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FINAL REPORT

ON THE

CONTINUOUS SYRIAN HEALTH SURVEY

AID/ne-C-1422
276-0006

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July 7, 1980

CONTINUOUS SYRIAN HEALTH SURVEY

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FINAL REPORT
CONTINUOUS SYRIAN HEALTH SURVEY

I. INTRODUCTION

A. Purpose of the Survey

The Continuous Syrian Health Survey (CSHS) was undertaken in October, 1977 by the Ministry of Health of the Syrian Arab Republic with the cooperation of the United States Agency for International Development in response to the need for better data on the health status of the Syrian population. The goals of the survey are threefold:

1. To supply the Ministry of Health with data on the health needs of the population from a consumer viewpoint,

2. To develop baseline data from which to measure changes in health needs,

3. To train a staff capable of conducting health surveys.

Existing health data is limited to mortality certificates, hospital discharge and clinic visit records and several special interest surveys. The quality of this data is suspect as reporting is often incomplete and certain sectors of medical care are not included. For example, there is no information available on illness treated by the private health sector, or on self treated or untreated illness. Data on the consumer's motivation for seeking or not seeking care from a specific health professional is lacking. The health survey was proposed as a means of filling this void and enabling the Ministry of Health to design more effective programs that satisfy the demand for health services, see Figure I-1. The demand for health services is a function of several factors: the health status as perceived by the individual; the motivational impetus to seek or not to seek medical services and the health status as assessed by a health professional. The CSHS is emphasizing the first two factors and is focusing its efforts on the answers to the following questions:

- How do the people of Syria perceive their health status?
- Does the disease process effect their ability to function in society?
- What is the consumer's perspective on the appropriateness, availability

and accessibility of the existing health care system?

The answers to these questions will assist in clarifying the health needs and problems of the country and local regions. While not conclusive, the data will serve to differentiate among populations who regard illness as a normal state and do not seek treatment: those who recognize their illness but decide against medical care and the medically served population. If certain diseases are not perceived as abnormal, then future health projects must emphasize outreach programs and case finding surveys to discover new cases, encourage their appropriate treatment and to initiate preventive measures. This is a very important aspect of a health services system for these unrecognizable or seemingly asymtomatic problems may have a tremendous impact on society's productivity. However, these are expensive programs to implement requiring teams of physicians, nurses and laboratory technicians to travel around the country in mobile health units and assess each individual's health status. Given the limited resources of Syria, this type of epidemiologic investigation should only be undertaken after baseline data on the whole population has been collected and communities identified where it can achieve maximum effectiveness. Thus, the CSHS, by providing answers to the first two questions, can enable the Ministry to target specialized epidemiologic teams and programs in the most appropriate areas.

The third question addresses the issue of the acceptability to the consumer of services provided. Building government clinics in every village will be a useless and expensive exercise if they will not be used and cannot be staffed. If a large percentage of the population is willing to undergo the greater expense and travelling inconvenience to seek care from private physicians, the local clinics will be bypassed. In a country where the distribution of health professionals is an acute problem, it is critical that if placed in a community the health professional will be of maximum service to the people. No data is currently available on the differential utilization patterns of the private and

public health care system. Until such a time as this data becomes available, maximizing the effectiveness of the services provided by the Ministry of Health is not possible. The CSHS will provide baseline data on such utilization patterns which can later be supplemented by a small attitudinal survey comparing users of the Ministry of Health facilities with users of the private health facilities. The Planning Department can then effect the most efficient distribution of health professionals and develop training programs in health areas where trained personnel are insufficient to meet the demand.

A further outcome of the CSHS will be the creation of an efficient method of managing routine data collection operations. Public health programs to be effective must be closely monitored. Changing health conditions must be detected early and effective action taken. All existing public health projects should be routinely evaluated to determine their effectiveness. This flow of reliable information from the field to the central Ministry is the foundation of good management practices. The CSHS can be an important and useful tool to the Planning Department of the Ministry.

B. Survey Content

The principle criteria used in selecting variables for inclusion in the health survey were the utility of the information for planning and evaluating health programs, see Figure I-2. Of particular interest to the Ministry of Health is data on health problems that are easily recognized and can be effectively controlled by simple public health measures, i.e. immunization, potable water. Another major area of concern is the identification of the medically unserved and underserved populations in Syria.

Demographic and other environmental variables have been included in order to help identify geographic areas or population groups that may constitute a subgroup with a high risk of disease.

The questionnaire was reviewed by public health survey experts in the United States as well as public health physicians in Syria. Their comments were

invaluable in designing the final form.

Based on the results of the first year's data, the Planning Department will assess the utility of the data and add or delete topics from the future survey. It will also identify special health problems that warrant a greater emphasis. Thus, the survey is a dynamic tool changing as the needs of the Ministry of Health changes.

C. Structure of the Report

The final report on the Continuous Syrian Health Survey is presented in the following parts:

Part I, INTRODUCTION: deals with the purpose, goals and objectives of the survey. It includes a brief description of the survey content.

Part II, CHRONOLOGY OF EVENTS: lists the dates of the major events occurring during the three year period of the survey.

Part III, MAJOR ACCOMPLISHMENTS: includes five sub-sections describing the major accomplishments of the survey which are: 1) development of an appropriate health survey design, 2) development and testing of a health questionnaire, 3) training and supervising a survey team, 4) systematic supervision of the data collection and 5) preparation and formating the data for automated data processing.

Part IV, ISSUES AND PROBLEMS: deals with the major issues and obstacles confronting the survey team in the implementation of the survey.

Part V, RECOMMENDATIONS: for the successful continuation of the Continuous Syrian Health Survey. The report proposes future staffing requirements and organizational structure for continuing the health survey. Suggestions are also made for areas to be included in future surveys.

FIGURE I-1

HEALTH INFORMATION SYSTEM

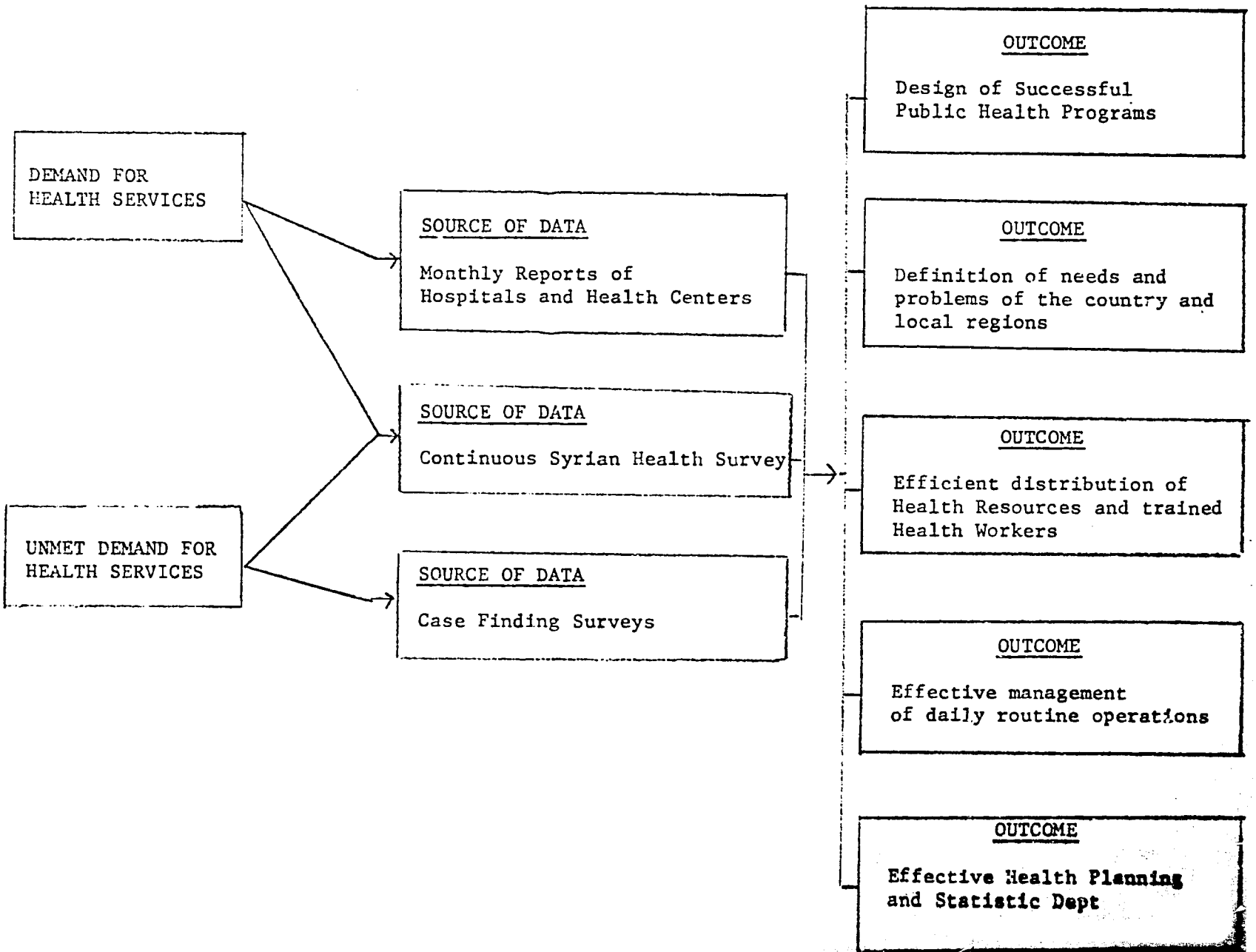
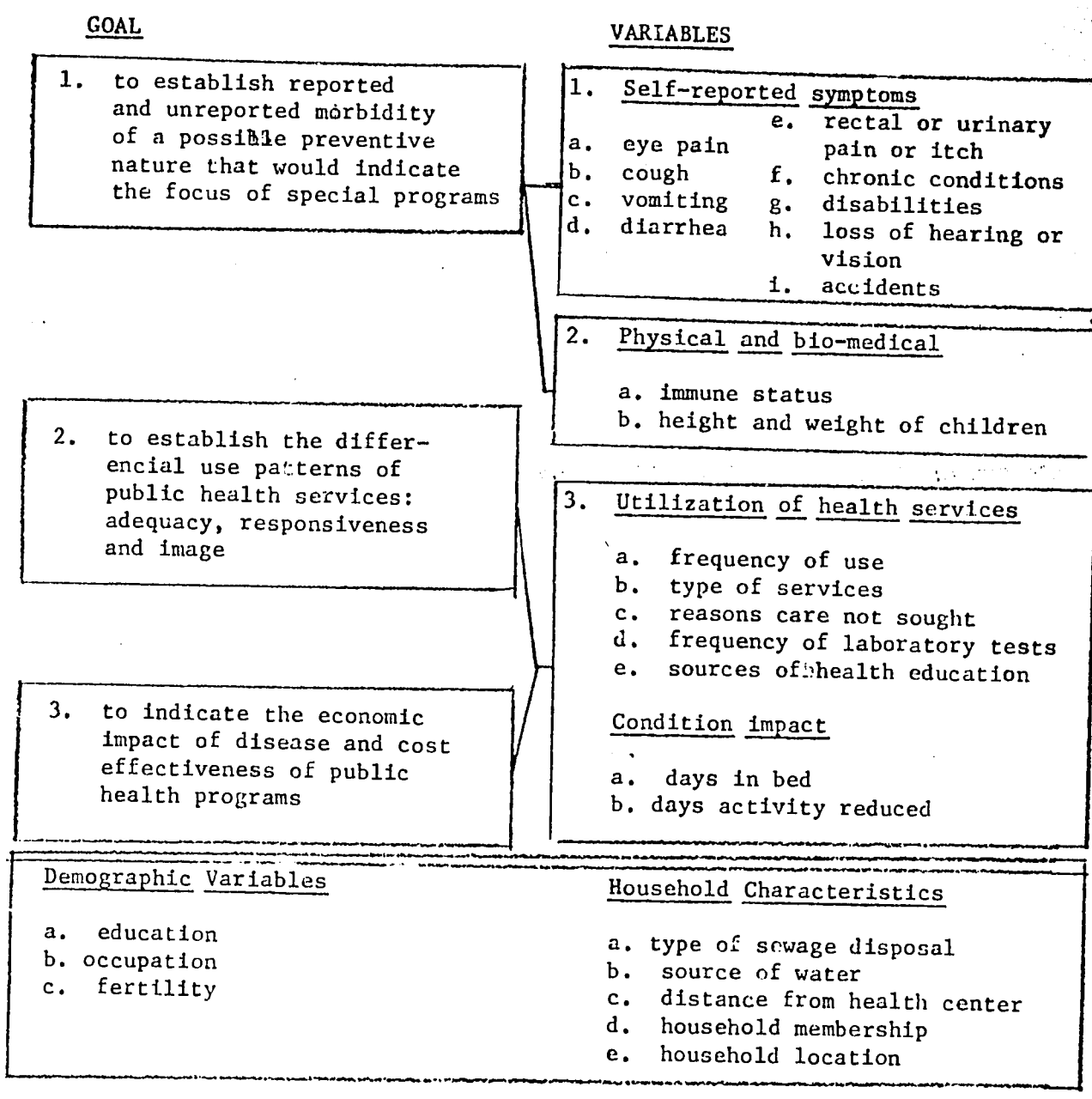


FIGURE I-2

GOALS AND VARIABLES
OF THE HEALTH SURVEY



II. CHRONOLOGY OF EVENTS OF THE CONTINUOUS SYRIAN HEALTH SURVEY

October and November, 1977	The health survey consultant arrived and was assigned a counterpart, Leila Sharak, in the Central Bureau of Statistics (CBS). Together a complete review and evaluation was made of existing health data.
December, 1977	An Interministerial Committee was created and they approved the goals and objectives of the survey. A preliminary survey design and schedule was also presented contingent on securing funding for per diems for the interviewers from the Prime Minister's office.
January, 1978	Approval for funding was not forthcoming and the responsibility for data collection was shifted from the CBS to the Ministry of Health. The issue of funding the data processing was raised and deferred. AID/Damascus was apprised of this difficulty. A counterpart, Nawal Shoura from the Statistics and Planning Department at the Ministry of Health was assigned to work on the survey.
February - March, 1978	A preliminary questionnaire was prepared and discussed with several physicians from the Ministry of Health.
April - May, 1978	Thirteen health sanitarians from five provinces were assigned to work on the health survey as interviewers. A field trip was conducted to meet the regional staffs and to assess the local difficulties in implementing the survey. A pre test of the questionnaire by the local staff in the field was also conducted.

The survey vehicles were shipped from the United States.

June - July, 1978 — Ms. Shoura resigned from the health survey due to her heavy work load at the Ministry. Fr. Fateh Mohiddiyn was appointed as her replacement. Briefing sessions were held to familiarize him with the Continuous Syrian Health Survey.

August, 1978 — Nine vehicles arrive for the survey and await licensing from the Ministry.

September, 1978 — Two short term consultants were requested: one in survey epidemiology and the other in data processing.

The design of the training program and field test was approved by the Ministry.

An assessment of various sampling frames was completed and the sample design formulated.

October, 1978 — Three one week training courses were conducted in Damascus to familiarize the interviewers with the questionnaire and proper interviewing techniques.

November, 1978 — The vehicles were registered and assigned to the field in response to a letter from AID/Damascus.

United States experts reviewed and sent comments on the survey questionnaire and design.

December, 1978 — AID/Damascus met with the Ministry of Health to discuss the issues of field travel. It was satisfactorily resolved and field work began immediately.

A pilot test of the Continuous Syrian Health Survey was conducted in five provinces as well as field assessment of survey operations.

The Ministry of Health was unable to nominate a suitable candidate for a Master's degree in Biostatistics to supervise the health survey on the departure of the health survey consultant.

January - February, 1979 — The completed questionnaires from the pilot test were returned to Damascus. Any problems or questions about the data collection, sampling design and interviewing difficulties were discussed with the interviewers.

The data were compiled and analyzed.

The questionnaire was revised based on the results of the pilot test and approved by the Ministry of Health.

March, 1979 — The print shop at the Ministry of Health indicated that it was unable to print the questionnaire due to the installation of a new machine. Bids from private print shops were solicited.

April - May, 1979 — The Ministry requested a meeting to review the status of the Continuous Syrian Health Survey and the results of the pilot test. Due to delays because of sickness, travel and translation difficulties final approval for continuation was not received until the end of May.

June, 1979 — The short term consultant, Paul Callen, in data processing arrived from the University of Texas School of Public Health.

He adapted the questionnaire for coding to facilitate the data processing. Based on an assessment of computer facilities in Syria, he recommended that two data input devices be obtained, and the data input entered at the Ministry of Health and processed at the University of Texas.

July, 1979

Mr. Mohiddiyn was nominated for a short term training program. He will require additional training in English language prior to departure.

AID/Damascus gives tentative approval for funding the data processing based on the recommendations of Paul Callen.

August, 1979

The final questionnaire was printed and assembled.

After several discussions with the Ministry of Health, the survey vehicles temporarily being used by other departments were returned to the survey. One vehicle was destroyed in an accident.

A detailed coding manual was prepared including complete instructions on the numerical coding suggested by Paul Callen.

September, 1979

One week refresher training courses were held in each of the five provinces to review the questionnaire, sampling methodology and coding.

October, 1979

Full implementation of the survey began.

The interviewers report to Damascus every two weeks bringing with them the completed forms. These are edited errors and either corrected or returned.

November - December 1979

Mr. Mohiddiyn began an English language course in preparation for his training program.

The data processing requirements were again reviewed due to the reluctance of AID/Damascus to purchase the requested input devices. The Central Bureau of Statistics has been contacted about assisting in the data processing.

The sample size for the remainder of the year was reduced by half. This was necessitated by the lack of staff at the Ministry to edit and supervise the data collection and by the data processing requirements.

The first quarter data collection was complete.

January - February, 1980

The Ministry of Health officially requested the Central Bureau of Statistics to do the data processing of the survey. AID/Damascus has given tentative approval to provide the funding.

March, 1980

The State Planning Commission rejects Mr. Fateh Mohiddyn's nomination for short term training stating that his level of English is still too low.

Second quarter data collection ends.

April, 1980

The Central Bureau of Statistics agrees to conduct the data processing.

AID/Damascus is unable to fund the data processing and the Ministry of Health agrees to fund it as per their obligations under the contract.

	The field trip to assess the reliability and validity of the survey design was postponed indefinitely due to civil disturbances.
May, 1980	Data processing begins.
June, 1980	Third quarter data collection ends.
August, 1980	Survey consultant leaves.
September, 1980	Fourth quarter data collection ends.

III. MAJOR ACCOMPLISHMENTS

The major accomplishment of the Continuous Syrian Health Survey (CSHS) has been the development of the capability within the Ministry of Health to design and conduct a survey thereby reducing their dependence on technical assistance from other SARG ministries and international agencies. The experience gained as a result of the survey includes;

A. identifying and developing a statistically appropriate health survey design.

B. developing and testing a host country specific health questionnaire

C. training and supervising a team of data collectors

D. regional systematic supervision of data collection

E. preparing and formating the data for automated data processing.

A. HEALTH SURVEY DESIGN

Prior to the implementation of the CSHS the Ministry of Health had had very little experience in designing a host country specific health survey. Surveys funded by international organizations were being conducted simultaneously in several different countries and so of necessity the survey design was predetermined with only slight modifications for regional differences. Thus, the Ministry never became involved in the preliminary stages of the survey work: the definition of the problem, the development of goals and objectives and finally the design of a survey appropriate to specified needs and available resources.

The first step in the design of a survey is the definition of the goals of the survey and the needs of the Ministry. Unless the relationship between these two is clearly established and understood initially, the data will be of only academic interest to researchers. The goals of a survey are: one, to advance integrated world knowledge about conditions existing in different countries, i.e. international comparative studies and two, to be used as a working tool of a Planning Department in the development of effective public health programs.

The CSHS addressed primarily the second goal. The purpose was not to dictate the structure and content of a survey but to generate within the Ministry a mechanism of identifying problem areas, designing an effective survey to investigate the problem and, finally, using that data to design required corrective or preventive action programs or to evaluate existing programs. Without this systematic approach to short term and long term planning, the Ministry has shifted its attention and resources from one project to another to meet each new crisis. The concept of using large scale quantitative baseline data as a planning tool is unfamiliar to the Ministry. Numbers were regarded suspiciously and policy decisions depended heavily on an intuitive assessment of the problems. It was also apparently recognized that prior data acquisition attempts were so poorly designed and implemented that an intuitive assessment of existing problems and appropriate responses guaranteed a higher probability of correct orientation than reliance on unreliable statistically derived data. The first task of the CSHS was to promote the need for a general health data base. This was a slow process involving many meetings and discussions but eventually resulted in a clearer understanding within the Ministry of the uses of survey data in establishing a baseline from which to measure future changes in the health status of the population.

With this agreed upon, the CSHS turned its attention to defining the more specific objectives of the survey. Normally this would be done in collaboration with a Health Planning Department, the ultimate users of the data. At this time, however, the fledgling Health Planning Department at the Ministry was not fully established having lost most of its staff to training programs in the United States. The CSHS consequently worked with a variety of vice ministers and doctors and with the U. S. expert in health planning in specifying the objectives, variables and outcomes of the survey. Various algorithms were examined for collecting the data. Ultimately a continuous household interview survey was decided upon where data would be collected at quarterly intervals from five provinces by health

sanitarians. The survey would focus on self reported conditions and the utilization of health facilities including a special section of children under five years of age. The survey was to be a multistage clustered sample. A total of 2,500 households would be visited throughout the year, see Table III-1. These households are stratified by size of community; urban areas of over 50,000 population, medium towns between 5,000 and 50,000 population and rural areas of less than 5,000 population. The subsequent sampling stages differed for each stratum depending on the accuracy of the sampling frame. The urban areas and medium towns were subsampled according to streets within neighborhoods while rural areas were subsampled by villages. Separate mappings and enumerations of each area was rejected as being too time consuming. Instead, interviewers used a random systematic sampling technique to select the households from the sampled clusters.

As a result of this exercise, the Ministry has participated from the outset in the step by step design of a health survey. The systematic progression from the definition of a problem to the design of a tool appropriate to its solution has given the Ministry an analytical method for approaching any health problem. This familiarity and thorough understanding of the preliminary stages of survey design will also enable the Ministry to derive the maximum utility from the finalized data collected for the CSHS. A knowledge of the relationship between the data and the previously defined data needs, will make the survey a practical tool developed by the Ministry to meet needs defined by the Ministry. It is their survey.

B. DEVELOPING AND TESTING A HEALTH QUESTIONNAIRE

As indicated above, most of the previous surveys in Syria have used survey designs and questionnaires developed outside Syria. Priority in these surveys was put on problems common to many countries rather than on areas of particular interest to a specific country. The format of the questionnaire and questions was standard and assumed a common level of acceptance of the blunt

question and answer structure. In a country, such as Syria, where exposure to surveys is limited, this structure may or may not be appropriate and the questionnaires must be tested locally. Questions that generate one response in one country often produce a totally different one in another environment. This is particularly true for questions relating to health. Subjects that are taboo or shameful in one country may not necessarily be taboo elsewhere. Direct questions on culturally sensitive subjects do not often generate valid responses because the individual being questioned will rarely respond honestly. Attitudinal responses regarding the motivations for seeking of medical care or towards proposed public health projects are particularly sensitive to cultural variation. One method of soliciting in depth data on these subjects is by adopting an anthropological approach of careful probing and intensive unstructured interviewing of a small sample of people. Fortunately, most subjects have proven to be amenable to study by large scale surveys using a carefully constructed questionnaire. This questionnaire, however, must be appropriate to the environment where the survey will be conducted. Simply translating questions from one language to another does not necessarily ensure that the survey will be cross-culturally appropriate. Each question must be examined and tested from two aspects: what information is wanted and what information is it possible to collect from the local population. This will be the first time the Ministry has been confronted with this issue and had to create a questionnaire that is culturally appropriate to their country and that meets their data requirements.

The Ministry of Health is also at the stage in development where the investigation of specific local health problems is becoming more important. These may be problems resulting from differential cultural practices or discrete health problems specific to different regions of the country. Prepackaged surveys and questionnaires developed for application in any country may not necessarily generate the specific data required. In order to investigate these

areas, the Ministry must develop a questionnaire or set of questionnaires valid to their operational environment. Complete expertise in the field of survey design will require intensive training in survey methodology outside of Syria. This training is highly specialized combining a knowledge of statistics and public health. It is not currently offered at Syrian Universities and the need may not warrant its development. Suitable training is available outside of Syria and should be utilized. A basic familiarity with the process of survey design gained from the CSHS will, however, enable the Ministry to evaluate proposed surveys and take a more active role in their implementation. This will enable the Ministry to make an independent assessment of the utility of proposed projects vis a vis their integration into the planning structure and programs of the Ministry.

The first step in developing the questionnaire was establishing the criteria for selecting variables for inclusion. These were based on Kessne methodology in A Strategy for Evaluating Health Services.

1. The variable must have a significant functional impact on the individual.

2. The variable should be well defined and easy to recognize by data collectors.

3. The prevalence of the variable should be high enough to permit collection of sufficient data.

4. The natural history of the variable or condition should vary with utilization and effectiveness of medical care.

5. The techniques for medical management of the variable should be well defined for prevention, diagnosis or treatment.

6. The effects of nonmedical factors on the variable should be understood, i.e. social, cultural, economic, behavioral.

The CSHS considered each question, its satisfaction of the above criteria and its relevance to the goals and objectives of the survey. For example, data on most chronic conditions such as heart disease or cancer were excluded because public health measures for prevention are either undefined or very

complicated. In addition, decisions were made on the extent of the detail on specific data items to be included and whether or not the respondents could provide accurate responses to highly specific questions. The need for detailed information had to be weighed against minimizing the length of the interview. Since the objective of the survey was to provide baseline broad spectrum health data, detailed probing into any area was avoided as being inappropriate and would excessively lengthen the interview time. The final structure of the survey was a set of questions, each with predetermined selection of possible responses. The structured format will necessitate that all interviews are conducted in a similar manner and ensure that the data collected by the different interviewers are comparable.

Once a preliminary questionnaire was prepared, the CSHS began the lengthy process of testing the questions to ensure their appropriateness, clearness and reliability. Many tests were conducted both locally and in the field by actual survey interviewers. Each pretest and the final pilot test resulted in modifications of some questions. General questions such as "Have you been sick during the last two weeks?" had to be clarified "Have you had any eye problems, cough, etc?" Having minor illness is not recognized as being sick; a person is sick who cannot get out of bed. Following Kessner's procedures, several tracer conditions were selected that would reflect the overall health status of the family. The tracers selected were: eye problems, respiratory conditions, vomiting, diarrhea and rectal or urinary problems. The two week recall period was found to be too short to generate sufficient data for analysis and was lengthened to one month. Confusing questions were clarified. For example, there was some confusion in the distinction between types of sewage disposal. The field test indicated 47% of the families had no toilet and 18% had latrines. This result was inconsistent with field experience and expert opinions at the Ministry. It became apparent that the concept of latrines was not widely understood and needed elaboration. "Is your toilet inside or outside the house?

If outside, what do you use?" Other modifications involved reordering the sequence of questions so that it more closely paralleled the flow of conversation. The pretest and pilot test were used to generate the set of responses for each question. In the case of most questions, the responses to the questions fell easily into four or five discrete categories. While this limits the variety of possible responses, it greatly facilitates the coding and data processing.

Throughout this process the CSHS worked with epidemiologists and public health doctors from the Ministry who provided medical expertise. The questionnaire was also sent to three survey statisticians in the U. S. for their review and comment. Secondary opinions on the structure and content of the questionnaire were sought for assurance that the survey was consistent with existing survey methodology and contained no major oversights or potential problem areas. The staff of the CSHS had been totally immersed in the revisions of the questionnaire for months. So the input of outside experts was solicited to provide an objective evaluation of survey content and form. Their criticisms and comments were considered and weighed against experience acquired thus far by the CSHS. In general, the comments were of a technical nature involving minor modifications to facilitate the management of the survey and the data processing. In total, there were at least three major revisions of the questionnaire before it was satisfactorily refined into an applicable and useful tool capable of fulfilling the objectives of the survey.

A pilot study was conducted to examine the sampling methodology, to establish a reporting mechanism from the field to the Ministry, to further test the questionnaire and to develop the analytic methodology. The pretest conducted thus far had been relatively small. The pilot study involved interviewing 249 households following the exact procedures to be used in the final study. First it was a test of the applicability of the sampling methodology. A heavy reliance had been placed on the sampling frames generated by the Central Bureau of Statistics during the 1970 census. The pilot test indicated that frames provided a

dependable list of villages, however, the size of the villages had changed significantly in the last ten years. Uncertainty about male interviewers being able to enter households was unfounded in most rural areas. It was only a problem in certain neighborhoods of larger towns and cities. The local health directorates agreed to send female nurses with the interviewing team in these areas. Second, the reporting mechanisms were established from the field to the central Ministry in Damascus. The telephone and mail communication system in Syria is undependable so a system of bi-monthly shuttles was developed to transport forms and messages to and from the field. Third, the pilot test was the first large scale test of the questionnaire. It enabled the interviewers to gain confidence in administering the questionnaire and to make useful suggestions for clarifying confusing questions and recording the information. It also allowed the survey supervisor to observe each interviewer in the field and make recommendations regarding interviewing techniques. The larger sample size of the pilot study further tested the appropriateness of the questionnaire in even more diverse cultural settings and ensured that the final revised form would be the most suitable.

With the data from the pilot study, the CSHS was able to develop the basic statistical methodology for the analysis. The analysis can be divided into the following parts according to the type of data and sophistication of the statistics; operational statistics, first, second and third order analysis. Operational statistics will be used to supervise the administration of the survey. For example, the number of interviews per day, the length of the interview, the variation between interviewers. Table III-2 gives a few examples of various types of operational statistics based on the data derived from the pilot test. The number of households and individuals and place of residence serves as a check on the rate of completion of the forms and the adherence to sampling methodology. The length of time of the interview gives an indication of whether or not the

interviewers are rushing through the questions or taking excessive time. In the pilot test, the longest time was in Sweida 65 minutes and the shortest in Lattakia 25 minutes. This discrepancy was investigated and attempts made to standardize the pace of the interview. Comparisons among interviewers of the times and other data can serve as another very simple way to monitor the quality of the data and performace of the data collectors. The statistics used for analysis are minimal. Graphical displays should be maintained, showing the numbers of interviews completed and the rate of progress. Mapping displays can be used to indicate the distribution of the households in each province. Means and standard deviations of variables such as length of interview will give an indication of the variability in the data. If this variability exceeds a specified limit, 95% confidence level is generally used, procedures should be instigated to investigate the cause. Except for the means and standard deviations, these statistics can be compiled manually as the forms are completed and charted by clerks. The more complicated statistics must await the computer processing.

The first order analysis is compiled on the entire sample. The first step is to compile marginal frequencies for each question that is the number of respondents in each response category and the percents. Table III-3 and III-4 give some examples of this type of analysis. The total number of respondents for each question, can be used to verify the completeness of the forms and to indicate which variables can be analyzed further. In cases where an extremely high percent of the responses fall into one category, further analysis is not justified and eliminating the question should be considered. Variables with evenly distributed responses should be selected as data for second order analysis. The statistics commonly used for first order analysis of qualitative data are percents and percentiles.

Table III-4 gives some examples of first order analysis for quantitative data or continuous numerical data. For example, the mean number of doctor visits last year was 1.48. This variable can also be examined graphically by plotting

the frequency, see Figure III-1, i.e. number of persons visiting the doctor; once, twice, etc. This will indicate whether or not the distribution is skewed, that is perhaps most persons visit the doctor two or three times a year but two persons go every week. In this case the mean is distorted by these outliers and the median is a better measure of central tendency. Thus the first order statistics must be examined before further analysis is decided on.

The second order analysis involves comparing the first order variables among subgroups. This type of analysis is too complicated and time consuming to perform manually on such a large data set. It requires computer analysis. Table III-5 gives examples of the type of analysis possible. The choice of subgroups is dependent on the purpose of the analysis. Data can be analyzed geographically by province or by rural and urban residence; by age, adult versus child or by socio-economic subgroups. Before the data can be subdivided, the frequencies of each subgroup must be examined to ensure that there are sufficient numbers in each category. The choice of statistics is dependent on the type of data. For comparing two percents the Chi-Square Test should be used, and for comparing means, the t-test or analysis of variance. In general, these can be computed by the computer directly or manually from the tables.

The third order analysis is the most sophisticated. It involves combining the information of many variables into a single indicator. For instance, data on the prevalence of certain symptoms and diseases can be combined with age, doctor visits, paramedical visits, etc. to create a single index of health. Instead of having to examine 10 or 15 different variables, a single composite index can be used to establish differential patterns in health status. The statistic used for this purpose is multiple regression or categorical analysis. Another possible analytic technique is to select a group of persons, i.e. malnourished children, and examine what characteristics are held in common. In this way, it is possible to develop a profile of a specific group or people. For example, the characteristics held in common by malnourished children might

be: poor home environment, uneducated parents, history of diseases, large familty size. This will enable the Ministry to identify and prioritize areas and risk factors where malnutrition is likely to occur and target public health programs there. The statistical technique used here is factor analysis.

The pilot test was thus a trial run of the survey from sampling selection to data analysis. A final report was prepared including selected findings, suggestions for further analysis and possible conclusions. This was presented to the Ministry as a demonstration of the applications of the data derived from the health survey.

The developing and testing of the questionnaire was without a doubt a time consuming process. All in all, it took almost 11 months. The tendency is to want to begin data collection as soon as possible and rush through the design and planning. Data hastily collected is often of questionable utility and may not generate the needed information. Another survey would be needed, requiring still more resources and time. The CSHS placed a high emphasis on the design and planning phase of the survey because it was the first baseline study to be undertaken by the Ministry. Each test and retest of a question served to clarify the meaning both in the mind of the respondent and to the CSHS. The end result of these revisions is a questionnaire that will provide the Ministry with a sound data base on the health status of the population for the first time.

C. TRAINING A SURVEY TEAM

The team of interviewers recruited for the survey were male health sanitarians living in the surveyed regions. Male interviewers were chosen instead of female because the work required extensive traveling, long hours and carrying equipment from house to house. Men were more willing than women to undertake this type of work. In areas where entering the household proved to be a problem, a local woman was sent by the Directorate of Health to accompany the team. The data collectors were living in the provinces where they would be interviewing.

They were therefore familiar with the area and the travel time to and from the rural areas was minimized. This proved doubly advantageous because names of several diseases and conditions varied depending on the regional dialect. The interviewers could thus rephrase the questions using local terminology. A total of seventeen interviewers have been trained in interviewing techniques and data collection. These persons will be a permanent core of data collectors that can be called on to participate in future surveys. Because of the quantity of data that will be demanded by the Ministry in future for supervising routine operations and for special interest surveys, having the ability to collect its own data using experienced interviewers will be a real asset.

A series of training courses were designed and arranged for interviewers. Once again since this was the first time such an extensive survey was being conducted, the entire program had to be developed by the Ministry. It was important to instill good interviewing techniques from the beginning since these interviewers would be responsible not only for the quality of data collected by the CSHS but potentially for the data from all future surveys conducted by the Ministry. The CSHS developed a program to explain the design, goals and objectives of the survey. One session was devoted to proper interviewing techniques and one on following a sampling methodology. Practice sessions were held where the interviewers could practice administering the questionnaire both in the classroom and in the type of locations where they would be interviewing. Since most of the people in rural areas of Syria have never been exposed to surveys, they are unaccustomed to questionnaires and responding to direct questions. Instruction on special techniques was necessary. These techniques covered the proper introduction upon entering the household, how to maintain a friendly, yet professional manner, what to do when the respondent gives contradictory responses and how to pin point vague ideas as age or number of doctor visits. Over this year of data collection from rural and urban areas, the team of interviewers has developed into a group of very skilled technicians that

can function efficiently with a minimum of supervision. Not only can they be used as data collectors for future surveys, but also due to the skill acquired from the CSHS in coding, sampling plans and administration, they can act as regional survey supervisors responsible for administering local surveys and training additional data collectors. This will enable the Ministry to conduct surveys or investigate health problems in a local area at a moment's notice with a local staff that is trained and experienced in survey techniques.

D. ROUTINE SUPERVISION OF DATA COLLECTION

One of the problems facing the Ministry is the lack of dependable health data. Routine data are often incomplete and sometimes even erroneous and there is no efficient mechanism for monitoring its reporting. The Ministry needs to develop a system for ensuring the collection of high quality health data. One of the accomplishments of the CSHS was the establishment of a systematic method of collecting data forms, reviewing them for completeness and correcting any errors. Prior to the distribution of the forms, each questionnaire was assigned an identification number and summary tables were maintained in the Central Ministry to record the status of each form, i.e. completed, returned, filed, see Table III-6. The interviewers reported to Damascus twice a month. Their forms were reviewed for any errors which were then explained to them at that time. Errors generally resulted from carelessness, for example, miscoding a question or skipping a question. Each error was reviewed with the data collectors and the need for careful recording and coding emphasized. Occassionally, consistency errors were detected where the respondent had given contradictory responses, for example, admitting to visiting a doctor in one question and then denying it in a later question. Where conflicting responses were recorded, techniques in verifying the correct response were reviewed. Any unusual cases or problems were discussed, resolved and updated coding changes distributed to the other interviewers. Because of the frequent reporting by the interviewers,

any mistaken ideas or areas of confusion were detected early and a consistent level of performance could be maintained. If the completed questionnaires required additional information, either to clarify the responses or to complete missing data, they were returned to the field for correction.

As expected, there were errors in coding, skipped questions in the beginning. However, through careful monitoring and continual insistence on high quality data recording, the number of errors decreased significantly after a month. This is the usual pattern experienced in any survey and is particularly true when survey interviewers have had a minimal experience in data collection.

An orderly filing system was created to ease locating and retrieving a specified form and to ensure that no forms were lost. This system of continuous monitoring, checking and filing was not a standard procedure within the Ministry. Traditionally such procedures were conducted upon completion of the project or annually. Thus errors that could have been corrected early in the project are neglected until the end when they can become major difficulties. Insistence on a 100% completion of the assigned work load also set a new precedence. Reporting of health data currently being collected rarely achieves this percentage and little effort is made to improve it. Thus by instituting a filing system and monitoring systems, the CSHS is setting a precedent for future surveys and the upgrading current collection procedures.

Reliability checks have been designed and implemented by the CSHS. Reliability checks are required for two reasons: the first is to ensure that the respondent will give the same response if asked the same question. In other words, is the data reproducible given that the other circumstances are the same? The second is to verify the actions of the interviewers. Did he follow the sampling procedure exactly in selecting the household? Did he in fact interview the individual in the household? There are numerous examples of surveys done in other countries where the interviewers fill in the forms themselves without visiting the households. A sample of households was selected for re-interview from each survey region.

The outcome has been approximately 2,500 household interviews generating over 7,000 individual questionnaires that have been completed, edited and filed.

Since statistics are only as good as the data they are based on, there is little point in conducting a survey without emphasizing routine supervision of data collection. The survey supervisor must be a hard task master who can demand a high level of performance from the field staff while at the same time maintaining their enthusiasm in what can become a repetitive boring routine. It was of grave concern that initial enthusiasm would wane as work progressed. This is the normal pattern and is especially a problem when an organization is conducting a survey for the first time. There is a tendency to assume that directions will be understood and followed. As experience on other surveys has shown, this is rarely the case. It is a particular problem in societies like Syria where clarification of directions is rarely asked for. It is thus entirely possible to instruct an individual and assume that because no questions are asked, the directions were understood. Only to discover later that the interviewer was completely confused. This is by no means unique to Syria but exists in many developing countries. Even experienced and skilled interviewers become careless in time without supervision. They start losing interest and taking short cuts. It is therefore important to continually reinforce the importance of the work they are doing and show them the results as soon as possible. Continuous close monitoring and a close relationship with the data collectors is a key factor in any survey. The CSHS has developed an efficiently running mechanism for conducting a large survey and an experienced and competent survey supervisor. The procedures established for the CSHS can be an example that could easily be applied to other data collection operations and thus upgrade the overall quality of all health data within the Ministry. Implementation of these procedures will of course be dependent on the Ministry's interest and willingness to improve the overall quality of health data existing in Syria. The procedures are not difficult but require persons interested and dedicated to administer the

operations as well as concern on the management level for the quality of data collected.

E. PREPARATION OF THE DATA FOR DATA PROCESSING

Data processing and computers will be used increasingly as Syria develops in size and technology. Because of the vast quantity of data collected routinely by the Ministry of Health, it is critical that it becomes familiar with methods for facilitating and supervising automated data processing.

Data processing is nothing more than the storing and retrieval of required information from large data sets. In the process of conducting a survey, thousands of forms are being completed, coded, edited and entered into a computer. They are in constant motion. Before forms can be processed, procedures and filing systems must be established so that forms are not lost or duplicated. If data forms are physically stored in an orderly manner, data processing is facilitated. The CSHS has developed such a system.

As a part of the CSHS, a short term consultant consulted with the Ministry on alternative methods of processing the data and on adaptations to the questionnaire to ease data entry. Together with the consultant, the CSHS examined the questionnaire and developed a numerical coding system and format. The form was redesigned so that the data could be coded directly on the form by the interviewers. The data can then be inputed directly into the computer and the interim step of coding the data on a separate form avoided. The data will be input from the form into the computer by the Central Bureau of Statistics, CBS. The CSHS has worked closely with the CBS to develop the format for data entry, range checks for verification and the layout of the output. For each question the acceptable range had to be stated. For example, the acceptable range for sex is one or two, male or female. Any other codes are errors. Consistency checks were established to eliminate contradictory responses. For example, if the respondent visited the doctor twice in the last month, the date

of last doctor visit should be within the last month. Eighteen checks were suggested for edits in consistency. The CSHS will then examine the list of errors and verify bhe correct code by checking the original form.

As a result of preparing the questionnaires, a working relationship exists between the Ministry and CBS. There is a person at the Ministry familiar with the requirements of data processing, i.e., format of the questionnaire, coding, editing. This knowledge is essential to the computer analyst who has no knowledge of the subject matter of the survey. One of the most critical aspects of computer analysis is to ensure that the data is entered into the computer in such a way that the desired statistics can be easily retrieved. Thus, a close collaboration is required between the Ministry of Health and the data processor. The more familiar the Ministry is with data processing requirements, its limitations and technical vocabulary, the better the working relationship. The experience gained by the CSHS in preparing the survey questionnaires for data processing will be invaluable in the analysis of CSHS data and in the future as dependence on computers for information management increases.

In summary, the CSHS has generated a supervisory and field staff familiar with designing and conducting a nationwide survey. It has left behind an infrastructure of vehicles, staff and operating procedures. It is now the responsibility of the Ministry of Health to direct the system. If the survey is to continue, the resources developed within the project must be maintained and not reassigned to other projects. The Ministry must develop the necessary resources to meet the needs of additional surveys. As the Planning Department established itself, more and more information will be needed. The minimal staff and resources of the CSHS, while barely adequate to continue the present survey, cannot possibly be assigned additional work. The small nucleus of trained personnel must be expanded and their training continued. It is only in this manner that the Ministry can continue to build a Statistical Department that can collect data efficiently without the dependence on other ministries

for interviewers and other resources. This independence gives the Ministry total responsibility for the collection of health data in Syria. The type and quality of the data will depend on the correct utilization of existing resources and the development and expansion of these to satisfy the future needs.

TABLE III-1

ALLOCATION OF SAMPLE SIZE BY PROVINCE

PROVINCE	ESTIMATED HOUSEHOLDS (1980)	SAMPLE SIZE
Sweida	32,000	200
Al-Hasekeh	88,000	550
Idleb	76,000	475
Lattakia	84,000	525
Homs	120,000	750
TOTAL	400,000	2,500

TABLE III-2

OPERATIONAL STATISTICS BASED ON DATA
DERIVED FROM THE PILOT TEST

OPERATIONAL STATISTICS

Number of Households interviewed	249
Number of Individuals interviewed	647
Average number of Questionnaires per Household	2.6
Average time per Household	40.4 minutes
Average time per Individual	15.5 minutes
Location of Household	
Urban	32%
Medium Town	36%
Rural	32%
Average Number of interviews per day per person	3

TABLE III-3

FIRST ORDER STATISTICS BASED ON QUALITATIVE DATA DERIVED FROM THE PILOT TEST

Variable	Number	Percent
Number of Respondents	647	
Source of routine health care		
a) Ministry of Health Clinic	161	24.9%
b) Private Clinic	581	89.8%
c) Other	99	15.3%
Occurrence of a cough lasting over two weeks		
a) yes	74	11.4%
b) no	567	87.6%
Last visit to the doctor		
a) within the month	84	13.0%
b) between 1-12 months	207	32.0%
c) between 1-2 years	85	13.1%
d) over 4 years	271	41.9%

TABLE III-4

FIRST ORDER ANALYSIS BASED ON QUANTITATIVE DATA DERIVED FROM THE PILOT TEST

Variable		Mean	Standard Deviation
Number of Respondents	647		
Number of doctor visits in the last year	950	1.48	2.11
Weight of children	181	10.04	2.0
Height	227	89.8	7.9

TABLE III-5

SECOND ORDER ANALYSIS BASED ON
DATA DERIVED FROM THE PILOT TEST

Variable	Mohafaz				
	Sweida	Homs	Al-Hasekeh	Lattakia	Idleb
Doctor Visits during the last year for adults					
Mean	1.6	3.5	3.1	3.5	2.4
Standard Deviation	0.8	2.9	2.5	4.0	1.8
Immunization Status of Children under 5					
DPT	27.8%	8.2	10.8	16.7	16.2
BCG	27.8	4.3	3.1	13.9	11.8
Polio	47.1	10.6	9.2	22.9	20.8
Measles	22.2	4.3	1.5	14.3	5.1

TABLE III-6

RECORD OF FORM COMPLETION

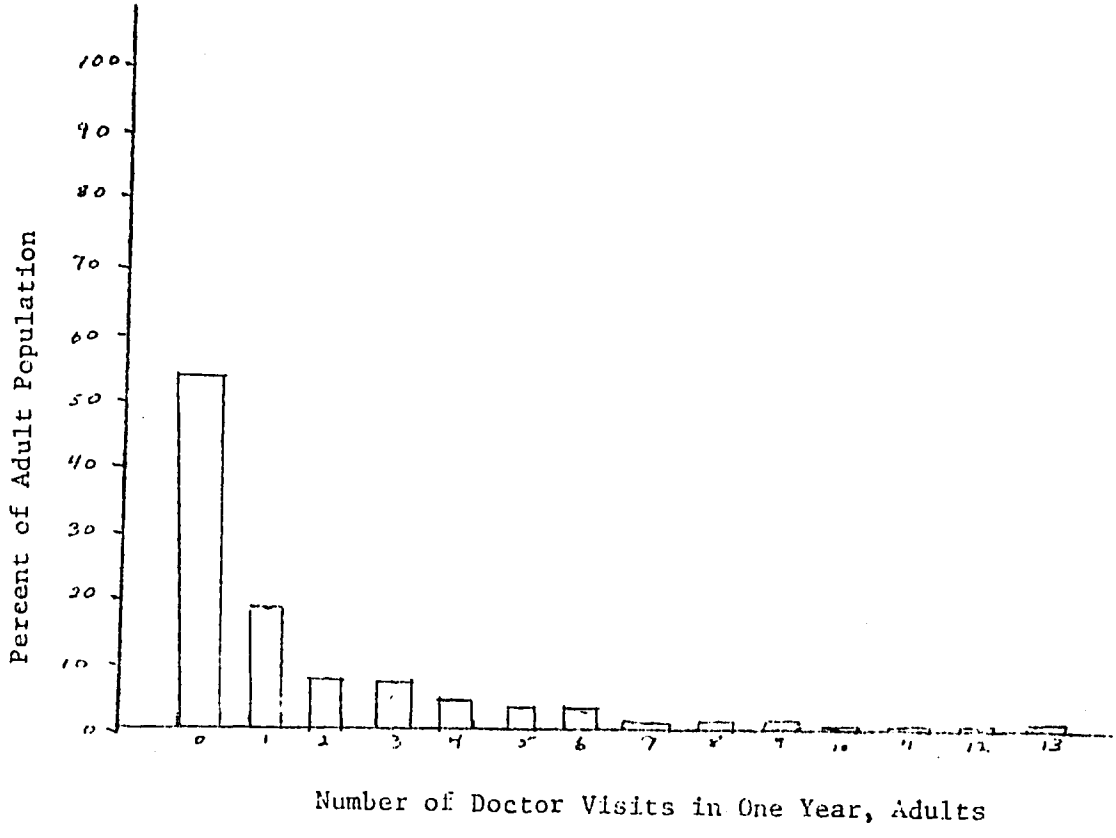
QUARTER, 1980

_____ Mohafazez

Household Number	No. of Ind. Quest.	Date Compl.	Date Rec'd	Date Edited	Date Returned for correction	Date Filed	Village

Figure III-1

Frequency Graph of Data on Number of Doctor Visits
During a One Year Period, Data Derived From Pilot Test



IV. ISSUES AND PROBLEMS

While the accomplishments of the survey were great, no survey is designed and implemented without experiencing some problems and obstacles. This was true of the CSHS. In each case, the problems were analyzed and the obstacles surmounted but the result was many delays. Consequently, the original project which was to last one year was extended two more years. These delays were of grave concern to the Ministry which was anxious for results and to AID/Damascus which was responsible for the technical assistance. The issues and problems that faced the CSHS fell into five general categories:

A. The original design and scope of the survey

B. The Ministry of Health support

C. Unanticipated delays

D. Commodities

E. Continuity of the survey.

A. The Original Design and Scope of the CSHS

One of the first issues facing the CSHS was the design and scope of the project proposed originally by the contract. The aim of the CSHS was to be the design of a nationwide continuous health survey with U. S. technical assistance provided during the first year and the subsequent implementation of the survey carried out by the Syrian Government during the second year. This is a most formidable task for a country like Syria which has only a brief history of surveys. The United States with 44 years of data collection experience, still required one full year from design to implementation of a nationwide survey. In Canada four years were necessary. It was, thus, unrealistic to expect that Syria which has no trained biostatisticians, trained interviewers or survey logistics support, could design and implement a nationwide health survey in one year with the technical assistance of only one survey statistician. The original design was modified and reduced in scope. Instead of surveying the entire country, five provinces (mohafazah) were selected and quarterly subsamples

were used instead of weekly ones. The original design proposed was a copy of the United States National Health Interview Survey. The intent of the technical assistance should not be to import only technology and simply impose the U. S. National Interview Survey on Syria, but to assist a country in developing a valid mechanism and trained staff for facing their unique health problems.

A possible explanation for the overly ambitious nature of the original design was the inadequate assessment of the needs and resources of the Ministry of Health, prior to the signing of the contract. The Ministry of Health from the outset had no clear picture of what data was needed and consequently, what kind of survey to conduct or even whether or not a survey was necessary. So instead of beginning to work immediately on the survey design, the survey statistician spent the first four months in developing the conceptualization of a health survey within the Ministry and only then could the actual work begin.

The time frame of one year for survey design, as mentioned above, was unrealistic from the outset. It assumed a level of development and expertise that does not exist in the Ministry of Health and may only be achieved after five or ten years when the persons being trained in public health in the United States return to the Ministry. At the present time, the Statistics Department contains no one with adequate training in Biostatistics, that is at the Master's level. An infrastructure of persons trained in Public Health and Biostatistics has to be developed before the Ministry of Health can conduct surveys without a heavy dependence on technical assistance. Given the input of only one technical advisor and minimal expertise within the Ministry, the one year time frame becomes even more unrealistic.

The one year time frame was also based on the assumption that once the survey was designed it could be implemented by the Syrian government with only periodic technical assistance. Most surveys done in Syria to date have been one shot studies, the data collection taking approximately two weeks. The expertise

of the Central Bureau of Statistics (CBS), while sufficient for these short surveys, lacks sufficient depth to conduct the CSHS where data would be collected over a long period. The limited resources of the CBS and, more critical, of the Ministry of Health were constantly being siphoned off for other projects. Therefore, the continuing presence of a survey consultant during the third year was necessary to ensure the continuation of the project and to deal with the unanticipated problems and delays. In fact, a fourth year of periodic consultations especially on the analysis is strongly advisable.

B. Ministry of Health Support

Prior to the arrival of the survey consultant, the Ministry of Health was to obtain the authorization from the Prime Minister's office to reimburse the Central Bureau of Statistics (CBS) for the per diem of their interviewers. This was a clearly stated condition of the contract. It was not accomplished then or during the first four months after the survey statistician arrived. As it was impossible to continue working with the CBS without this authorization, the responsibility of the data collection was shifted to the Ministry of Health. This resulted in another major delay because the Ministry has little expertise in conducting large surveys and has severely limited resources. The development of this capability within the Ministry, while taking longer, will be of greater benefit to the Ministry in the long run.

To design and conduct a survey requires a minimum staff of four persons in the central office in addition to data collectors in the field. A survey director, field supervisor, two clerks and thirteen data collectors and five alternates was the staffing proposed. The Ministry provided one person in the Central Ministry plus field staff. They were unable to nominate a suitable candidate for training in biostatistics and provided no clerical assistance. The CSHS was constrained from the outset by lack of personnel support from the Ministry. The survey statistician instead of advising spent most of the time doing routine tasks, i.e. compiling data from the pilot test. This work could

have easily been done by clerks and the supervisory personnel would have been freed to oversee the design of the project. As a consequence, the sample size had to be reduced in half. The limited resources of the Ministry is appreciated, but without additional staff it is doubtful whether the survey can keep current with data collection while at the same time beginning the data analysis given a staff of only one person.

The Ministry has been reluctant to approve field trips for the CSHS staff. This has been due principally to civil disturbances in various parts of Syria. The timing of these occurrences was particularly unfortunate because the intention was to check the validity of reliability of the data prior to the departure of the survey consultant. The plan called for re-interviewing a selected number of households in each province. In this way adherence to sampling methodology could be examined as well as the accuracy of the data. It may still be possible to carry out this program if the Ministry authorizes the field trips. At this time, however, there is no indication when the situation in the country will return to normal. The civil disturbances have also brought to a halt data collection in one urban area and several towns in one province. Every attempt is being made to adhere to the sampling design. Only in areas where the safety of data collectors is jeopardized was it abandoned.

C. Unanticipated Delays

There were several unanticipated delays resulting in over a month. The first occurred ten months into the survey when the original counterpart, Ms. Nawal Shoura, assigned to the project, resigned. She is responsible for the mortality and morbidity statistics and felt that she could not take on additional responsibilities. Another counterpart was assigned, Mr. Fateh Mohiddiyn. It required several weeks to familiarize him with the status of the survey.

The second major delay was the arrival and licensing of the survey vehicles. Nine vehicles were shipped in April, 1978, and arrived after five

months. The cars were finally registered, licensed and distributed to the field in November, 1978. The scheduling of the start of the pilot test and training of the interviewers was dependent on the use of the vehicles and was scheduled at the earliest possible time, December, 1978.

The third delay was lack of response from AID/Damascus on the requests for short term consultants. Two scopes of work were submitted in September, 1978, for a survey epidemiologist and a computer analyst. Paul Callen, the short term consultant in data processing, finally arrived nine months later in June, 1979. The consultant in epidemiology never arrived. Prior to finalizing the questionnaire, it was considered advisable to seek the opinions and input of several outside experts. Thus, the final printing of the questionnaire was held up until it could be reviewed and revised by Paul Callen. Although this consultancy was done under extreme time pressure, his suggestions have proven to be invaluable and well worth the delays. They have greatly simplified the data processing. The survey was ultimately sent to three survey experts in the U. S. for their comments which were extremely helpful but took over six months.

The fourth delay was in the printing of the questionnaire. This in one way was fortunate for it allowed time for the short term consultant, Paul Callen, to review the form before the final printing. After completion of the pilot test, the questionnaire was revised and finalized in March, 1979. It had been the intention of the CSHS to have the questionnaire printed at the Ministry of Health print shop. At this time, the print shop was converting from a hand-set printing press to off-set and was unable to print the forms. It was necessary to use a private print shop requiring the solicitation of bids before awarding the contract. This was a delay of two months. Another month delay was due to awaiting the arrival of Paul Callen. In total, the printing was held up three months.

The fifth delay is more general in nature. The decision making process within the Ministry of Health is very time consuming and bureaucratic. There is

almost no delegation of authority. In general, the Minister's approval is required for almost all matters. It is often a mere formality since each proposal is always presented and approved initially by the Vice Minister directly responsible for the survey. On a number of occasions, particularly during the summer months, progress on the survey was delayed while the Minister and Vice Ministers were out of Syria attending various international meetings.

D. Commodities

The commodities ordered for the project were the following:

4 AMC Jeep Cherokees

5 International Scouts

5 Olivetti adding machines

15 Baby Scales

5 Electronic calculators

15 Boxes of computer tape.

The nine vehicles have proven to be difficult to maintain and repair. The engine's design was very sophisticated involving complicated electronic devices that were very difficult for local mechanics to work on. In general, if a part needed repairing, it had to be replaced. Unfortunately, the spare parts sent from AID arrived almost a year after the vehicles and were inadequate. Few spare parts are available locally since these cars are the only ones of their kind in Syria and parts are not imported. Future projects might consider the availability of expert mechanics and spare parts before selecting the vehicles.

The fifteen baby scales were unable to withstand the hard use given them. They had to be transported from village to village over rough road and then carried from house to house. In future projects, consideration should be given to whether commodities will be used in the field or in an office setting.

The five Monroe electronic calculators were the engineering model, not the statistician model. These were useful but did not have the built-in statistical functions of the other model that facilitate calculation. For an

equivalent amount of money a small mini-computer could have been purchased.

The fifteen boxes of computer tape will probably keep the Ministry supplied in tape for a long time. Several tapes will be required for the first year's data.

In general, the type of commodities ordered were very necessary to the operation of a survey. In every case, however, selection of a more suitable brand or model would have facilitated the work,

In cases like the CSHS where commodities are not needed, until well into the project, it might prove useful to solicit the recommendations of the local field staff prior to ordering the commodities. In this way the field staff can assess the needs of the project upon arrival and suggest the most useful commodities with a list of those which could be maintained locally. Often it is only after a team has been working in the local environment that the commodities needed for completion of the project can be accurately determined. Repair, maintenance and function should be considered in the case of any commodity.

E. Continuity of the Survey

The continuity of the survey is jeopardized in two ways. The first is the inability of the Ministry to nominate a candidate for a Master's of Public Health in Biostatistics. This person should have been sent for training for two years in the United States and would have returned to be director of the CSHS. While the survey can continue after the departure of the survey consultant, it would be extremely beneficial if additional personnel could be trained.

The field supervisor was proposed for a short term training course. A program was designed for him and he was accepted by the institution. His nomination was then rejected by the State Planning Commission of the Syrian Government because of his low level of English language. In spite of the fact that his level was considered adequate by the training institute, by the survey consultant, and by the Ministry, he was not approved. It would be extremely useful for the Ministry to continue its attempts to find a suitable training program

for him.

Finally, the data processing of the information already collected is in progress. The issue of data analysis was first discussed with the Ministry of Health, the CBS and AID/Damascus in January, 1978, and all agreed that a source of funding would be necessary. The short term consultant in data processing determined the requirements of data processing and estimated the costs. The unfortunate nine month delay in his consultancy meant delays in finalizing the data processing arrangements. When he arrived he assessed the capabilities of the CBS and private firms to do the work. His recommendation was for the Ministry of Health to obtain two data entry devices. Preliminary analysis was to be done at the CBS and final analysis at a large U. S. computer center. His report was submitted to AID/Damascus and they tentatively agreed to fund the purchase of the machines and computer analysis. Several months later the decision was reconsidered and AID/Damascus proposed contacting the CBS. The CBS had indicated on numerous occasions that they were severely overworked and could not take on additional projects. A formal request was made by the Ministry of Health to the CBS to assist in the data processing with the understanding that the funding would be available from AID/Damascus. The CBS finally agreed to process the data and estimated that the cost would be 28,000 L.S. and it would take 3 months to complete. At this time AID/Damascus determined that they would be unable to provide funding and that under the contract this was the responsibility of the Ministry. At this time, the Ministry has still not given formal approval for the funding. The survey statistician is scheduled to leave August 30, 1980. Sufficient data should be processed by that time to serve as model for the preliminary analysis. Several alternatives are being discussed at the Ministry for further processing. There is no one at the Ministry with sufficient technical expertise to complete the data analysis without outside technical assistance. This assistance should be sought from another international organization, such as UNICEF. Another alternative is to complete the data processing in the United States and

submit a final report to the Ministry. This issue should be resolved shortly

In conclusion, the issues and delays experienced during the CSHS were frustrating to both the Ministry and AID/Damascus. At no time was progress completely stopped indicating a termination of the project. Bit by bit some progress was made. Three years from design of a survey to the completion of one year of data collection is not excessive. The Ministry has within its grasp the first reliable baseline data on the health status of the population and the utilization of health resources.

V. RECOMMENDATIONS

The purpose of the CSHS was to leave the Ministry of Health with baseline health data and an experienced staff that could design and conduct health surveys. The accomplishments and difficulties have already been reviewed. What remains is a discussion of recommendations to ensure the smooth continuation of the work begun under the health services contract. Certain steps must be taken by the Ministry so that the progress thus far achieved is not lost and so that the Department of Planning, Statistics and Research continues its forward momentum and develops into an efficient and effective arm of the Ministry of Health. Efficiency and effectiveness do not occur spontaneously or even automatically with the passage of time. They will be realized only as a result of a trained staff and well structured organization. Trained personnel are needed to manage and direct activities especially in areas where the Ministry has had no previous experience. They can provide the guidance needed so that the Ministry does not duplicate the mistakes of many other countries but chooses the path that leads most directly to the goal of efficiency and effectiveness. The benefit of a trained staff is lost, however, unless they function within a well structured organization. Clear lines of responsibility on top and below must be established to enable decisions to be made and actions to be carried out promptly. Both trained personnel and a well structured organization are the minimum conditions for administering any project; one without the other leads to staff frustration and inefficiency. Therefore, the proposed recommendations will focus in three areas:

A. the staffing requirements of the CSHS

B. the organizational structure of the CSHS

C. future activities of the CSHS

A. Staffing Requirements for the CSHS

As mentioned previously, the CSHS staff currently consists of: a survey statistician from the United States, a survey supervisor and field staff from five mohafazat. The U. S. expert has been filling the role of Director of the

CSHS, see Figure V-1, and is scheduled to leave shortly. An organization without a director is like a chicken without a head. It can continue functioning temporarily but eventually dies. It was unfortunate that the Ministry was unable to secure the nomination of any candidate for either a long term or short term training program in Biostatistics. It is still critical to the continuation of the survey and to the realization of the benefits of the work already invested, that the Ministry train a candidate in Biostatistics at the Master's or Doctoral level. In the interim until such a candidate is nominated and completes his training, the Ministry must secure additional expert assistance. UNICEF has been following the survey from its beginning and if requested by the Ministry of Health could provide further technical assistance. The Ministry will continue to be dependent on outside technical assistance until it develops its own staff of persons with advanced degrees in Public Health. This expertise is nonexistent in Syria and is not obtainable from any local institution. Biostatistics is a specialized field combining a knowledge of both statistics and public health. It is premature to expect the Schools of Public Health in Syria to offer such a program. It is even questionable whether or not such a program is warranted in a small country like Syria. Excellent training is available at many institutions in Europe and the United States and the Ministry should take immediate steps to locate a suitable candidate for training there.

The survey supervisor has been working in this capacity for over two years and would greatly benefit from a short term training course in practical survey techniques. This would allow him to perfect his survey skills and provide him the opportunity of studying and participating in a health survey being conducted in Europe or the United States. He could thus contribute more effectively to the running of the survey here in Syria.

The eleven data collectors currently assigned to the project should be retained and continue to work on the CSHS. Should the Ministry expand the CSHS to cover additional geographic regions or age groups, additional data collectors must be trained from the selected regions. The Ministry has a valuable asset in

the existence of a field staff of trained data collectors. It would be a tremendous loss if the Ministry should shift these persons onto another unrelated project and thus lose the benefit of their skills and experience. In the future the Ministry will find itself faced with the task of providing quanitative health data and will appreciate the existence of a trained field staff.

The last category of staff required is clerical support. The routine review and monitoring of the questionnaires can easily be done by clerks. It would require only a brief training period. This clerical staff will also be required to review the errors detected by the data processing and make all the corrections necessary. Again this would require a very minimal amount of training. The clerks need have no previous training in statistics or health. All that is required is a conscientious attention for detail.

In summary, the following staff and training is recommended for the CSHS:

1. Director of CSHS: Master's or Doctorate in Biostatistics
2. Survey Supervisor: six to twelve months training in survey techniques
3. Field Staff: retain current 11 data collectors and train additional ones as required
4. Clerical staff: two clerks to be trained on the job.

B. Organizational Structure for the CSHS

In addition to staffing problems, the CSHS also experienced organizational difficulties. Figure V-1 shows the recommended organizational chart for the CSHS. The Director of the CSHS would be responsible to the Director of the Department of Planning, Statistics and Research who would in turn be responsible for coordinating the activities of the Planning Department, Vital Statistics Department, CSHS and all other data gathering projects. He would then report to the Vice Minister.

For this hierarchical system to work, it requires placing a higher priority on gathering health data. The management must also have a well defined conception of what it hopes to accomplish in the succeeding years and can state this in terms

of hard criteria, only then can the CSHS take these criteria and incorporate them into a quanitative survey that will provide feed back on progress of the Ministry towards it stated goals and objectives. Until now the full benefit of quantitive surveys has never been totally appreciated by the management level of the Ministry. Unless the CSHS is completely integrated into the routine planning and operational structure of the Ministry, it never will be. This will require that the CSHS have an adequate staff, its own budget and responsive management interested in the results of the project.

The Director of the CSHS would be expected to continue to develop and maintain working relationships with various departments within the Ministry of Health, with the health committee of the State Planning Commission (SPC), with the Central Bureau of Statistics and with any other SARG Ministry involved in health related activities. For the CSHS to continue to be a useful tool, the Director must expand the input from various departments as to their data requirements. For example, the Planning Department needs statistics on the utilization of health facilities to determine unserved or underserved areas. The Maternal and Child Health Department needs data on nutrition. The Epidemiology Department needs data on infectious disease patterns. It is imperative that each department develop a well defined program. Criteria can then be generated to be used as a monitoring tool for supervising field activities and evaluating program effectiveness, the results reported back to the respective departments on a routine basis providing each department with a steady source of useful health data. This working relationship already exists as a result of the development of the CSHS. However, to totally fullfil its potential, the CSHS is dependent on being presented with coherent health programs with clearly defined objectives. Since these still do not exist in some departments, they must be developed before the CSHS can become an integral part of the Ministry.

The Director of the CSHS must also interface with the State Planning Commission (SPC) which is responsible for the evaluation of the five year plan for

the Ministry of Health. Quantitative input from the CSHS would be useful to the SPC in its monitoring of health conditions. It would thus seem beneficial to incorporate criteria from the CSHS into the five year plan.

The Director of the CSHS must maintain the working relationship already established with the Central Bureau of Statistics. Close cooperation is necessary to ensure the data is correctly processed and the necessary statistics generated.

The Director of the CSHS must continue to work with other SARG Ministeries which are collecting data in health related fields, such as the Ministry of Education in school health, the Ministry of Agriculture in nutrition, etc. This will ensure that this data is comparable to that collected by the CSHS and can serve to supplement its findings. The Director of the CSHS must, therefore, serve as the coordinator of all health data gathering activities both within the Ministry of Health and in other Ministeries. Wherever possible the CSHS should be modified to include the needs and interest of the various departments. Where this is not possible the CSHS can ensure that the data collected apart from the CSHS is standardized and is comparable with health data generated by the Ministry of Health. The CSHS would become a central clearing house of all health data available in Syria.

The first steps towards establishing this network of relationships has been taken. It is up to the Ministry now to follow through and to expand the role of quantitative health data analysis both in planning and in managing a day to day operations. This means the establishment of an overall plan as well as clear and concise departmental programs. These must have measurable objectives that can be incorporated into the CSHS. Only by placing a high priority on quantitative analysis can the Ministry ensure that the CSHS becomes the integral tool it was designed to be.

C. The Analysis of the First Year's Data and Continuation of the CSHS in the Second Year

Complete analysis of the first year's data will be impossible prior to the departure of the survey statistician. Arrangements have been made with the Central Bureau of Statistics for data entry, validation and marginal counts. Additional analysis will have to be done at a large computer installation outside Syria. Since the CSHS represents the first broad spectrum health data on Syria, its importance cannot be overestimated. The preliminary analysis should, however, provide the Ministry with considerable useful data. Arrangements with several institutions in the United States are being pursued in the effort to locate an appropriate computer installation for further analysis. The Ministry should definitely plan on sending the data outside Syria for complete analysis. The regional UNICEF office is familiar with the survey and could provide additional technical assistance if requested.

The second year of the survey will be dependent on the Ministry of Health. It is recommended that the survey be expanded into those mohafazat not yet covered. In the five mohafazat already surveyed, it is not necessary to repeat the whole broad spectrum questionnaire again. It is recommended that a specialized questionnaire be developed focusing in several areas.

1. Epidemiologic: A team of physicians and health technicians would travel to areas of Syria determined from the data from the CSHS. They would assess the health status of a small sample of the population through physical examination and laboratory diagnosis.

2. Investigatory: Several trained interviewers would visit families in different parts of Syria and investigate more deeply the issues raised in the analysis of the data from the CSHS. These interviews would be unstructured and conducted similar to an anthropological study.

3. Medical Records: A small study should be conducted to examine the data collected by hospitals and health centers. These data on treated

illness would complement the data derived from the CSHS on self-perceived illness.

4. Specialized Public Health Surveys: There are several areas of public health that might benefit from further investigations by specialized studies. These areas can be determined from the analysis of the broad spectrum data collected for the CSHS. Several potential areas that might warrant further investigation are: nutrition, environmental conditions, immunization, diarrheal diseases.

Except for the epidemiologic survey which requires physicians, the data collectors could be easily trained to conduct any of the other surveys.

The future continuation of the survey, however, is totally dependent on the satisfactory resolution of the first two recommendations. Without a trained staff and a well structured organization, the survey would be operating under such restrictions and disabilities that it may not be able to continue.

In conclusion, the need for trained personnel and good organization cannot be emphasized enough. It is up to the Ministry to allow the CSHS to achieve its full potential by providing it with staff and budget sufficient for its activities. These demands for resources are not excessive and would greatly facilitate the CSHS. For the CSHS to function effectively, the director must be included in the discussions of policy making and decision making within the Ministry. It is only by continuing to increase the level of awareness of the uses of quantitative analysis to management that the CSHS can achieve its maximum benefit. This will also serve to familiarize the CSHS with the type of data required by management in the future. The CSHS can in turn assist the Ministry in developing measurable criteria. Data plays an important role in budgetary decisions, in securing funding from abroad and daily operational management. This fact must be recognized and the development of the data collection arm of the Ministry be continued.

FIGURE V-1

RECOMMENDED STAFFING REQUIREMENTS FOR THE CSHS

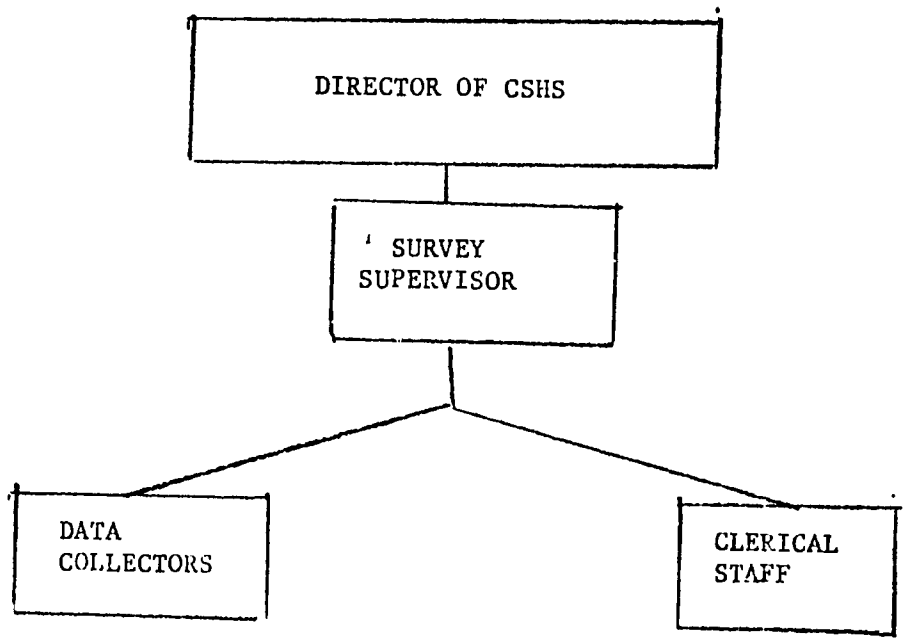
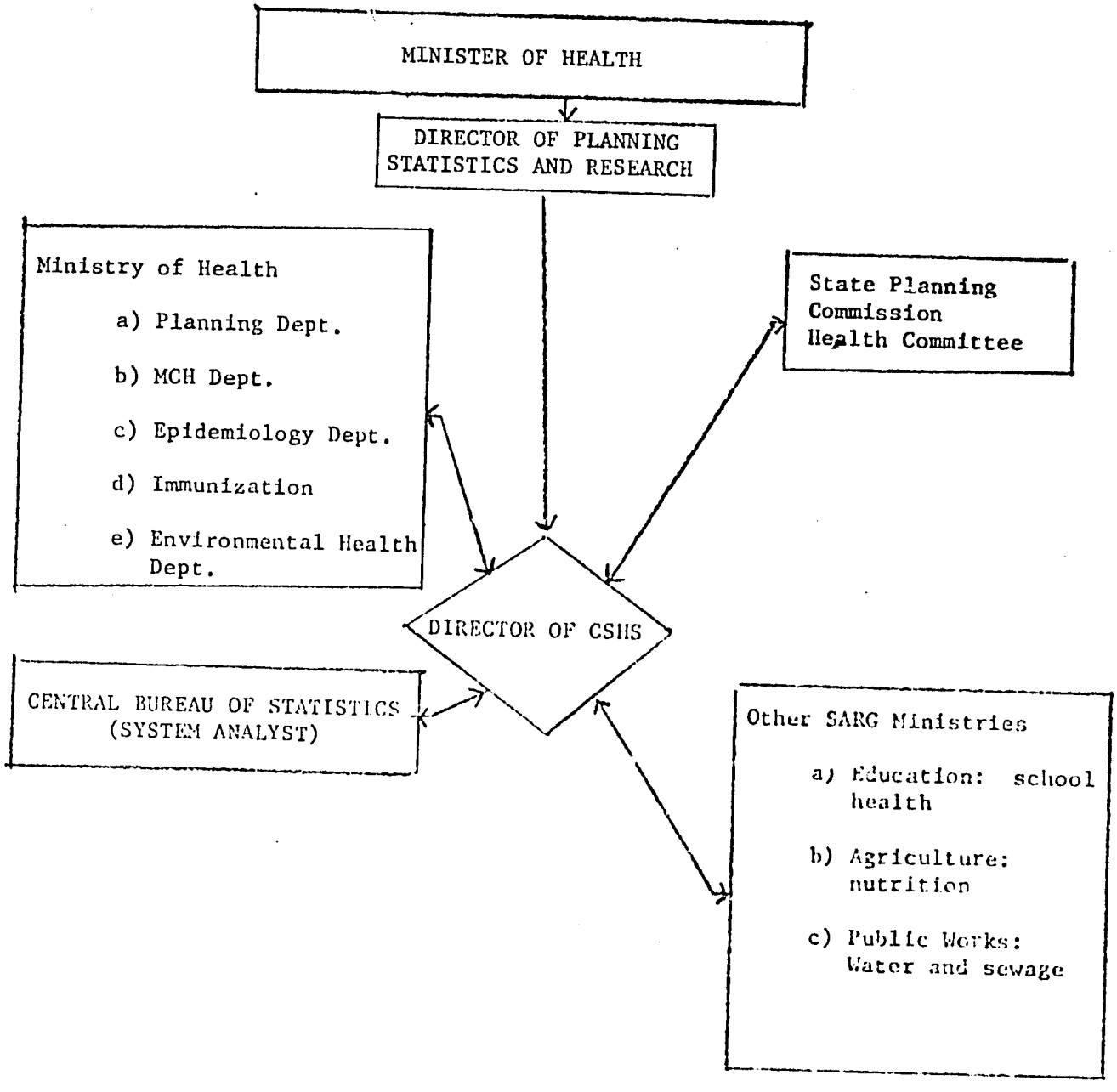


FIGURE V-2

RECOMMENDED ORGANIZATIONAL STRUCTURE FOR THE CSHS



APPENDIX I

I. Sampling Methodology

A. Overall Scope

The Continuous Syrian Health Survey (CSHS) will be a cross-sectional interview study of consumer attitudes towards health in Syria. During each year of the survey, information will be collected once from each household selected. The sample has been divided into four equally representative subsamples to eliminate seasonal biases.

B. Sampling Design

The CSHS is a stratified multistage clustered sample. This minimizes requirements of staff and vehicles. The sample size, originally 5,000 households, had to be reduced to 2,500 due to personnel constraints and data process requirements. By the end of the first year between six and seven thousand persons will be interviewed in the reduced sample size.

A rough estimate of the population of Syria in 1980 projected from the 1970 census figures is 8.5 million. Fifty-seven percent of the population is rural and 49% under the age of 15. There are approximately 1.5 million households in the country. See Figure 1 for the geographic distribution of the population.

It was not possible to survey all 13 provinces in the country during the first year so five were subjectively selected as an initial step towards the eventual inclusion of all areas. The only criteria used for selection was general geographic location. The geographic areas covered by the sample are: South, Sweida; West, Lattakia; North, Idleb; East, Al-Hasakeh; Center, Homs; See Figure 2.

The units of study for which the data will be analyzed are the selected individual, household and doctor visit.

C. Sampling Frame

As in many developing countries, no accurate sampling frame exists for individuals, households or geographic areas. The 1970 census, however, has compiled a thorough list of all villages, towns and cities in Syria, including the population and number of households. While it is possible that some new villages were constructed between 1970 and 1980, it was felt that this list provided the most reliable sampling frame for our survey. It's accuracy will be evaluated based on the results of the 1980 census.

D. Total Sample Size and Allocation

The calculation of total sample size is based on a compromise of precision and cost. Cost including personnel, vehicles and time is the limiting factor. Too large a sample would be both too costly and provide excessive precision. On the other hand, too small a sample may provide estimates so inaccurate as to render the survey useless though economical. The most efficient sample size is one providing sufficiently precise estimates at a reasonable cost.

As a first step towards estimating the sample size, the following variables must be defined:

L : The accuracy of the sample estimate or tolerance limit

λ : The probability that the accuracy level is not exceeded, also known as confidence

σ^2 : The variance of the estimate, or σ : the sampling error of the estimate

p : The true value of the percent in the total population of the quantity being estimated from the sample.

The accuracy of the sample estimate (L) is set at one percent. In other words, the percentages calculated from the sample data will bracket the true population value, p, to within plus or minus one percent. It is, however, impossible to guarantee this; there is always the chance that the estimates are not reflective of the general population value and are incorrect. A probabil-

ity can be placed on this occurrence and this is λ or the confidence level. For the purposes of this survey, $\lambda = \pm 1$ or a confidence level of 68%. Thus, there is a 68% probability that the estimates from the survey plus or minus 1% will reflect the true situation of the population and consequently a 32% chance that they do not.

The last variable that must be defined is the variance (σ^2) or sampling error of the estimate (σ). This can be derived empirically from the pilot study for each variable studied. However, in the case where the number of variables is large and are binomial proportions, a single conservative estimate can be used, $\sigma^2 = .25$. This variance estimate is for a simple random sample. A design effect (DEFF) has been included in the sampling error estimate because the sample design of this survey is multistage. A DEFF = 2 is considered appropriate for this design.

The sample size is calculated as follows:

$$\text{Sample Size (n)} = \frac{(\lambda^2)\ (\text{DEFF})\ (\sigma^2)}{L^2}$$

$$\text{Sample Size (n)} = \frac{(1)^2\ (2)\ (.5)^2}{(.01)^2} = 5{,}000 \text{ households}$$

In summary, based on a sample of 5,000 households, percentages can be estimated from survey data to within $\pm$ 1% of the true value in the population with a 68% probability that this is correct.

The reduction of the sample size to 2,500 households does effect the accuracy of the sample estimates. The accuracy decreases from $\pm$ 1% to $\pm$ 1.4%. This drop was not considered excessive given the limitations of resources being experienced and that the original estimates of sample size were conservative. For a full comparison of the two sample sizes, see Part II.

Based on an estimated number of households in Syria for 1980 of 1.5×10^6, the overall sampling fraction is 0.2%.

The allocation of the sample to each province was proportional to size, see Table 1. The size was estimated from 1980 population projections derived from the 1970 census.

E. Stratification

The sample was divided into three strata: rural areas or villages of under 5,000 persons: towns of between 5,000 and 50,000 persons and urban area of over 50,000 population, see Table 2. Each stratum was sampled proportional to size.

Since the health status and use of health services will be analyzed according to rural or urban residence, it is necessary to insure that sufficient households are surveyed in each strata to allow for thorough analysis.

F. Clustering

Each stratum had a slightly different clustering procedure based on available information and the ease of enumerating and selecting the sampled households. The number and distribution of clusters for the second stage was determined to maximize the geographical area covered. This was considered necessary since no estimates of inter-area variance for health data were available. The number of the households selected from the third stage clusters was fixed as the number of households a team of interviewers could visit in a day. This varied from mohafaz to mohafaz depending on the estimates of travel time needed to locate the sampled cluster, see Table 3.

In the first stratum, urban areas, a complete list of neighborhoods was compiled for each city. From this list, neighborhoods were selected as clusters for the second sampling stage. The average number of neighborhoods selected from each urban area for an entire year was 17. The range varied from 9 to 32. Finally, two streets were randonly selected from each neighborhood as clusters in the third sampling stage. Each street was enumerated and households random-systematically selected. There were approximately five

households selected from each street.

The strategy for the second stratum, towns, was to select a maximum number of towns as clusters for the second sampling stage. A list of towns with an estimated population of between 5,000 and 50,000 for 1980 was provided by the Central Bureau of Statistics. The average number of towns selected from each mohafaz for an entire year was eight. Again a list of neighborhoods was compiled for each town and two neighborhoods were selected as clusters for the third sampling stage. Within each neighborhood, two streets were randomly selected and enumerated. The households were then random-systematically selected. The average number of households selected from each street was two.

In the rural areas or third stratum, nawahi were selected as clusters for the second sampling stage. A nahia is the smallest administrative district in Syria. The average number of nawahi drawn from each mohafaz for an entire year was 27 ranging from 11 in Sweida, the smallest mohafaz, to 36 in Homs, one of the largest. From each stage two cluster or nahia, two villages were selected as stage 3 clusters. Each village was enumerated and the households random-systematically selected. The average number of households selected from the stage three cluster was five.

Table 3 gives the total number of clusters selected for a year. In fact, these were originally selected as four independent subsamples. Each selection was done with replacement.

G. Accuracy of Sample Estimates

Confidence limits are used in order to determine whether the estimates derived from the survey data will be sufficiently precise to be useful. The accuracy of these estimates can be calculated for specific variables given a known sample size. In this case, sample size (n) equals 2,500 households. Solving the formula used in Section D for L, the accuracy of the sample esti-

mate, the equation is :

$$L = \sqrt{\frac{\lambda^2 (DEFF)\, \sigma^2}{n}}$$

Suppose that the percent that is to be estimated from the survey occurs in the population at a frequence of 50% or p = .50. The variance, σ^2, is calculated as p(1-p); λ^2 = 1 and DEFF = 2 as before; therefore L = 1.4%.

Expressed in terms of confidence limits, p can be estimated to $\bar{P} \pm 1.4\%$ with a 68% level of confidence. That this is interval does in fact include the true value, p, occurring in the population.

Suppose now that the quantity examined is a rarely occurring event in the population, p = .01; then L = .28% or p can be estimated as $\bar{P} \pm .28\%$ with 68% confidence. Thus, the less frequent and more frequent events can always be estimated with a greater degree of accuracy than those moderately occurring ones in a given sample size.

One reason for taking a large sample is to allow the data to be analyzed by various subgroups, i.e., residence and age group. Based on the sample size from Sweida Mohafaz, n = 200, estimates of p = .50 and .01 would yield confidence limits of $\bar{P} \pm 5\%$ and $\bar{P} \pm .99\%$ respectively. Thus as the sample size decreases and the tolerance limits become larger, the sophistication or depth of analysis permitted by the data is limited by the sample size of the subgroup to be examined.

The other unit of data analysis is the individual. Table 4 gives the expected number of respondents estimated from the results of the field test. For a sample size equal to 2,500 households, the expected number of individuals would be approximately 5,759; 2,500 children and 3,259 adults. Thus, for quantities such as percent of persons sick or percent of persons seeing a doctor, Table 4 gives the accuracy for various values of p. For example, if the value of p in the population is p = .50, the accuracy of this estimate would be $\bar{P} \pm .9\%$ for all individuals, for adults $\bar{P} \pm 1.2\%$ and for children

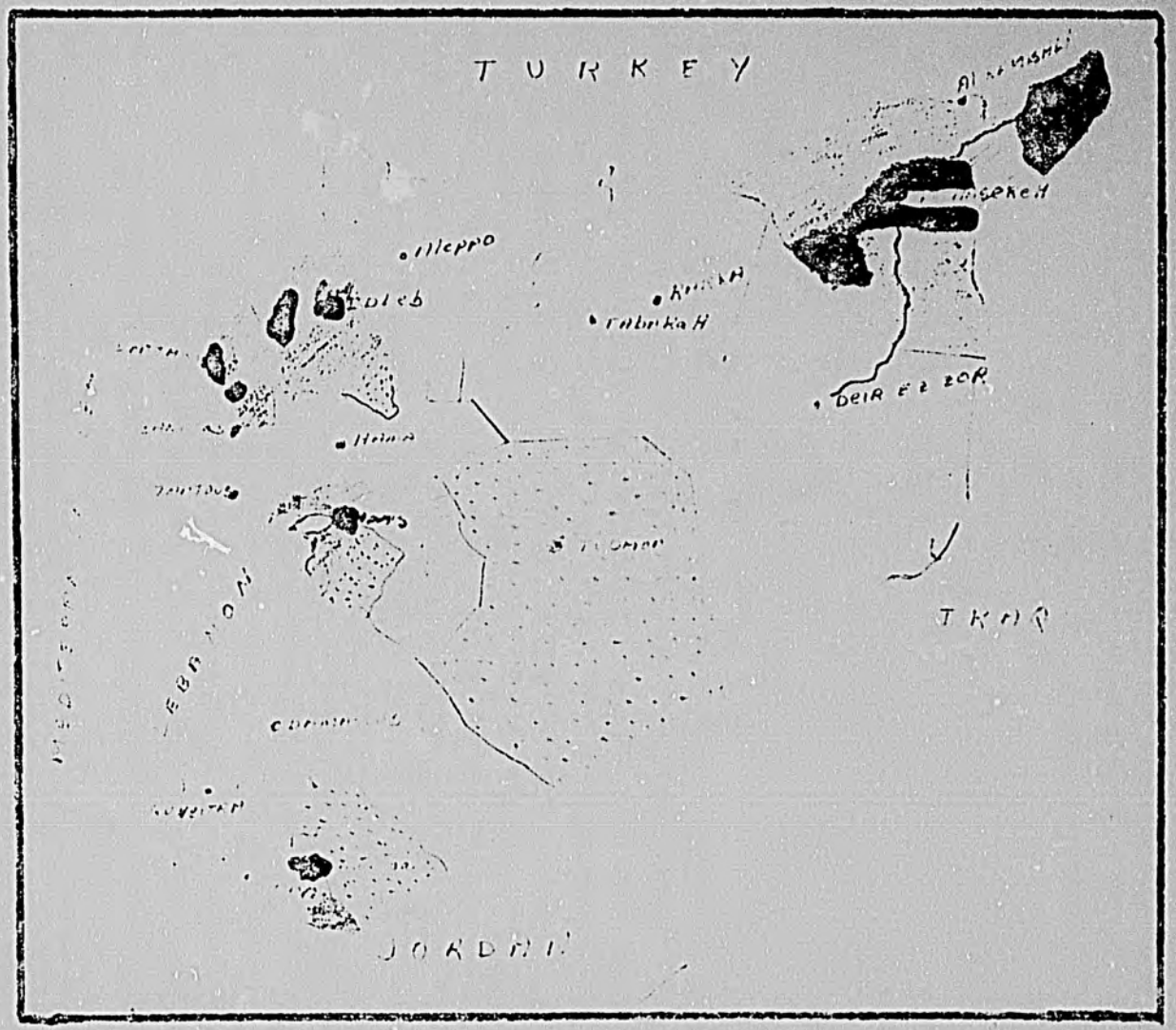
$\bar{P} \pm 1.4\%$. These estimates are all calculated at a confidence of 68%.

In a sample of 2,500 households, approximately 849 doctor visits would occur during the month prior to the interview and 245 hospital visits during the last year, see Table 4. As a hypothetical example, suppose that 50% of the doctor visits in the population are to specialists, based on a sample of 849 doctor visits, p can be estimated as $\bar{P} \pm 2.4\%$ with a 68% probability that this reflects the true value in the population.

Thus, the sample size of 2,500 households is large enough to allow sufficiently precise estimates to be made. The depth of analysis may be restricted in certain subgroups where the numbers of households or individuals are small. In general, however, the numbers should be great enough to provide the Ministry with useful baseline estimates of the perceived health status of the population and the utilization rates of health facilities.

FIGURE 1

POPULATION DISTRIBUTION in the Five Sampled Provinces of Syria, Projected to 1980 from 1970 Census



Over 50,000 Population

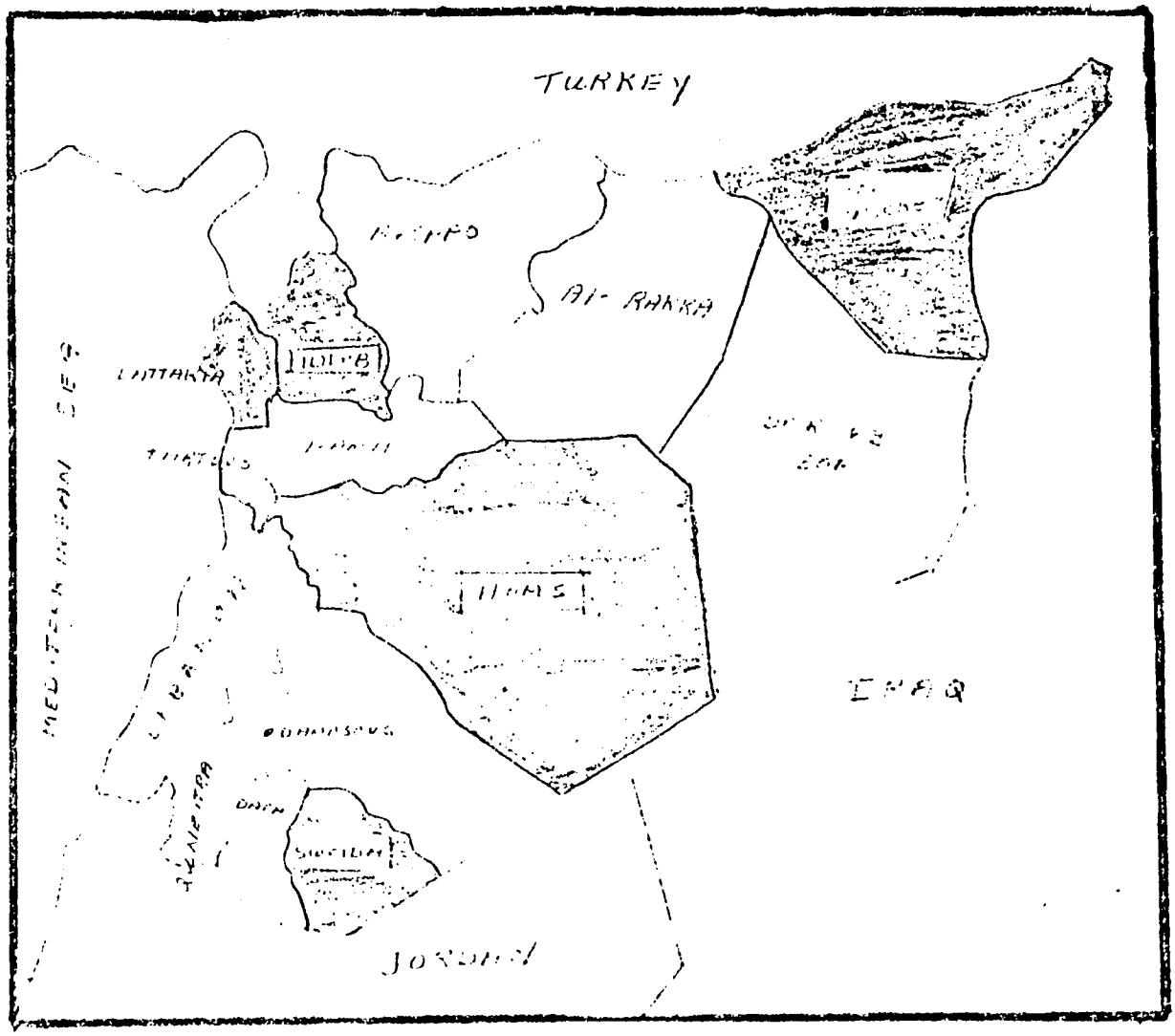
20,000 - 50,000

10,000 - 20,000

Less than 10,000

FIGURE 2

Map of Syrian Arab Republic Indicating Sampled Provinces



Sampled province

TABLE 1

Allocation of Sample

Mohafazat (Province)	Estimated Households (1980)	% Distribution	Sample Size
Sweida	32,000	8%	200
Al-Hasakeh	88,000	22%	550
Idleb	76,000	19%	475
Lattakia	84,000	21%	525
Homs	120,000	30%	750
TOTAL	400,000	100%	2,500

TABLE 2

Stratification of Sample into rural areas, towns and cities

Mohafaz	STRATA			
	Urban	Towns	Rural	Total
Sweida	25%	7%	68%	100%
Al-Hasakeh	23%	10%	67%	100%
Idleb	11%	29%	60%	100%
Lattakia	44%	9%	47%	100%
Homs	45%	15%	40%	100%
TOTAL	32%	15%	53%	100%

TABLE 3

Allocation of Sample to Clusters
For an Entire Year

First Stratum - Urban Area

Mohafaz	Stage 2 Neighborhoods	Stage 3 Streets	Number of Households
Sweida	9	2	3
Al-Hasekeh	32	2	2
Idleb	9	2	3
Lattakia	18	2	6
Homs	19	2	8

Second Stratum - Towns

Mohafaz	Stage 2 Towns	Stage 3 Neighborhoods	Streets	Number of Households
Sweida	5	2	2	1
Al-Hasekeh	9	2	2	2
Idleb	10	2	2	3
Lattakia	7	2	2	2
Homs	8	2	2	3

Third Stratum - Rural Areas

Mohafaz	Stage 2 Nahia	Stage 3 Villages	Number of Households
Sweida	11	2	6
Al-Hasekeh	24	2	8
Idleb	36	2	4
Lattakia	29	2	4
Homs	36	2	4

TABLE 4

The Accuracy of Sample Estimates of Various Levels of a Percentage (p) in the Population

Respondents	Expected Number	Accuracy (L) of Sample estimates of p	
		p = .50	p = .01
Households	2,500	± 1.4%	± 2.8%
Individuals	5,759	± .9%	± .2%
Children	2,500	± 1.4%	± 0.3%
Adults	3,259	± 1.2%	± 0.2%
Doctor Visits	849	± 2.4%	± .5%
Children	425	± 3.4%	± .7%
Adults	424	± 3.4%	± .7%
Hospital Visits	245	± 4.5%	± .9%
Children	50	±10.0%	± 2.0%
Adults	195	± 5.1%	± 1.0%

II. The Effect of Reducing the Sample Size

It has been proposed that the sample size of the Continuous Syrian Health Survey should be reduced by half. The current sample size (N_1) is 5,000 households and potentially 11,500 individuals. These households are distributed throughout 5 mohafazat and divided into four collection periods. Table 1 gives the total sample size currently being collected and the reduced sample size. Thus, for Sweida, the smallest mohafaz, the total number is reduced from 400 to 200. Table 2 gives the estimated standard deviations for the two sample sizes

For the purposes of estimating sample size, values of p, of one percent and 50 percent are used to give an approximate idea of the standard errors associated with different sample sizes. p is defined as the true value of the quantity in the population which is being estimated from the sample. Fifty percent gives the most conservative estimate and is used in sampling methodology when the variables being examined vary widely. Thus if, for example, the true percent of households within five kilometers of a Health Center is 50%, p = .50, based on a sample of N_1 = 5,000 we can calculate P between 49% and 51%. This is the 68% confidence level.* If, on the other hand, we reduce the sample size by half N_2 = 2,500, the estimate of p at a confidence level of 68% is between 48.6% and 51.4%. As the sample size is reduced, the standard error is increased causing a widening of the confidence limits of the estimate. If the data is examined by mohafaz at a 68% confidence level, the estimate of the percent of households in Sweida within five kilometers of a health center, would be between 43% and 57%. By reducing the sample size, the interval becomes 40% to 60%. This again assumes the true percent is 50. Unfortunately, if the size is reduced much further, the interval becomes so large as to be meaningless. This would occur if the data are analyzed by rural urban residence within a mohafaz. For example, based

on the 50 households from urban areas of Sweida, this variable could be estimated to be between 30-70%. By reducing the size of sample, we are reducing the complexity of analysis possible. Since it is unlikely that the household data would be examined by small subgroups this should not be a problem.

From the pilot test, there were 2.3 individuals per household; of those interviewed, approximately one would be a child. An estimate of 13% of adults and 17% of children would have doctor visits during the last month. Six percent of adults and two percent of children would have hospital visits during the last year. Table 3 gives the estimates numbers based on the original sample size and the proposed reduction. The results of the pilot test indicated that eight percent of adults had diarrhea during the last month. If this is used as a basis for calculating standard error N_1 and N_2, the estimate would fall between 7% and 9% for N_1 and between 6.7% and 9.3% for N_2 at a 68% confidence level. This data could be cross tabulated several times before the standard deviation would become too large to detect differences between groups.

Next, we turn to the quantitative data. Based on the pilot study the average weight of a one year old child is 9.7 kg. with 1.9 standard deviation. There are 1,250 children in this age group in N_1 and 625 in N_2. For N_1 the 68% confidence limit** would be $9.7 \pm .07$ ($9.63 \leq x \leq 9.77$) and for N_2 $9.7 \pm .10$ or ($9.60 \leq x \leq 9.80$). In fact, even if the subgroup was as small as 25, we could estimate the mean between 9.16 and 10.24. This is sufficient to detect even mild degree malnutrition.

Conclusions

If the data is examined on a nationwide basis, there is no difficulty in reducing the sample size by one half. However, if the data is to be examined by small subgroups, the reduced sample size will not provide

sufficient numbers. Since it was never the intention of this survey to provide a definite answer to all health questions but to indicate general baseline levels and areas for further detailed investigation, the sample size can be reduced and still provide all the necessary information.

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* 68% confidence level interval specifies the range within which a sample estimate can be expected to fall 68% of the time, if the same type of survey were repeated over and over again and there were no response error or error due to non-response.

The following formula was used to compute sample error (SE) for a percent:

$$S.E.\ (\bar{P}) = \sqrt{\frac{p(1-p)}{n}}$$

Where
- N = Sample Size
- p = The value of the percent in the population
- $\bar{P}$ = The estimate of p from the sample

Since the sample design used in the survey is a stratified, clustered design, a design effect (DEFF) of two has been included. This means that the error variance would be expected to be about twice that of a simple random sample of the same number of people. Such a condition results when clusters are somewhat homogeneous with respect to the variable being measured.

The 68% confidence interval is calculated from the standard error and is $p \pm 1$ X SE (P).

** The formula for standard error for quantitative data is:

$$S.E.\ (\bar{X}) = \sqrt{\frac{\text{Variance X 2}}{n}}$$

95 % confidence interval is $X \pm 1$ XSE $(\bar{X})$

Where
- $\bar{X}$ is the mean value
- n is the sample size

TABLE 1

Current sample size and proposed sample size

Mohafazat	Households		Individuals	
	N_1	N_2	N_1	N_2
Sweida	400	200	930	460
Hassekeh	1,100	550	2,530	1,265
Aleb	950	475	2,185	1,092
Lattakia	1,050	525	2,415	1,207
Homs	1,500	750	3,450	1,725
Total	5,000	2,500	11,500	5,750

N_1 is the original sample size

N_2 is the reduced sample size

TABLE 2

Expected standard deviations for percentages of households having a given characteristic for two sample sizes

	1%		50%	
	N=5000	N=2500	N=5000	N=2500
Sweida	.71	.99	3.56	5.00
Hasseke	.41	.58	2.07	2.93
Edlep	.44	.62	2.20	3.11
Lattakia	.44	.62	2.20	3.11
Homs	.38	.54	1.91	2.69
Total	.20	.28	1.00	1.41

TABLE 3

Expected number of respondents

	N_1	N_2
Households	5,000	2,500
Individuals	11,500	5,759
Children	5,000	2,500
Adults	6,500	3,259
Doctor Visits	1,695	849
Children	850	425
Adults	845	424
Hospital Visits	490	245
Children	100	50
Adults	390	195

TABLE 4

Comparison of the Accuracy of the

Estimates of Certain Quantitative Variables

for Children age 1

Variable	Mean *	S.E.*	Accuracy of Sample Estimate **	
			N_1 = 1,250	N_2 = 625
Weight	9.7	1.9	± .075	± .10
Height	73.4	6.9	± .27	± .39
Arm Circumference	14.0	1.9	± .07	± .10

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* Based on results of a pilot study

** Calculated for a 68% Confidence limit

III. Detailed Description of Sampling Frames

Part III is divided into four sections:

A. A complete list of all neighborhoods in each urban area indicating those sampled during each quarter.

B. A complete list of all towns in each mohafaz indicating those sampled during each quarter.

C. A complete list of all rural areas in each mohafaz indicating those sampled during each quarter.

D. A complete list of all villages sampled during each quarter.

A. A Complete List Of All Neighborhoods in Each Urban Area Indicating Those Sampled During Each Quarter

1. Sweida City

	Quarter			
	1	2	3	4
1. Kasour	x		x	
2. Beida		x		
3. Masakin		x		
4. Maslah	x			
5. Kabu			x	
6. Ein Ez Zaman	x			
7. Zuriyeh				x
8. Et Dibaseh				x
9. Et Nahida				
10. Wattri Kanawat				

2. Al-Hasekeh City

1. Askariyeh	x	x	x	x
2. El Mattar	x	x	x	x
3. Mauzafiyn	x	x	x	x
4. Al-Hasekeh Jadideh	x	x	x	x
5. Markaz El Balad	x	x	x	x
6. Asziziyeh	x	x	x	x
7. Tal Hajer	x	x	x	x
8. Ruwayran	x	x	x	x

3. Idleb City

1. Dubrit	x	x		
2. El Moutaneybe				
3. Boustan Charanoum				
4. El Naoura				

		Quarter			
		1	2	3	4
5.	El Mesakin Sharkiyeh				
6.	El Mehiyrab			x	
7.	El Sa'ha				
8.	El Shamalliyeh				
9.	El Haji		x		
10.	El Sigen	x			x
11.	Kasour				
12.	El Sheik Thilt	x			
13.	Mantara				
14.	Selebey			x	x

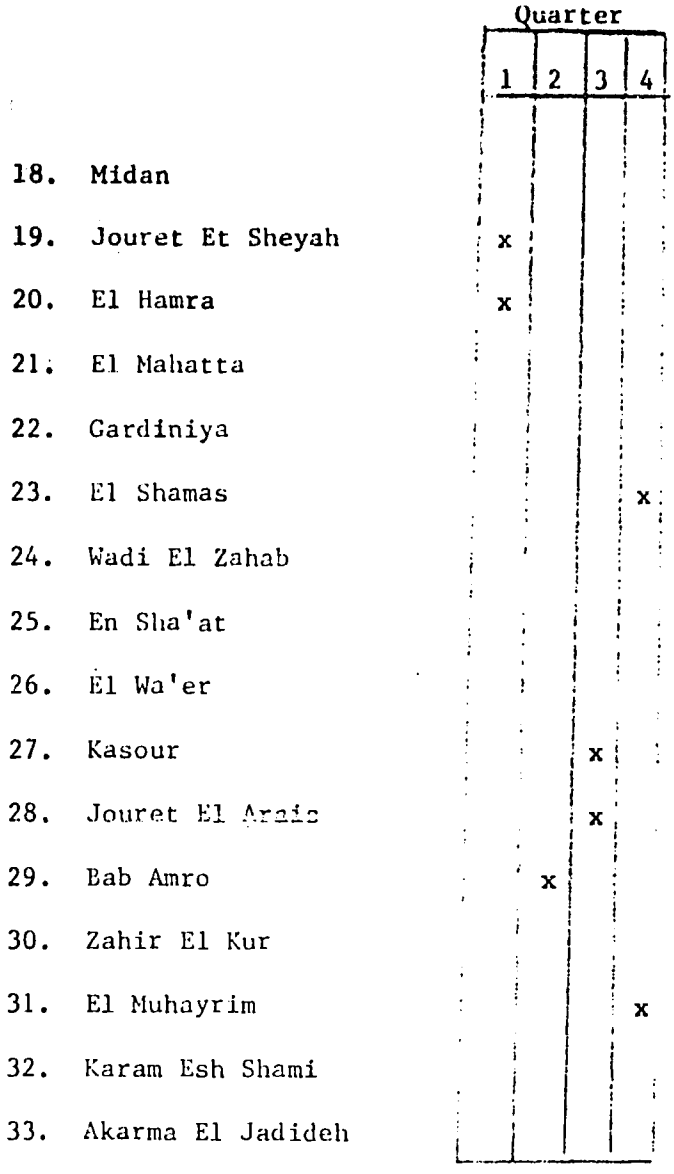
4. Lattakia City

1.	Al Ramel Shamalli			x	
2.	Mashoura Bey	x			
3.	Ali Jamal	x	x		
4.	Mashoura Zein			x	
5.	El Farouz	x			x
6.	Mashoura Kananas				
7.	As Sigen				
8.	Mar Takla				
9.	Shiek Dahir		x		
10.	El Kamaliyeh				
11.	El Ruweney				
12.	El Qalat				x
13.	Suleybeh				
14.	El Ashrafiyeh	x	x		x
15.	El Sabarien				x

		Quarter			
		1	2	3	4
16.	Masroureh Suleybeh	x			
17.	Attabiat				
18.	Masroureh Qalat				
19.	Maroureh A		x		
20.	El A'iydun	x			
21.	Boustan Samaka				
22.	Boustan Hammamē				
23.	Es Zakzakaniyeh				
24.	Mashoura Es Zyraha				

5. Homs, City

1.	Arman	x			
2.	Zahira			x	
3.	Nuzha			x	
4.	Karam El Loz	x			
5.	Karam El Zeitown		x		
6.	El Hadir				
7.	Boustan El Dewan	x			
8.	Hamidiy'e		x		
9.	Bab Sebah				
10.	Beyada				
11.	Deir Balbē	x			
12.	Karam Shumshum				x
13.	Wadi Sayeh		x		
14.	Ghaldiyeh	x			
15.	Bab Houd				
16.	Bartasiyeh				
17.	Garabise				x


Quarter
1
2
3
4
18. Midan
19. Jouret Et Sheyah
20. El Hamra
21. El Mahatta
22. Gardiniya
23. El Shamas
24. Wadi El Zahab
25. En Sha'at
26. El Wa'er
27. Kasour
28. Jouret El Arais
29. Bab Amro
30. Zahir El Kur
31. El Muhayrim
32. Karam Esh Shami
33. Akarma El Jadideh
x
x
x
x
x
x
x

B. A Complete List of All Towns in Each Mohafaz Indicating those Sampled During Each Quarter

Cluster Towns	Quarter 1	2	3	4
1. Sweida Mohafaz				
Salkhad	x		x	
Shubba	x	x		x
2. Al-Hasekeh Mohafaz				
Ras el Ein	x		x	
Dirbaseyeh		x		x
Hilaliyeh		x		
Amouda	x		x	
Malkiyeh	x			x
3. Idleb Mohafaz				
Binnesh			x	
Sarmin				x
Sarakeb				
Ma'arat Missrin				
Fou'a				
Ariha	x			x
Jisr Esh Shughour	x	x		
Harem				
Dana				
Salkin	x			
Armanaz			x	x
Kafr Tkharim				x
Muaratel Numan	x	x		

B. A Complete List of All Towns in Each Mohafaz Indicating those Sampled During Each Quarter

Cluster Towns	Quarter 1	2	3	4
1. Sweida Mohafaz				
Salkhad	x		x	
Shubba	x	x		x
2. Al-Hasekeh Mohafaz				
Ras el Ein	x		x	
Dirbaseyeh		x		x
Hilaliyeh		x		
Amouda	x		x	
Malkiyeh	x			x
3. Idleb Mohafaz				
Binnesh			x	
Sarmin				x
Sarakeb				
Ma'arat Missrin				
Fou'a				
Ariha	x			x
Jisr Esh Shughour	x	x		
Harem				
Dana				
Salkin	x			
Armanaz			x	x
Kafr Tkharim				x
Muaratel Numan	x	x		

Cluster Towns	Quarter			
	1	2	3	4
4. Lattakia Mahafaz				
Jableh	x	x		x
Da'Tour			x	
Tarabiz				x
Kurdaha	x		x	
5. Homs Mohafaz				
Deir Ba'al[illegible]				
Zabdal				
Taldo				x
Kafer Laha				
Kariatein				
Tudmor			x	
Sukneh	x			
Tal Kalakh		x		
al Sha'ra Center				
Shin				x
Rastan Center	x			
Talbiseh			x	
Kseir	x			

C. A Complete List of All Rural Areas in Each Mohafaz Indicating Those Sampled During Each Quarter

	Quarter			
	1	2	3	4
1. Sweida Mohafaz				
Sweida Center Nahia	x			
Shaba Center Nahia	x	x		
Arika Nahia	x	x		
Salkhad Center Nahia	x			
Kuraya Nahia	x			
Sigen Nahia			x	
Moushannaff Nahia			x	
Shakka Nahia				
Soura Nahia				x
Malah Nahia				x
2. Al-Hasekeh Mohafaz				
Al Hasekeh Center Nahia	x			x
Al Khabour Nahia	x			x
Al Shaddadeh Nahia	x		x	
Ras El Ein Nahia	x	x	x	
Al Dirbasiyeh Nahia	x	x		
Kamishli Center Nahia	x		x	
Tal Hamis Nahia	x	x		
Amouda Nahia	x			x
Kahtaniyeh Nahia	x	x		
Al Malkiyeh Nahia	x		x	
Al Jawadiyeh Nahia	x			
Ya'rubiyeh Nahia	x			x

	Quarter			
	1	2	3	4
3. Idleb Mohafaz				
Idleb Center Nahia	x			x
Abdul Dhour Nahia	x		x	x
Sarakeb Nahia	x	x	x	
Ma'arat Missrin Nahia	x	x		x
Ariha Center Nahia	x		x	
Ihsem Nahia	x			
Jisr esh shughour Center Nahia	x			
Bdama Nahia	x	x		
Darkoush Nahia	x	x	x	
Harem Center Nahia	x		x	
Dana Nahia	x			
Salkin Nahia	x			x
Kafr Tkharim Nahia	x		x	
Mu'ara Center Nahia	x	x		
Khan-Sheikhoun Nahia	x			
Sinjar Nahia	x	x		x
Kafr Nubl Nahia	x		x	
4. Lattakia Mohafaz				
Lattakia Center Nahia	x			x
Ein Beida Nahia	x			
Kastal Mu'af Nahia	x		x	
Kabaliyeh Nahia	x			x
Kasab Nahia	x		x	
Jableh Center Nahia	x	x		x
Hisan Center Nahia	x	x	x	
Ein Sharkiyeh Nahia	x			x

	Quarter			
	1	2	3	4
Al Haffeh Center Nahia	x			x
Slinfeh Nahia	x	x	x	
Kansabba Nahia	x	x		
Muzeir'a Nahia	x	x		
Kurdaha Center Nahia	x			
Fakhoura Nahia	x		x	
Homs Mohafaz				
Homs Center Nahia	x			
Tarin Nahia	x	x	x	
Taldo Nahia	x			
Hassia Nahia	x			x
Sadad Nahia	x		x	
Ein Niser Nahia	x			x
Fruklos Nahia	x	x		
Kariatein Nahia	x		x	
Tudmor Center Nahia	x		x	
Sukneh Nahia	x			x
Tal Kalakh al	x	x		x
Sha'ra Center Nahia				
Jabal al Hilou Nahia	x		x	
Wadi al Nadara Nahia	x			x
Hadideh Nahia	x			x
Rastan Nahia	x	x		
Fseir Nahia	x			
Al Mukharram Center Nahia	x	x		
Jub Jarrah Nahia	x	x	x	

D. A Complete List of Villages Sampled During Each Quarter

1. Sweida Mohafaz

1. Sweida Center Nahia
   a) Slim
   b) Kafr
   c) Dara
2. Shahba Center Nahia
   a) Nimra
   b) Bareka
   c) Mardak
3. Arika Nahia
   a) Arika
   b) Jrin
   c) Dama
4. Salkhad Center Nahia
   a) Araman
   b) Majdal
   c) Anas
5. Kuraya Nahia
   a) Baka
   b) Nimra
   c) Kuraya

1. Shahba Center Nahia
   a) Nimra
   b) Oum Zeitoun
   c) Mardak
2. Arika Nahia
   a) Arika
   b) Haran

1. Sigen Nahia
   a) Majdal
   b) Samil
2. Moushannaf Nahia
   a) Saleh
   b) Tarba

1. Soura Nahia
   a) Radimet
   b) Soura Kabireh
2. Malah Nahia
   a) Bouhm
   b) Sha'af

1. Al Hasekeh Center Nahia
   a) Tweini
   b) Malkhukhiyeh
2. Al Khabour Nahia
   a) Tal Tamer
   b) Tal Tawil
3. Al Shaddadeh Nahia
   a) Hajyeh
   b) Shaddadeh
4. Ras El Ein Nahia
   a) Ulouk Sharki
   b) Tal'et Mu'amra
5. Al Dirbasiyeh Nahia
   a) Karakoy Fokani
   b) Kawarkoy Sharkiyeh
6. Kamishli Center Nahia
   a) Antaniyeh
   b) Karameh
7. Tal Hamis Nahia
   a) Tal Hamia
   b) Tal Bas Sghir'

1. Ras El Ein Nahia
   a) Aradeh Kbir
   b) Tal ward Gharbi
2. Al Dirbasiyeh Nahia
   a) Jatal
   b) Dahileh
3. Tal Hamis Nahia
   a) Tal Ma'rouf
   b) Iskandarun
4. Kahtaniyeh Nahia
   a) Khirbet Dibeh
   b) Walifi-Amian Tahtani

1. Ras El Ein Nahia
   a) Tal Diab
   b) Safa
2. Kamishli Center Nahia
   a) Tartab Kbir
   b) Halko
3. Al Shaddadeh Nahia
   a) Ariseh
   b) Sa'ed
4. Al Malkiyeh Nahia
   a) Tabket Wadisus
   b) Mazra'at Shate

1. Al Hasekeh Nahia
   a) Tal'a
   b) Tal Brak
2. Al Khabour Nahia
   a) Khroumiyeh
   b) Mukhada
3. Amouda Nahia
   a) Kazanbuk
   b) Mozan
4. Ya'rubiyeh Nahia
   a) Safa
   b) Salman Sari

8. Amouda Nahia

   a) Nif
   b) Haram Arabeh

9. Kahtaniyeh Nahia

   a) Khweitlet Jawaleh
   b) Aheimer

10. Malkiyeh Center Nahia

    a) Mustafawiyeh
    b) Ar'rour Fokani

11. Al Jawadiyeh Nahia

    a) Tal Mansour
    b) Khusheiniyeh

12. Ya'rubiyeh Nahia

    a) Hamoker
    b) Hasna

1. Idleb Center Nahia
   a) Kariz
   b) Martin
2. Abdul Dhour Nahia
   a) Tal Tukan
   b) Wasita
3. Sarakeb Nahia
   a) Afes
   b) Khawary
4. Ma'arat Missrin Nahia
   a) Ram Hamdan
   b) Shallakh
5. Ariha Center Nahia
   a) Kourin
   b) Kurt
   c) Manazel
6. Ihsem Nahia
   a) Bara
   b) Ma'rata

1. Sarakeb Nahia
   a) Khanel Sabel
   b) Bweity
2. Ma'arat Missrin Nahia
   a) Zaradna
   b) Batienteh
3. Bdama Nahia
   a) Khirbetel Joz
   b) Safiyat
4. Darkoush Nahia
   a) Amoud
   b) Jub Safa
5. Mu'ara Center Nahia
   a) Mu'er Shurin
   b) Karatli
6. Sinjar Nahia
   a) Atameh
   b) Lweibeh Sharkiyeh

1. Abdul Dhour Nahia
   a) Judaideh
   b) Sukariyeh
2. Darkoush Nahia
   a) Zarzour
   b) Jamileh
3. Harem Nahia
   a) Kalb Lozeh
   b) Kafr Mou
4. Kafr Tkharim Nahia
   a) Sheikh Youseh
   b) Khirbet Wihbi
5. Ariha
   a) Oramel Joz
   b) Kursaya
6. Kafr Nuble Nahia
   a) Fatira
   b) Om Nir Kibliyeh

1. Idleb Center Nahia
   a) Ta'aoum
   b) Oral Shamaliyeh
2. Abdul Dhour Nahia
   a) Balisa
   b) Barisa
3. Ma'arat Missrin Nahia
   a) Kfarya
   b) Katyan
4. Salkin Nahia
   a) Kafr Hind
   b) Sa'idiyeh
5. Sinjar Nahia
   a) Tal Khanzin
   b) Tal Marak

3. Idleb Mohafaz, Cont'd

7. Jisr Esh Shughour Nahia

a) Ishtabrak
b) Huseiniyeh
c) Mazra'at Sheikhelias

8. Bdama Nahia

a) Najiyeh
b) Kamleh

9. Darkoush Nahia

a) Kharab Amen
b) Khirbet Amoud

10. Harem Center Nahia

a) Kafr Daryan
b) Bassina

11. Dana Nahia

a) Sarmada
b) Kafr Lousin

12. Salkin Nahia

a) Azmarin
b) Kafrana

13. Kafr Tkharim

a) Melas
b) Kuru

7. Sarakeb Nahia

a) Mu'aret Na'sar

14. Mu'ara Center Nahia

   a) Kafrumeh
   b) Abu Habeh

15. Khan Sheikhoun Nahia

   a) Habit
   b) Mazda

16. Sinjar Nahia

   a) Thalijeh
   b) Mukasar Tahtani

17. Kafr Nubl Nahia

   a) Has
   b) Jubala

1. Lattakia Center Nahia
   a) Jubbel Biebeh
   b) Nabdeh
2. Ein Beida Nahia
   a) Burej Islam
   b) Turbeh
3. Kastal Mu'af Nahia
   a) Kastal Mu'af
   b) Mazra'a
4. Kabaliyeh Nahia
   a) Sallour
   b) Yamadiyeh
5. Kasab Nahia
   a) Nab'ein
   b) Sulbeh
6. Jebleh Center Nahia
   a) Barjal
   b) Nabe Asal
   c) Wadi Jub

1. Jebleh Center Nahia
   a) Bseisin
   b) Ziadiet Aramti
2. Hisan Nahia
   a) Karfis
   b) Rahbiyeh
3. Slinfeh Nahia
   a) Durin
   b) Mrouj
4. Kansabba Nahia
   a) Mureij
   b) Rweiset Habib
5. Muzeir'a Nahia
   a) Kimin
   b) Hweiz

1. Kastal Mu'af Nahia
   a) Saraya
   b) Beit Tawej
2. Kasab Nahia
   a) Shajara
   b) Khayet
3. Hisan Nahia
   a) Dalyeh
   b) Musheirfiyeh
4. Slinfeh Nahia
   a) Marej Khokho
   b) Ballouta
5. Fakhoura Nahia
   a) Ananib
   b) Talaro

1. Lattakia Center Nahia
   a) Shamiyeh
   b) Kharnoubeh
2. Kabaliyeh Nahia
   a) Karmaniyeh-Tahtani
   b) Beit Ali
3. Jebleh Center Nahia
   a) Karm Mozi
   b) Kruse
4. Ein Sharkiyeh Nahia
   a) Harama
   b) Balei'lin
5. Al Haffeh Center Nahia
   a) Jurniyat
   b) Haref Salkin

4. Lattakia Mohafez, Cont'd

7. Hisan Nahia

   a) Basandyaneh
   b) Dorani
   c) Beit Shini

8. Ein Sharkiyeh Nahia

   a) Zama
   b) Maksaha

9. Al Haffeh Center Nahia

   a) Jingeil
   b) Bleiboun

10. Slinfeh Nahia

   a) Bab Janneh
   b) Domzin

11. Kansabba Nahia

   a) Uweinat
   b) Kabani

12. Muzeir'a

   a) Harra
   b) Arous

13. Kurdaha Nahia

a) Kalmakho
b) Ikei'a

14. Kakloura Nahia

a) Jobet Burghal
b) Khishkhasheh

1. Homs Center Nahia

   a) Qaral Kabireh
   b) Sa'en Aswad
   c) Mazra'at Nakash

2. Tarin Nahia

   a) Rubweh
   b) Khirbet Hayek

3. Taldo Nahia

   a) Khirbet Kabo
   b) Talil

4. Hassia Nahia

   a) Braij
   b) El Harbiyeh

5. Sudad Nahia

   a) Jafer
   b) Radifat

6. Ein Niser Nahia

   a) Ein Dawanir
   b) Ein Hussein Shamali

7. Fruklos Nahia

   a) Frulos
   b) Shitayeh

1. Tarin Nahia

   a) Khirbet Haman
   b) Zarzouriyeh

2. Fruklos Nahia

   a) Madabe
   b) Sabuniyeh

3. Tal Kabkh Nahia

   a) Zara
   b) Talzikhri

4. Rastan Center Nahia

   a) Tal Jabourin
   b) Hosh Durak
   c) Mazhariyeh

5. Al Mukharram Nahia

   a) Mukharram Fokani
   b) Aboue Khashabeh

6. Jub Jarrah Nahia

   a) Jub Jarrah
   b) Manoukh

1. Tarin Nahia

   a) Kazhal
   b) Butiseh

2. Sadad Nahia

   a) Jafer
   b) Kanayeh

3. Kariatein Nahia

   a) Hawarin
   b) Bordeh

4. Tudmor Center Nahia

   a) Kism Gharbi
   b) Sha'ra

5. Jabul Al-Hilou Nahia

   a) Kafram
   b) Safsafeh

6. Jub Jarrah Nahia

   a) Mas'oudiyeh
   b) Om Tweini Shamaliyeh

1. Hassia Nahia

   a) Sh'irat
   b) Aboudiyeh

2. Ein Niser Nahia

   a) Hamimeh
   b) Hmediyeh

3. Sukneh Nahia

   a) Uthmaniyeh
   b) Om Kbeibeh

4. Tal Kalakh Nahia

   a) Husamiyeh
   b) Smikeh

5. Wadi Al Nodara Nahia

   a) Mazineh
   b) Aman

6. Hadideh Nahia

   a) Rihaniyeh
   b) Tal Safa

5. Homs Mohafaz, Cont'd

8. Kariatein Nahia

a) Bir Gherbeh
b) Hawarin

9. Tudmor Center Nahia

a) Beida
b) Bedou Tudmor

10. Sukneh Nahia

a) Hamemeh
b) Kom

11. Tal Kalakh Nahia

a) Zara
b) Hasrajiyeh

12. Jabal Al-Hilou Nahia

a) Sweiri
b) Otan

13. Wadi-Al Nadara Nahia

a) Mashta Azar
b) Tariz Junoubiyeh

14. Hadideh Nahia

a) Ein Tineh Shark-iyeh
b) Khurbet Mankouleh

15. Rastan Center Nahia

   a) Ghajar
   b) Hosh Khalid Oman
   c) Kuneitrat

16. Ksein Center Nahia

   a) Bweida Garbiyeh
   b) Attifiyeh

17. Al Mukharram Nahia

   a) Haraki
   b) Om Dali

18. Jub Jarrah

   a) Mas'oudiyeh
   b) Rasm Hamideh