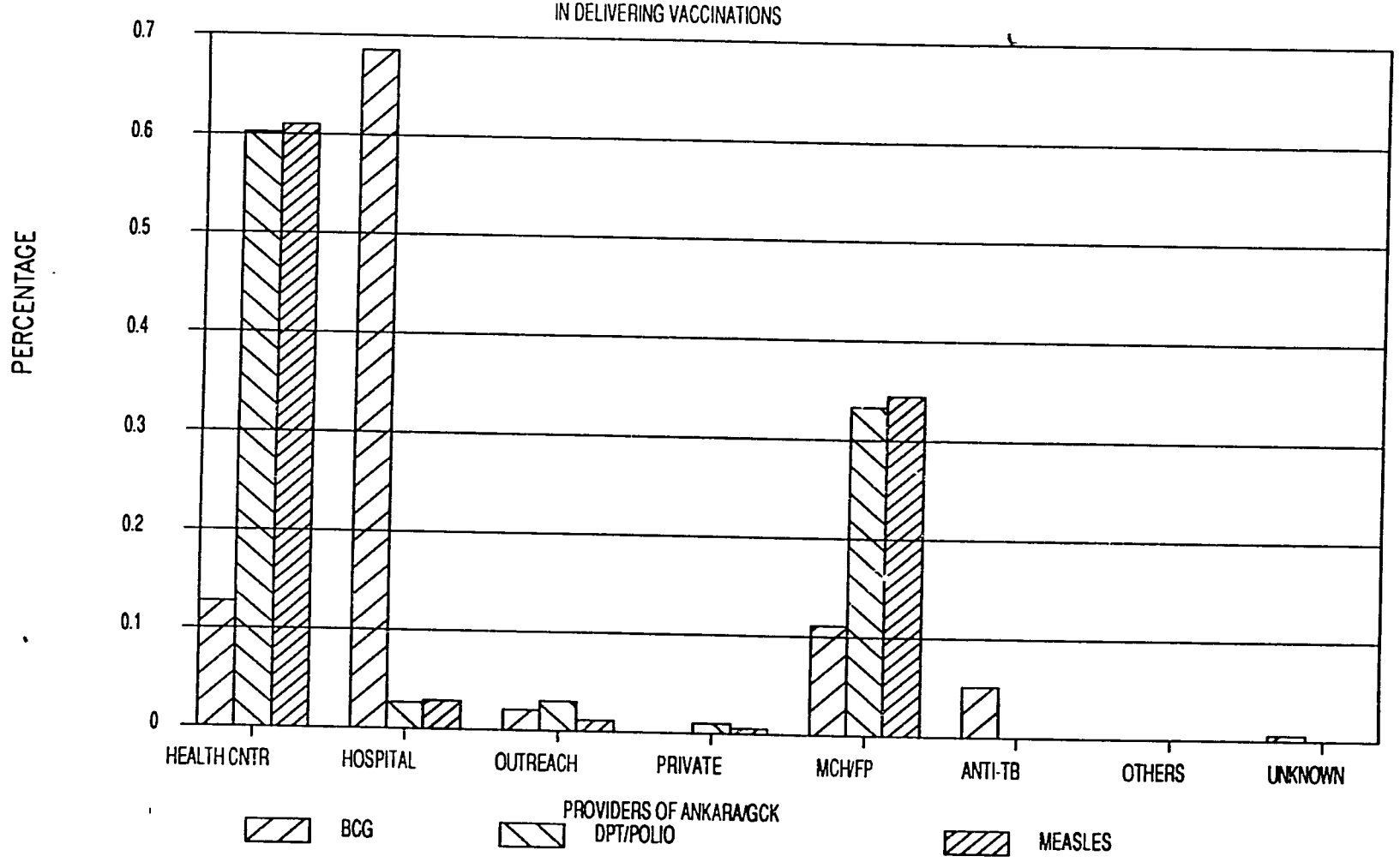
GRAPH 18: ROLE OF PROVIDERS

IN DELIVERING VACCINATIONS



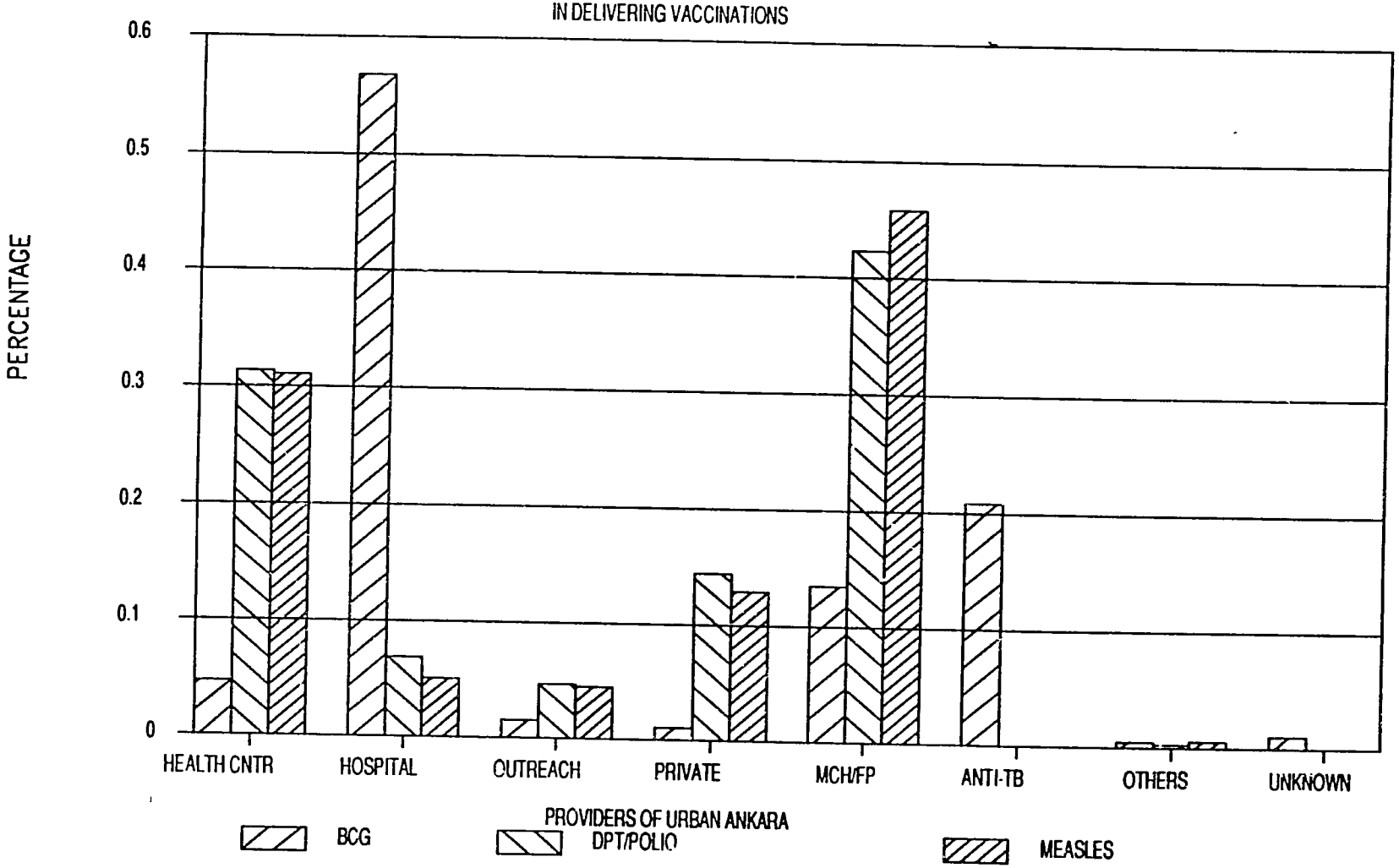
GRAPH 19: ROLE OF PROVIDERS

IN DELIVERING VACCINATIONS



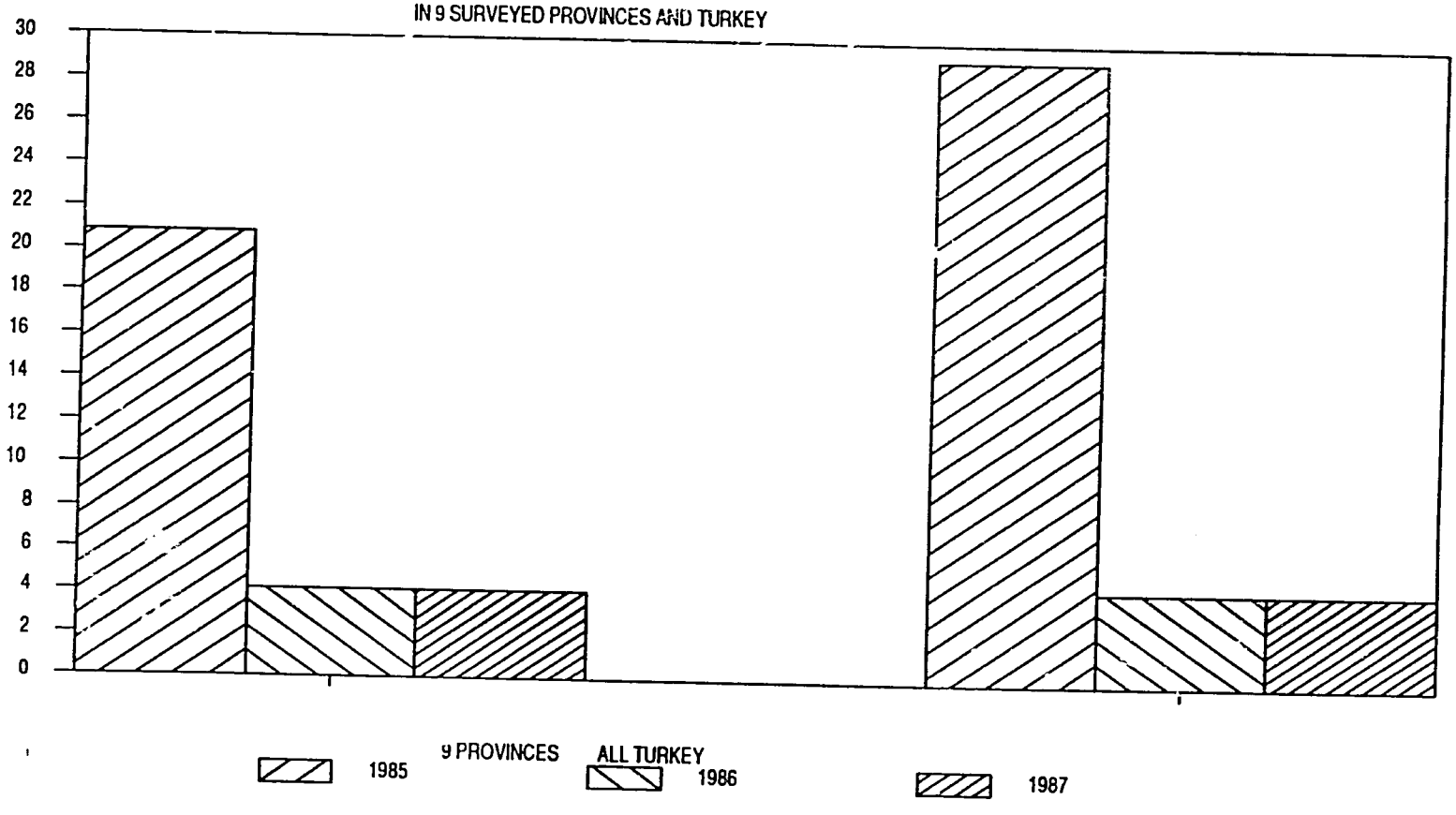
GRAPH 20: ROLE OF PROVIDERS

IN DELIVERING VACCINATIONS



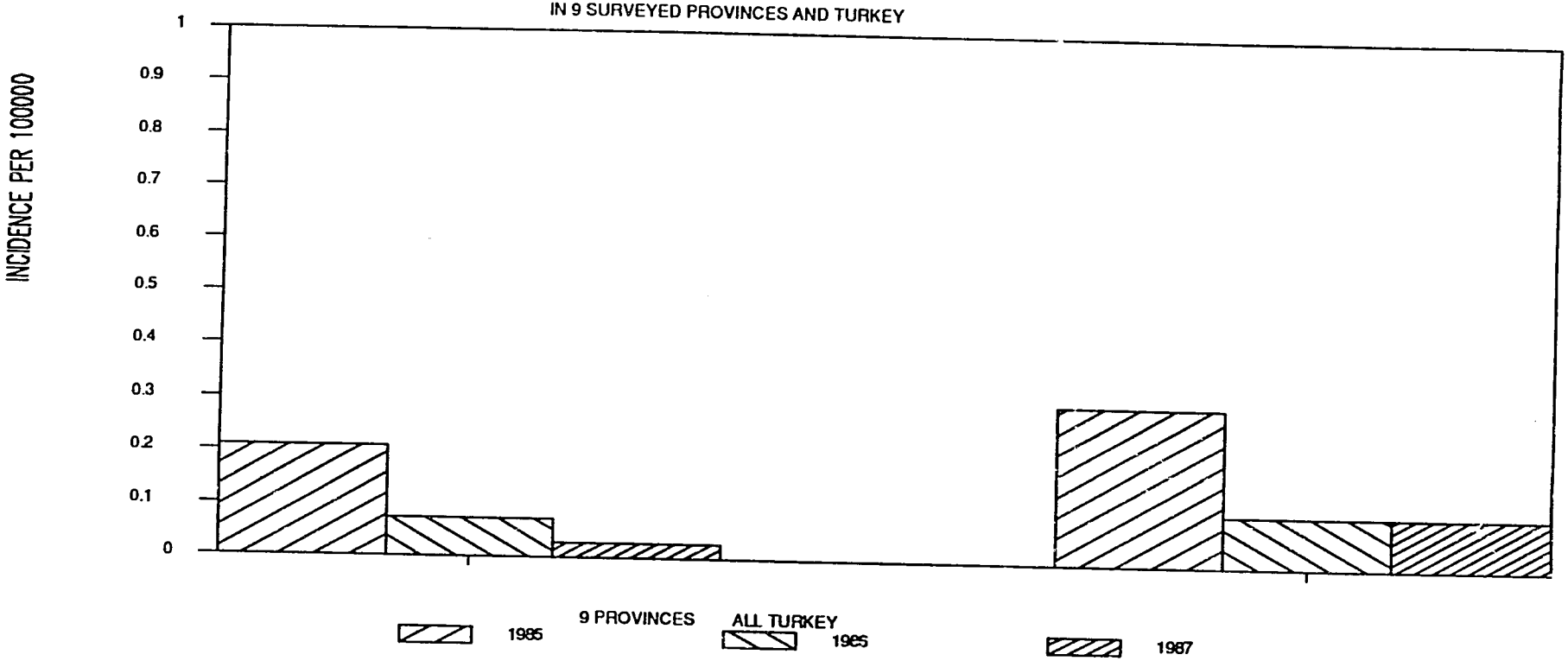
GRAPH 21: INCIDENCE OF MEASLES 1985-1987

IN 9 SURVEYED PROVINCES AND TURKEY

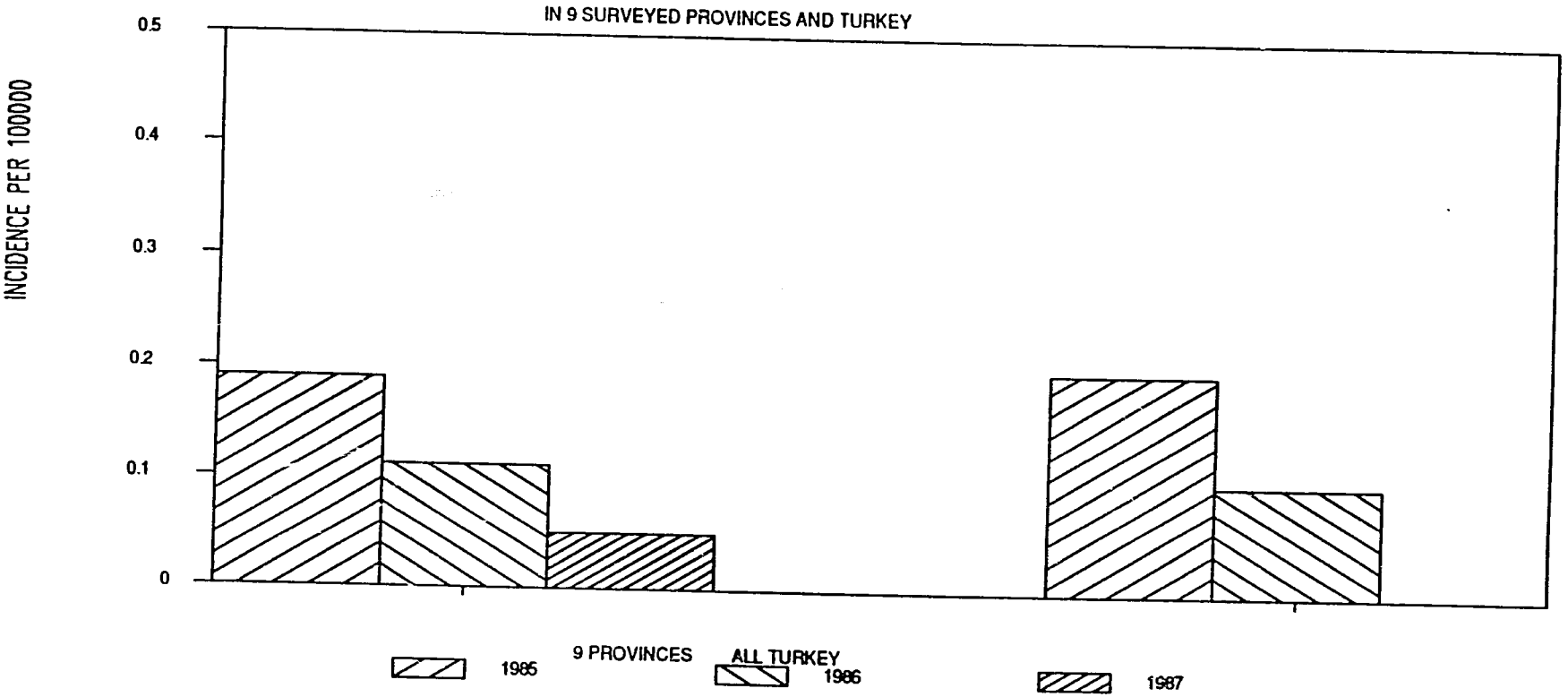


GRAPH 22: INCIDENCE OF DIPTHERIA 1985-1987

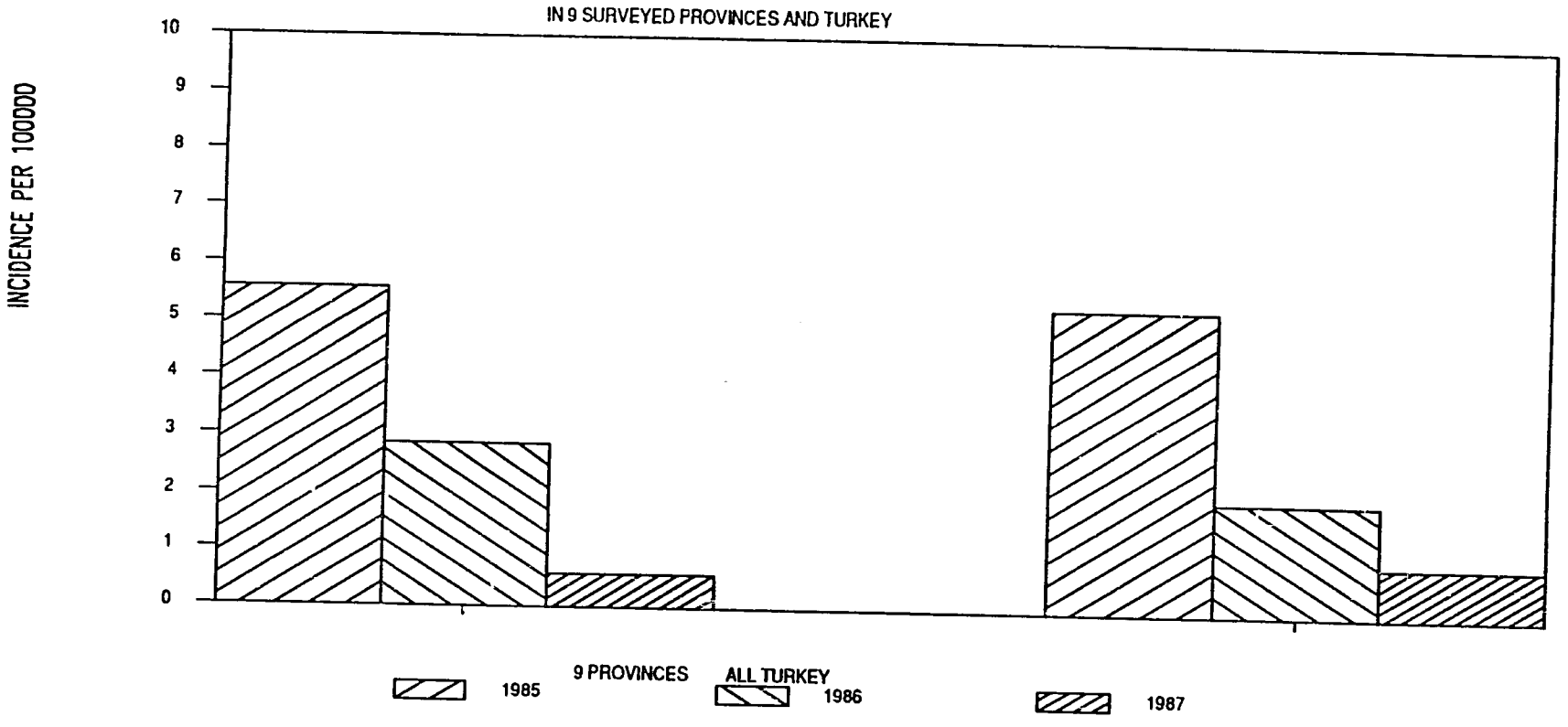
IN 9 SURVEYED PROVINCES AND TURKEY



GRAPH 23: INCIDENCE OF POLIOMYELITIS 1985-1987



GRAPH 24: INCIDENCE OF PERTUSSIS 1985-1987

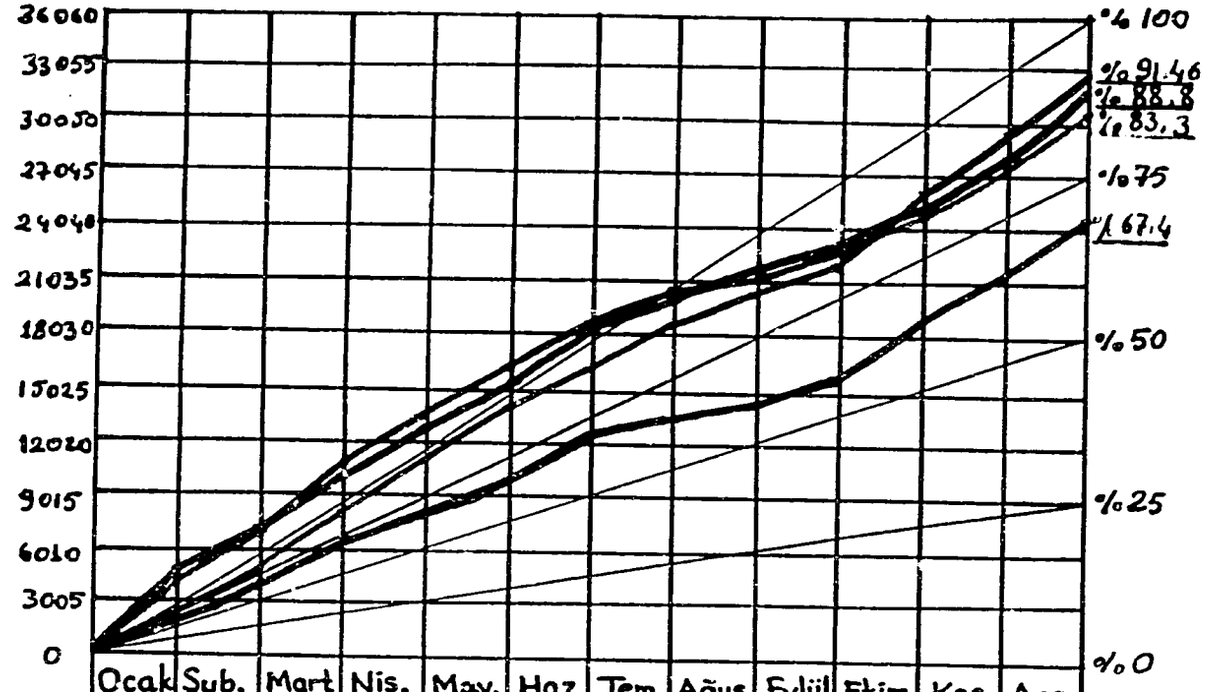


GRAPH 25: AŞI İZLEME GRAFİĞİ

0-11 Aylık aşılanması gereken bebek sayısı: 36060

Sağlık Ocağı

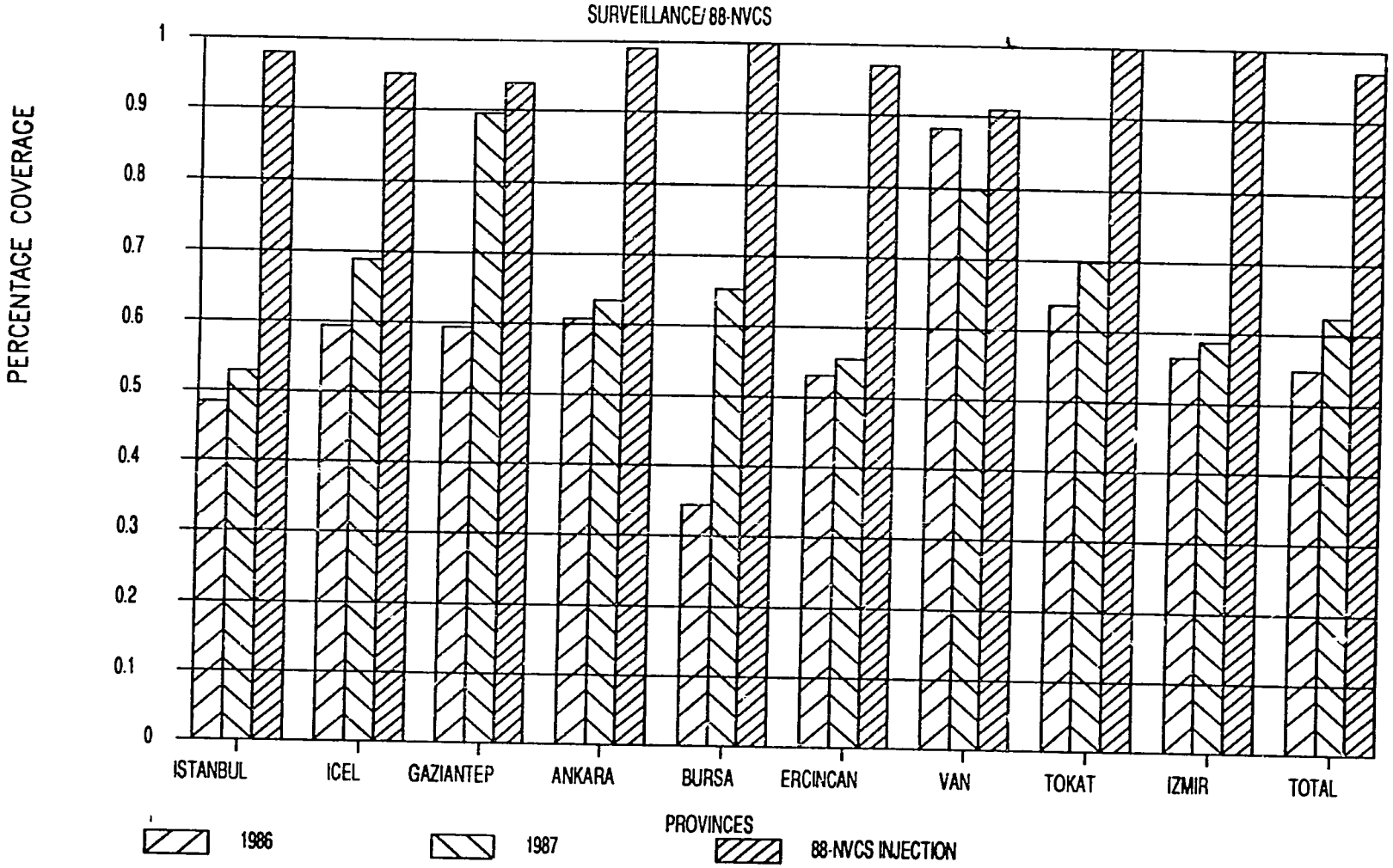
YILI : 1987



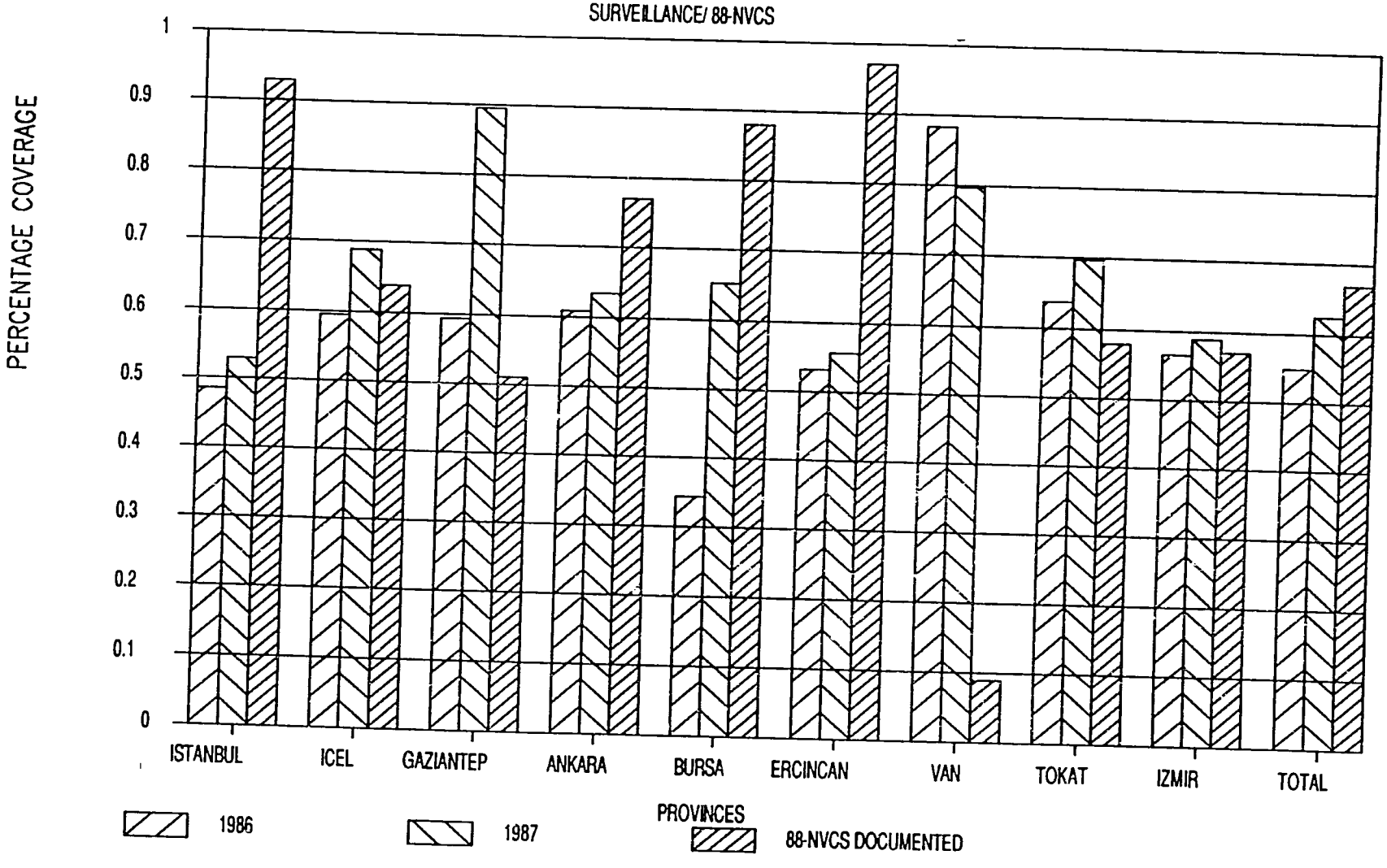
Yapılan Aşılar ve Miktarı

	Ocak	Sub.	Mart	Nis.	May.	Haz.	Tem.	Ağus.	Eylül	Ekim	Kas.	Ara.	
D.B.T. Polio I	2921	2446	2818	3203	2915	2542	1560	1365	1967	5011	2832	3401	Ay İçinde aşılanan
	2921	5367	8185	11388	14303	16845	18405	19770	21737	26748	29580	32981	Kümülatif Toplam
D.B.T. Polio II	4904	2887	2686	2552	2709	2480	1630	1318	1376	2734	2721	3972	Ay içinde aşılanan
	4904	7791	10477	13028	15738	18218	19908	21226	22602	25336	28057	32034	Kümülatif Toplam
D.B.T. Polio III	4619	3111	3341	2752	2385	1985	1632	1257	1426	2543	2014	2978	Ay içinde aşılanan
	4619	7730	11071	13823	16208	18193	19825	21126	22562	25105	27086	30064	Kümülatif Toplam
Kızamık	2430	1805	2056	2332	1960	1742	572	867	1650	3173	2476	2841	Ay içinde aşılanan
	2430	4235	6291	8623	10583	12326	13254	14164	15814	19023	21499	24340	Kümülatif Toplam

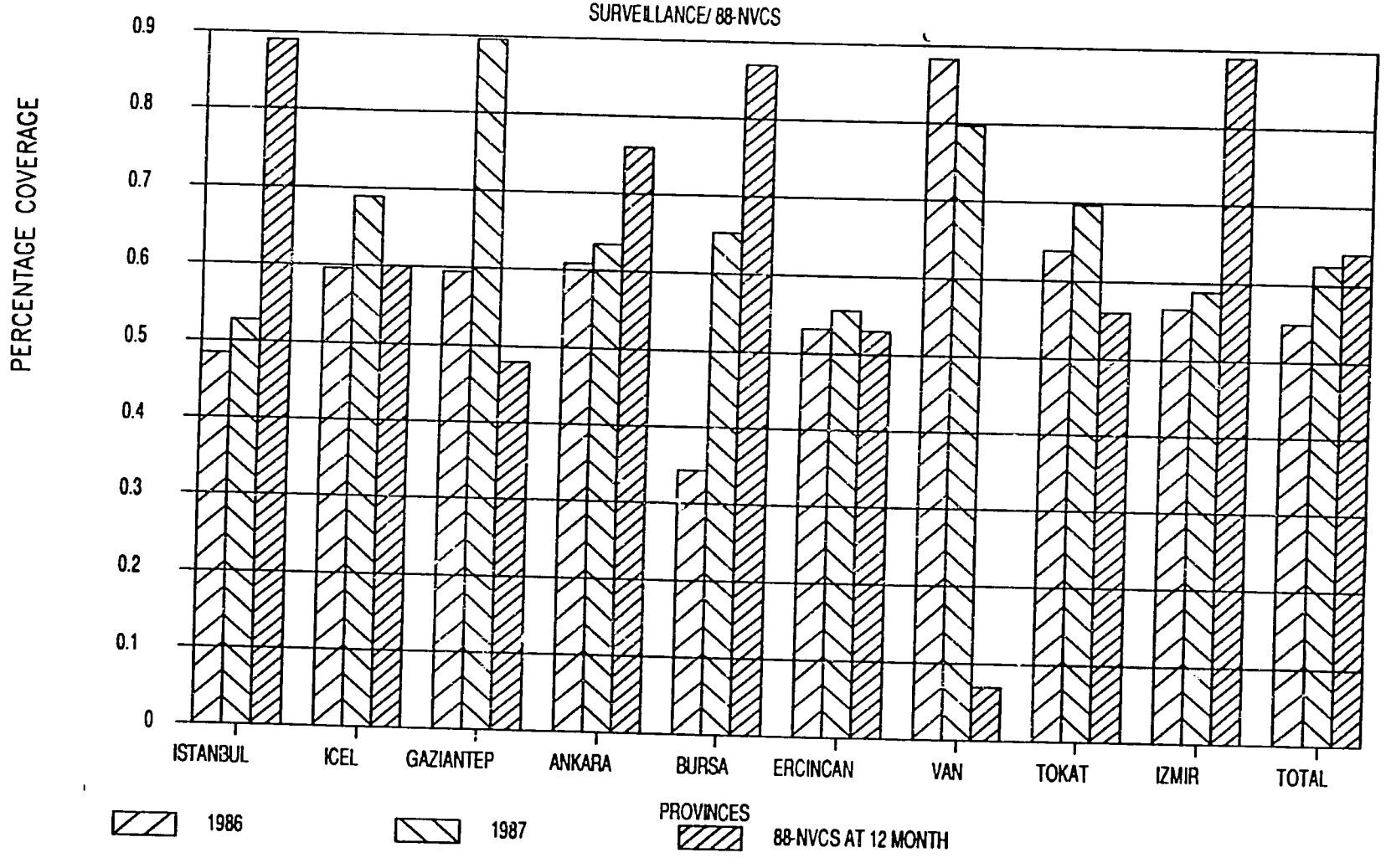
GRAPH 26: COMPARISON OF DPT 1 DATA



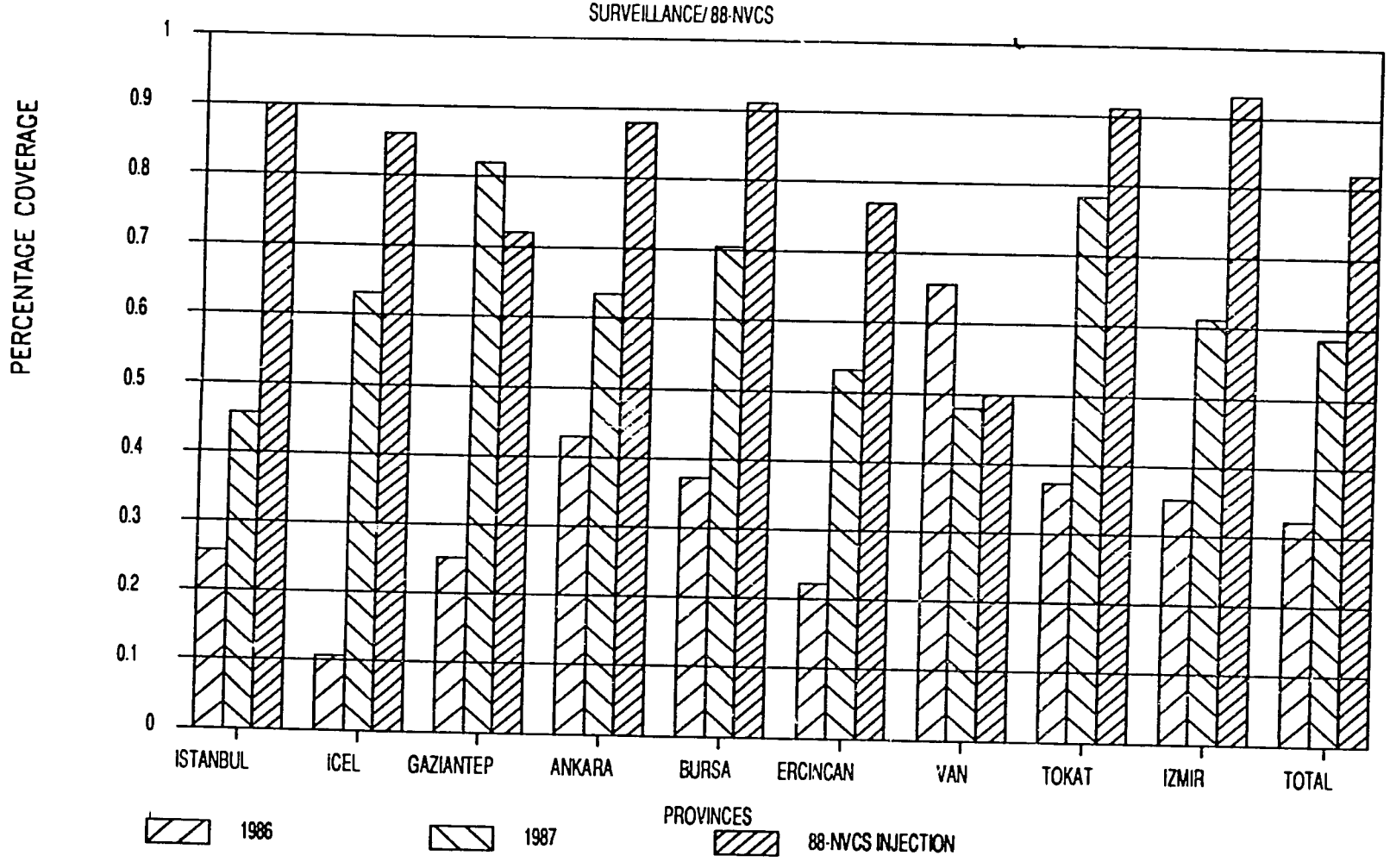
GRAPH 27: COMPARISON OF DPT 1 DATA



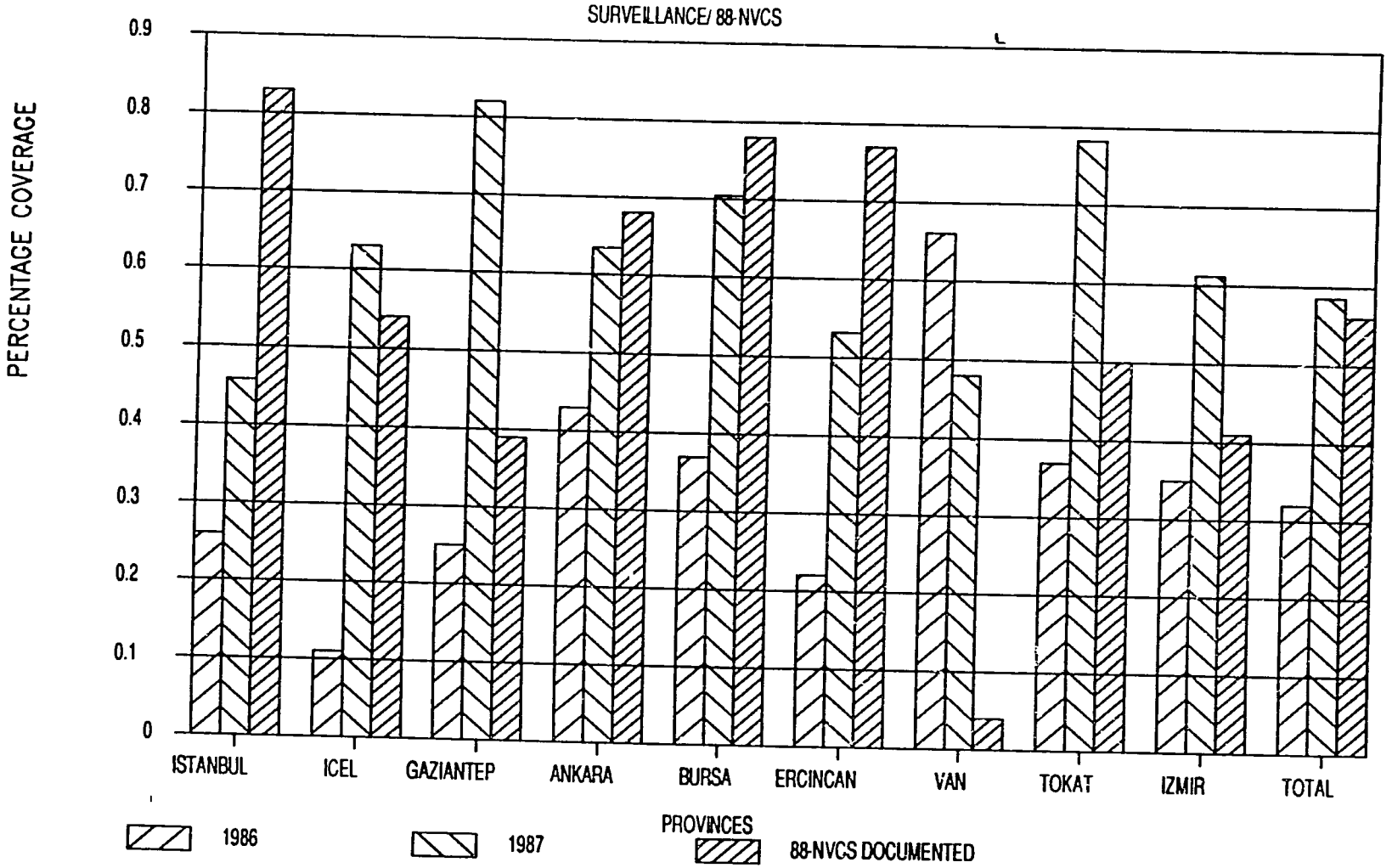
GRAPH 28: COMPARISON OF DPT 1 DATA



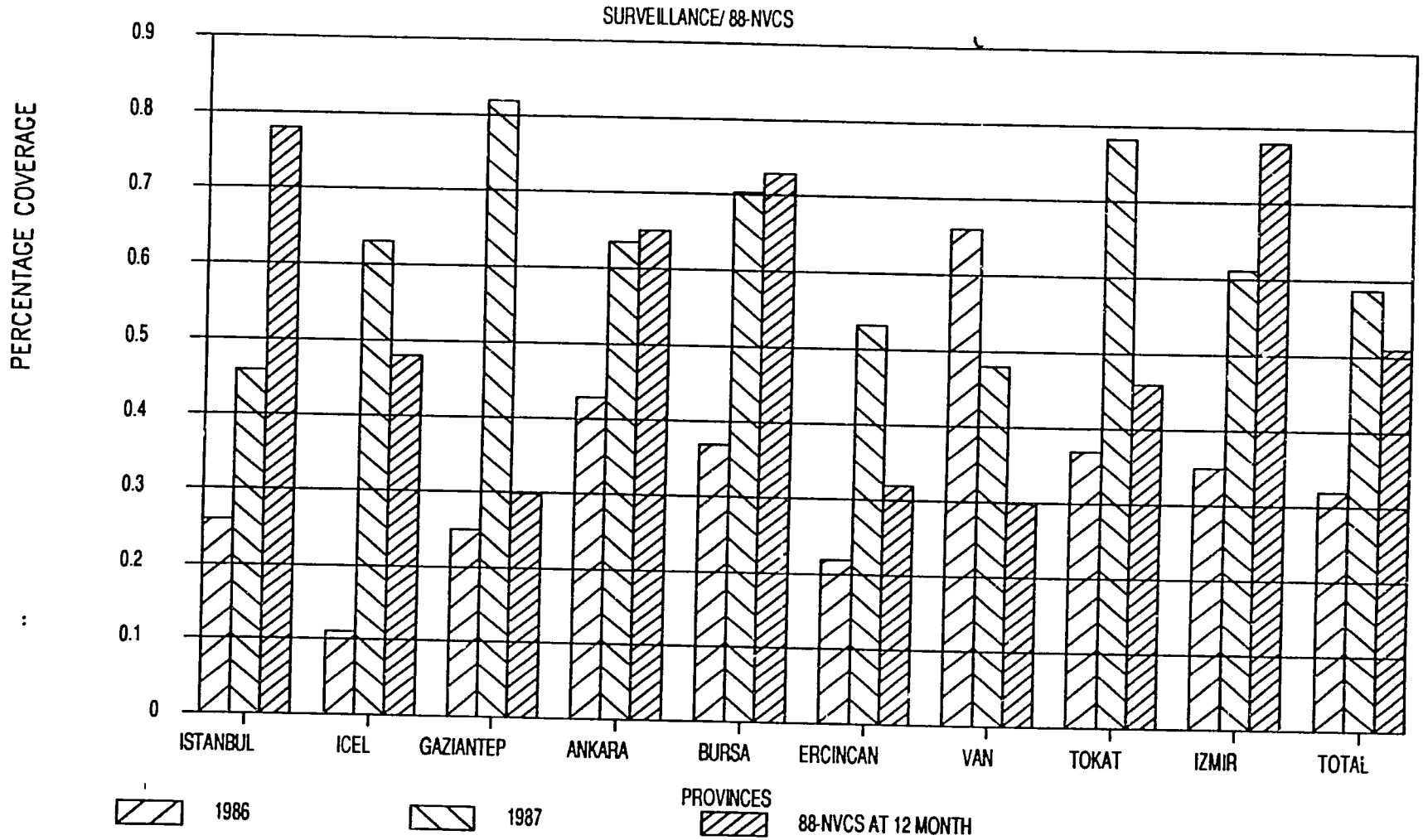
GRAPH 29: COMPARISON OF DPT 3 DATA



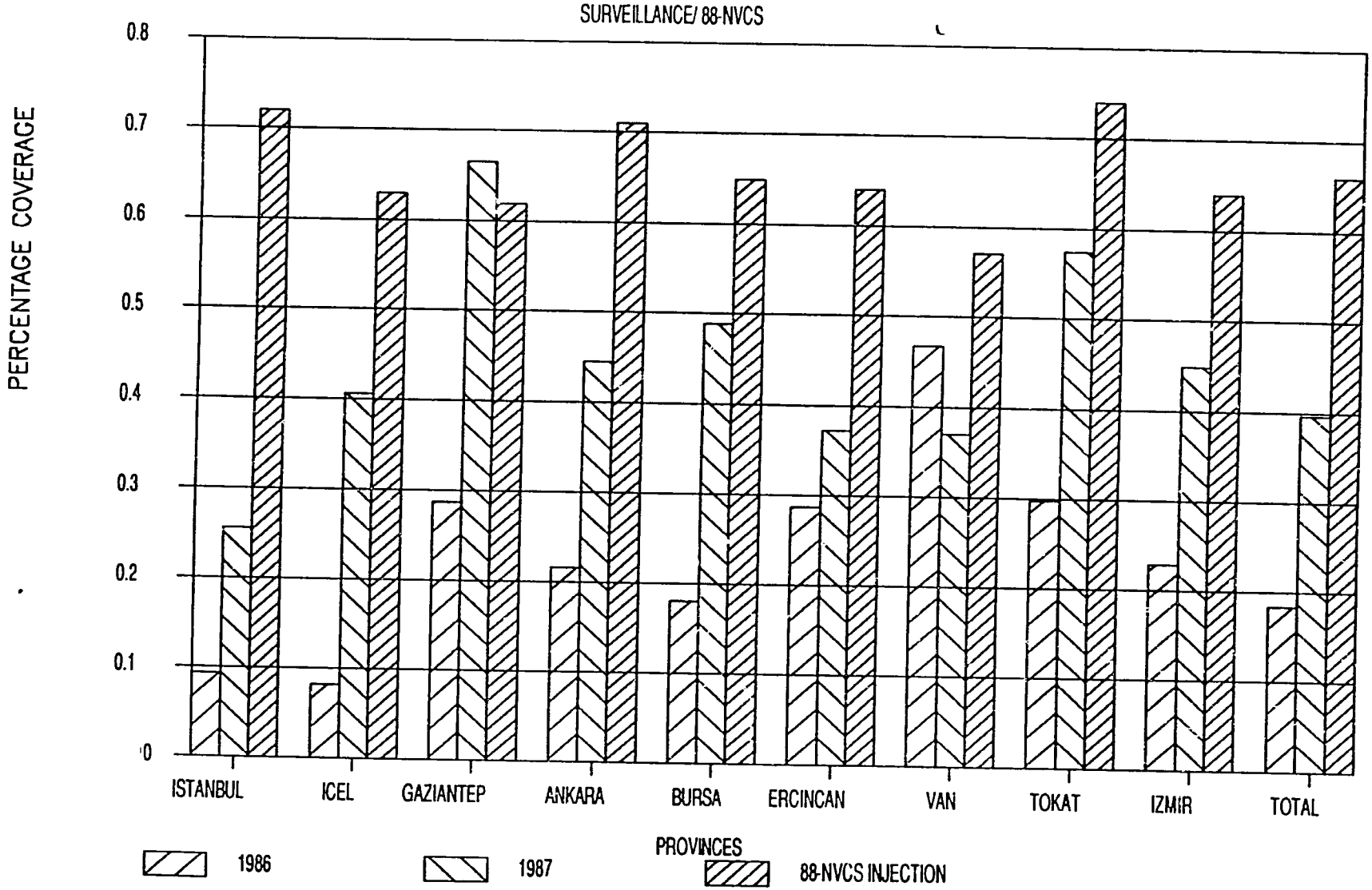
GRAPH 30: COMPARISON OF DPT 3 DATA



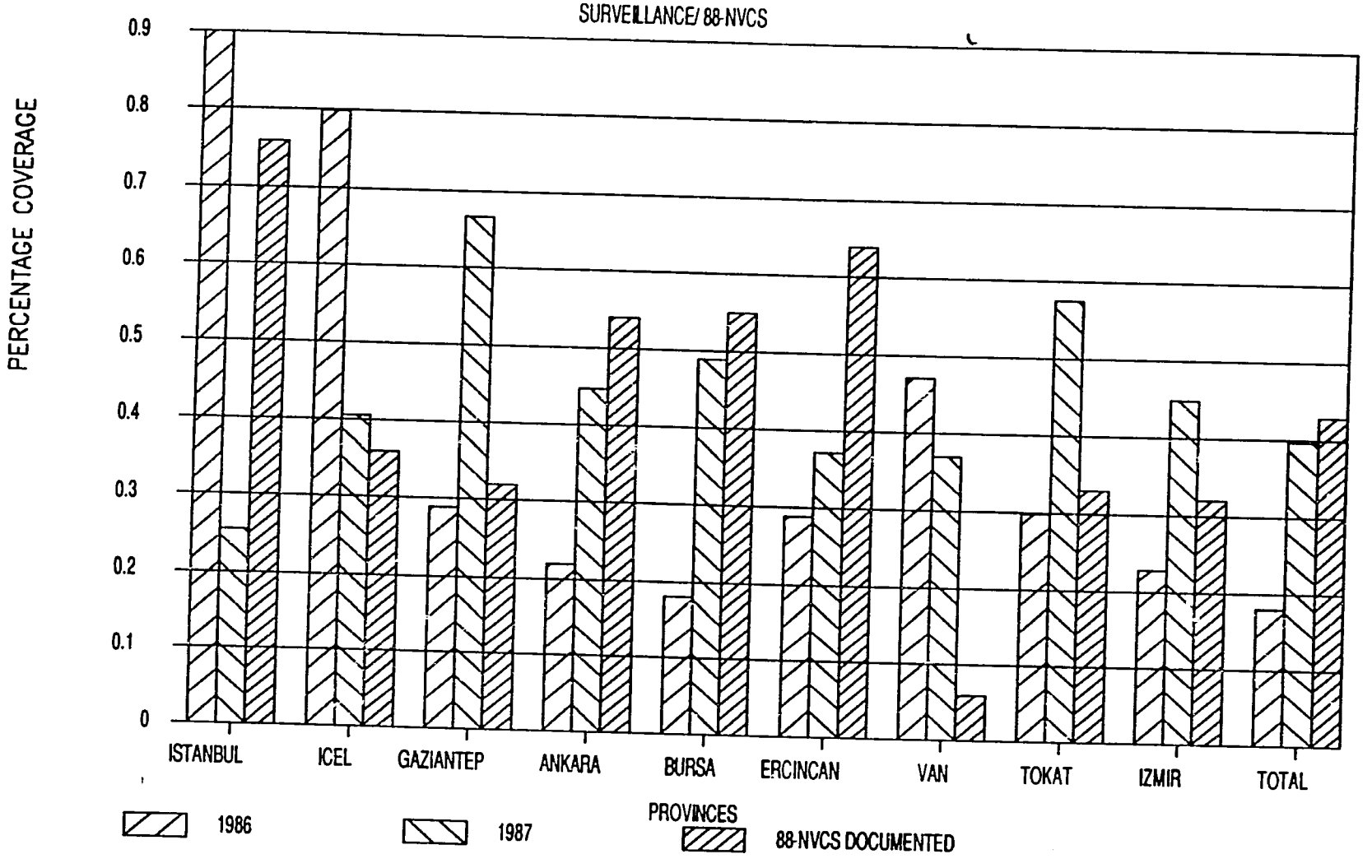
GRAPH 31: COMPARISON OF DPT 3 DATA



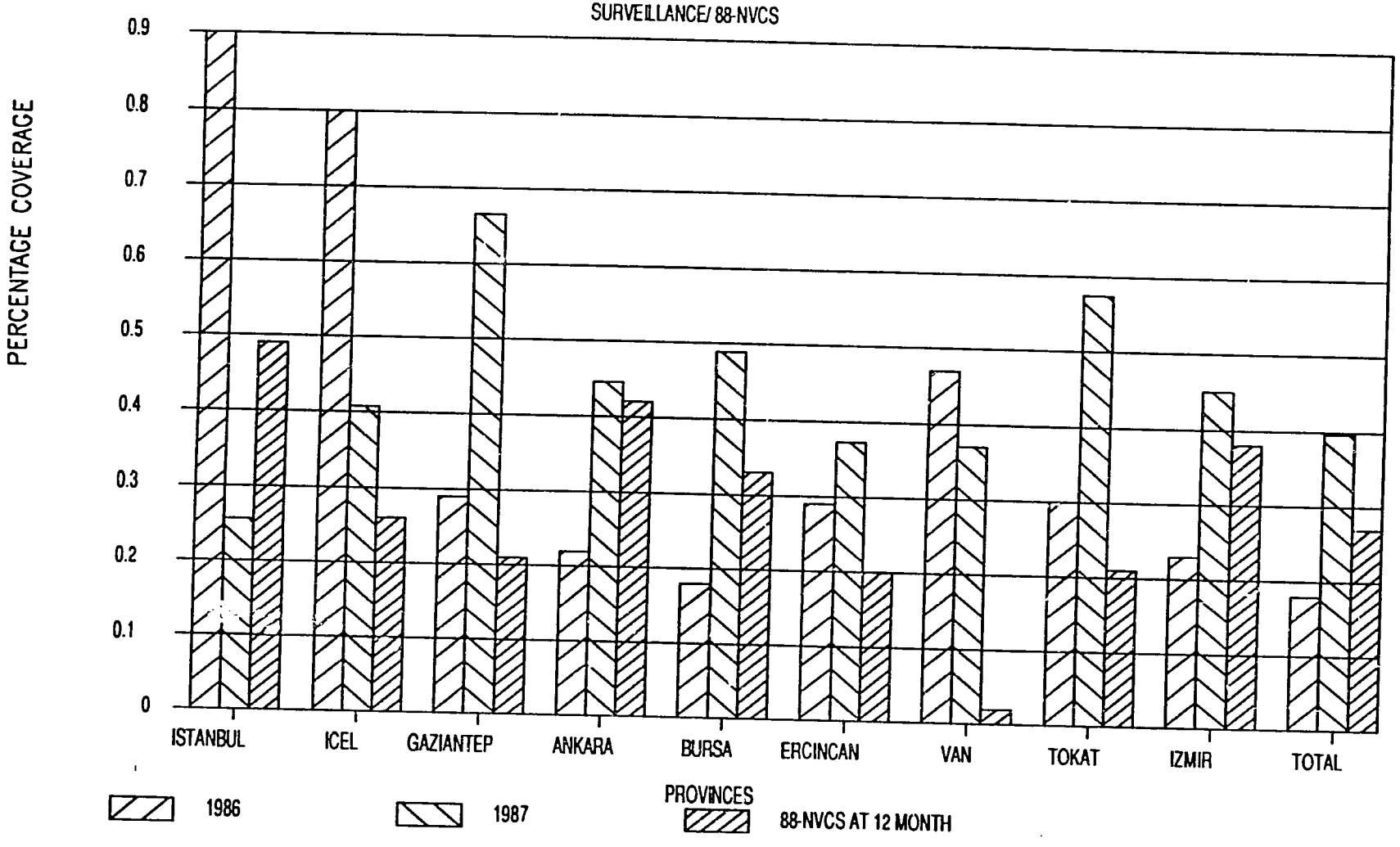
GRAPH 32: COMPARISON OF MEASLES DATA



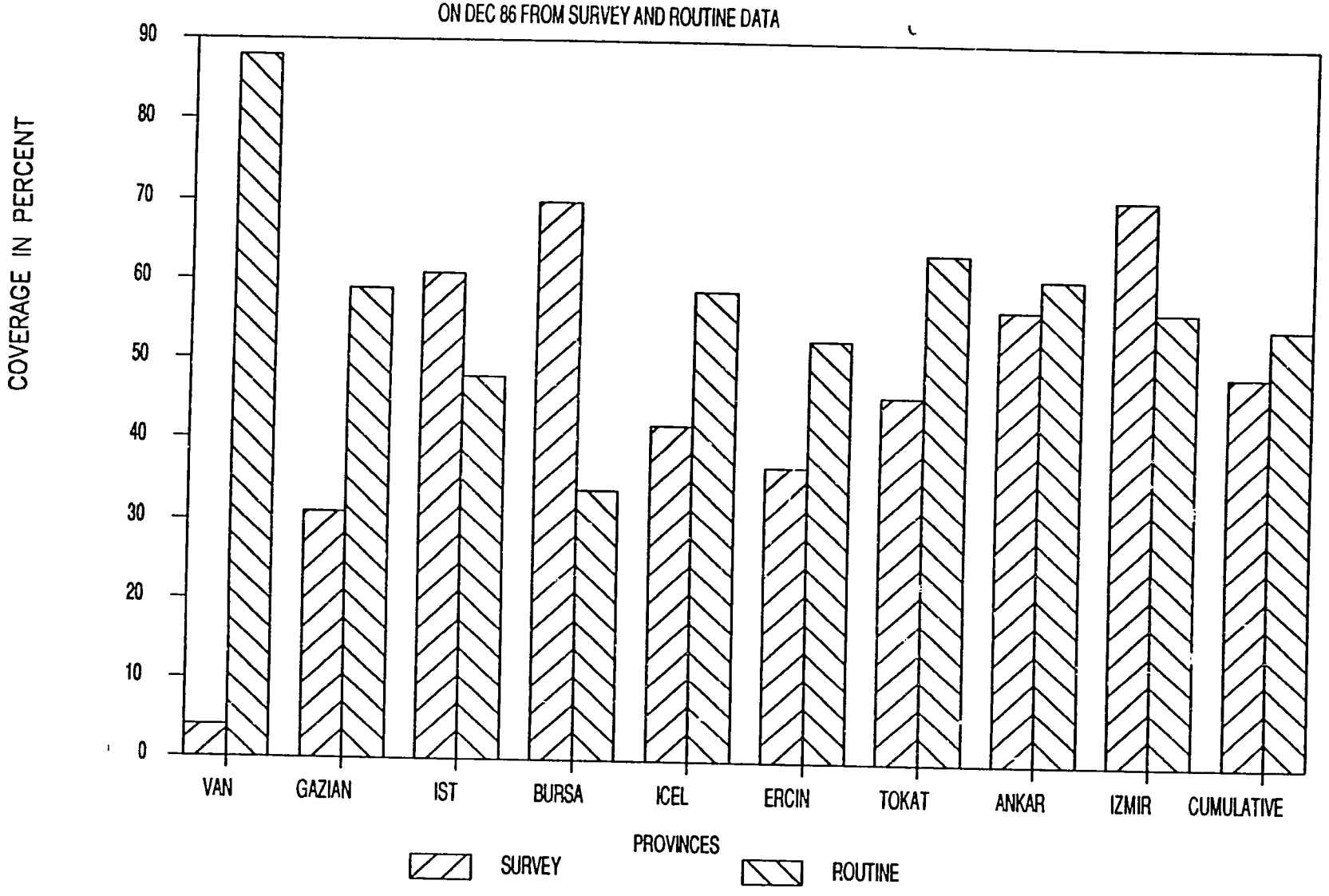
GRAPH 33: COMPARISON OF MEASLES DATA



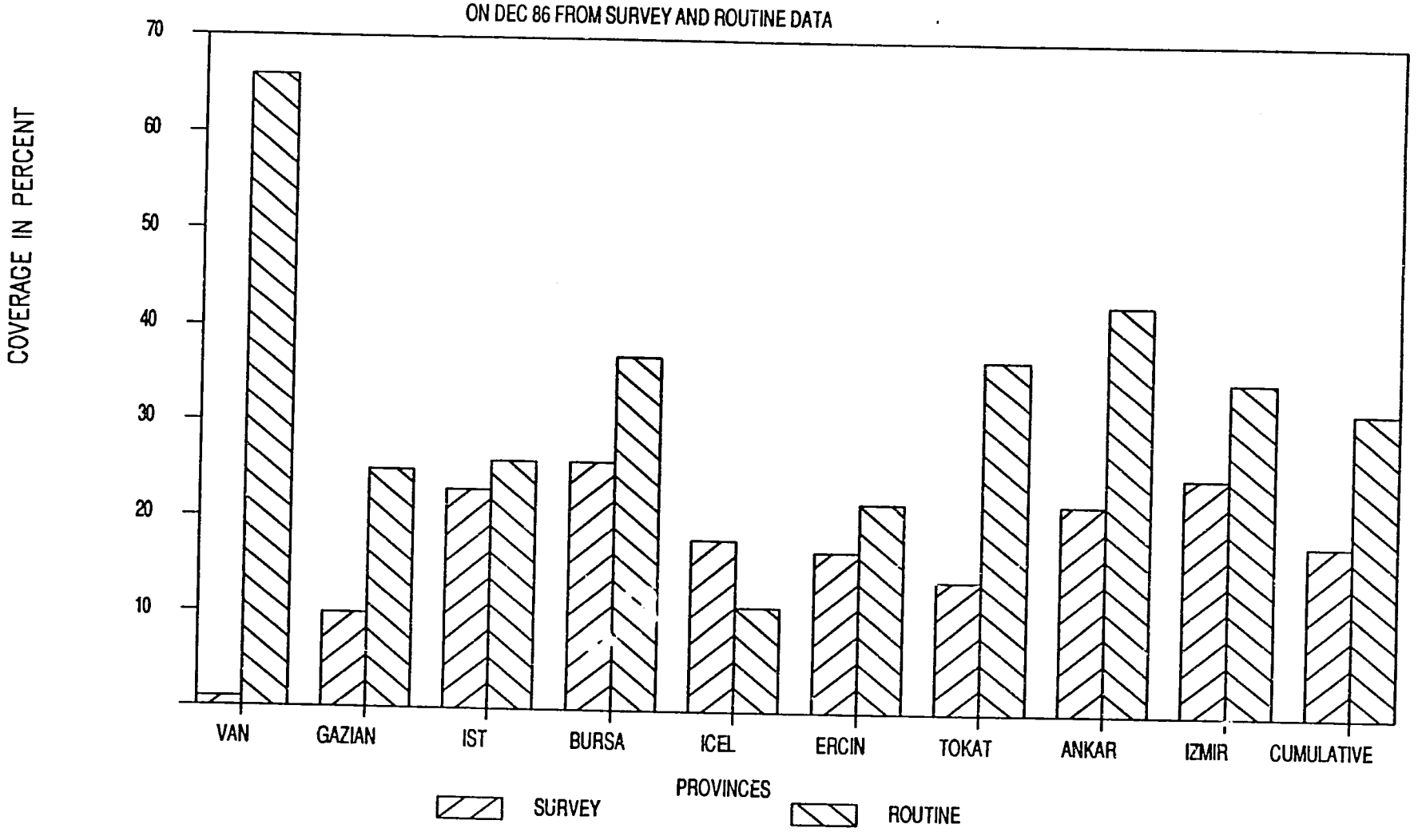
GRAPH 34: COMPARISON OF MEASLES DATA



GRAPH 35: COMPARISON DPT 1 COVERAGE RATES



GRAPH 36: COMPARISON DPT 3 COVERAGE RATES



GRAPH 37: COMPARISON MEASLES COVERAGE RATES