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METHODS OF ASSESSING MATERNAL AND CHILD HEALTH REQUIREMENTS FROM A STATISTICAL ANGLE

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There is a great need in the maternal and child health field for comprehensive data on conditions and circumstances influencing the health of mothers and children if the various activities are to be directed properly, and the efficiency of work evaluated for the area where it is carried out or where it is to be started. The statistical analysis of these data should demonstrate the actual situation regarding:

a) The size and characteristics (attributes) of the population as a whole and details of the population groups under control or desired to be under control.

b) The levels and features of mortality and morbidity of these population groups.

c) The amount and quality of the work performed.

This analysis can be elaborated only if the area for the work of the maternal and child health institution is strictly defined so that the data refer to a population that is known in every detail.

The data required for the analysis may be obtained from :

a) the population census;

b) the registration of vital events;

c) records kept in the maternal and child health institutions themselves as the result of their routine work;

d) records obtained or kept in other public health institutions;

e) special surveys.

Population Census

Through the population census data may be procured on the composition of the population according to the biological and social characteristics (attributes).

Distribution of children by sex and single year age-groups under seven years is certainly basic information. These data indicate the size of the child population needing health care. Comparison of these figures with the number of children actually under control (i.e. in each age group percentage of child population in that group which has visited the institution) is a yardstick for measuring how much the institution has penetrated into these groups.

Data on fertility and social composition of the female population at the reproductive age give needed and valuable information for maternity health care.

Information which may be obtained regularly from the Census figures in many countries is not always available in the Region. In five countries a census has never been taken; in two it has not been taken since 1940 and in five other countries it was carried out only between 1946 and 1948; in these countries therefore, either no census data are available, or the data are of no practical use. Even in the countries where the census has been successfully carried out there is a great delay in tabulation and publication of the data. All this indicates the great difficulties encountered in making use of population census data. In such cases, the initiative must be taken to urge the preparation of preliminary figures from data available in statistical bureaux and not to wait for the publication of the final results of the census.

In most cases, however, it is necessary to organize special surveys for obtaining the required data; the method employed will be discussed later.

2. Registration of vital events

Registration of vital events gives data on births and deaths which are of special importance in maternal and child health activities.

The first information coming from that source to a maternal and child health institute should be the transmission by the registrar of the address of each newborn child immediately after the notification of the births. This procedure is introduced in some countries (outside the Region) and gives the possibility of immediate operative action for the maternal and child health institution; in addition it is a means of getting important up-to-date statistical data.

The same procedure can be applied in cases of death occuring in the population groups for which the particular maternal and child health institution is operating.

Vital statistics give tabulated absolute figures on births and deaths in various categories of deliveries and child mortality, and on deaths in the female population. The importance which vital statistics services give to the problem is evidenced by the fact that only nine out of twenty-one internationally recommended tables refer to the data on infant and foetal deaths only. In addition a table on confinements showing the type of birth (single, twin, etc.) and status of issue (live-born, still-born), has been recommended.

Besides these tables which are of special interest for studying mortality among infants and for information on foetal deaths, there are two tables of general mortality where cause of death is given by age, and three tables regarding births which present data important from the point of view of the mothers' health. Altogether fifteen tables out of the twenty-one recommended for the annual tabulation programme are of the greatest use to the maternal and child health worker.

Details of what these tables contain can be found in the United Nations publication, Handbook of Vital Statistics Methods, Series F No.7, Chapter XII.D.

It must be admitted that there is no country in the Eastern Mediterranean Region where data on vital statistics are available for the country as a whole which are at the same time reliable enough to be used for a sound statistical analysis. Consequently they will not be discussed here in more detail, especially as it will take some time to raise the level of vital statistics registration in most of these countries.

The following suggestion as to what can be done immediately has been made by the writer in many countries of the Region.

It is possible to make a beginning by procuring all these statistics in a sufficiently reliable form in small administrative units, and gradually to extend the area covered from year to year according to the progress achieved. It is the writer's firm belief that maternal and child health institutions can play a great role in such a development of vital statistics because of their own needs.

3. Records kept in maternal and child health institutions

Records kept in maternal and child health institutions during their routine work should include information on :

a) The work performed.

b) The level and the features of morbidity among the population groups under the control of the institution.

c) The social and environmental conditions prevailing in the area which influence the health of mothers and children.

The general framework and methods for collecting this information are established in the printed forms used in the various types of maternal and child health institutions in their routine work. The particular type of the institution decide whether this form is an "Infant Card" or "Child Card", "Mother Card" or "Delivery Card", etc. There is no objection, of course, to having different forms used by different types of institutions.

But what represents a big handicap from a statistical point of view, is the fact that forms used for the same type of institutions vary so much, even in an area where the work of these institutions has to be evaluated from the same angle. Not only do the forms vary considerably regarding the items requested, but different definitions are given of the terms used in these forms. These conditions make it impossible to carry out the necessary statistical analysis and proper evaluations in general, as these are always based on the comparison of homogeneous data. Unless the forms are standardized according to the requirements, and unless uniform definitions are used for the same items included in these forms, no adequate evaluations are possible.

It is not an absolute uniformity of these records that is required but an agreement on the basic information which is necessary in all circumstances in which institutions of the same type are working, and also an agreement on uniform definitions for items or terms used. These are the conditions - sine qua non - which are essential if the collected data are to be used for evaluation.

There is, also, of course, the possibility of collecting other special data in addition to those generally agreed upon. This should be left to the decision and the wishes of the individual maternal and child health worker according to the specific conditions, and to the needs of the area involved. Additional items may have second priority if considered from the general maternal and child health standpoint, but they should also have uniform definitions if they are included.

What is needed, therefore, is a list of basic items of required information for inclusion in all forms used in institutions of the same type and a list of other items for which the collection of data is recommended as second priority. For each of these items a definition should be given which is generally accepted and which will then become obligatory in the country or region in which the data are collected and for which the evaluations have to be elaborated.

From the individual records kept in the maternal and child health institutions, periodical reports have to be prepared. These also require standardized forms. The information asked for in these periodical report-forms (monthly, quarterly) depends upon the agency which these reports are expected to serve, and the way they are prepared is based primarily on the fact that the institution itself is forced to review its work and its achievements. It would be inappropriate to discuss this matter in fuller detail in this paper. A few principles, however, may be established as follows :

a) The reports for short periods should include only the most important information needed for permanent records and the number of items should therefore be limited.

b) For longer periods (e.g. one year) more extensive reports may be required covering all the three above mentioned categories of information collected in the institutions.

c) No items should be included which are not necessary for evaluation of the planned programme.

d) Clear instructions for the preparation of all kinds of reports should be issued, and the personnel working on them must be well instructed on how to prepare them.

e) Reports should be analysed in the agency receiving them and not only consolidated statistically; the reporting institution must be informed of the results of the evaluation made in the higher health service of the agency.

4. Records from other public health service institutions

Just as the activities of all the different health institutions are closely connected with one another and their total efficiency depends on efficient work in every one of them, it is equally important that the records collected and statistical

evaluations made in various institutions should not be limited to a single type of service. Maternal and child health services need to be informed of what is going on with regard to acute infectious diseases or tuberculosis - to mention only two of the most important fields. The data covering these fields must of course be collected in epidemiological or tuberculosis institutions, but arrangements ought to be made at least for mutual notification of reported or diagnosed cases among the population which is being taken care of by these various institutions. The usefulness of isolated statistics pertaining only to one type of institution is very limited if the data are of mutual interest.

Also very often the same, or nearly the same, data are collected at the same time in different institutions, resulting in duplication of work. Much paper work could be avoided by an exchange of information and the collection of the data in one institution.

5. Special surveys

The four sources of data which have been mentioned above give information which is obtained permanently by the services of population, vital and health statistics. All these services have to be rationally organized to produce data which are of permanent use. Great care must be taken to avoid the collection on a permanent basis, of data of a temporary nature. To supply quantitative data which are used only from time to time as a basis for the solution of a specific problem, special surveys have to be organized.

A special paper would be necessary to discuss adequately the problem of these surveys and the questions which arise in connection with their organization. Only a few aspects will be considered here, although these will be dealt with as fully as possible because lately these surveys have become very frequent and their importance and usefulness cannot be over-emphasized. Unfortunately they have often been carried out in an unprofessional manner and consequently the results have been inadequate.

First, let us deal with the way these surveys are generally made. A field survey is the observation of a specific mass of persons, events or objects. The only valid method of evaluation of mass observation is the statistical one, just as it is recognized that the diagnosis of tuberculosis can only be based on an

x-ray picture or of typhoid on the Widal reaction. Moreover, there is no doubt that the person taking the x-ray picture or making the Widal reaction should be especially trained for it.

Unfortunately, the situation is often different when a field survey is organized. It is often undertaken without considering that it is a specialized task, a statistical investigation which has its established methods of processing and which requires specialized personnel.

In some cases, the purpose of the survey is not established, its statistical unit is not defined and the type of data specified as required is impossible to be obtained or cannot be defined in a way to allow for effective statistical processing (tabulation).

An effort is often made to improve the situation after the survey has been wrongly carried out by asking for advice on statistical processing of the data which have been collected. It is then naturally very difficult, if not impossible to improve on what has already been done. Only a small fraction of the results are really useful since the material collected can only, to a small extent, be used for statistically valid conclusions. The outcome is a waste of money and useless loss of energy, including sometimes that of the specialized workers.

When planning a survey, the basic rule should be the application of statistical methodology. Statistics are not mathematics; they are not even a branch of mathematics. Therefore, even a mathematician cannot help. The best expert in the field to be surveyed is unable to carry out the survey unless he has at the same time the necessary knowledge in statistical methods and that special sense for quantitative measurements which is essential in mass observation.

There are some principles of basic importance which have to be strictly observed. These are :

- the purpose of a survey is to be defined precisely;
- it should be clearly and minutely established what should be obtained from an analysis of the data which are to be collected;
- the purpose of the survey is not fully defined if it is not explained why this information is needed.

It certainly is not the scientific approach to make a survey in order to justify preconceived views on a certain problem. In this case, the purpose may be stated clearly, but it is, in itself wrong. A survey should not be planned to justify a point of view, but to find out if it is correct. It should be planned with complete lack of prejudice. The questionnaire should, therefore, include questions which may lead to adverse answers.

The data collected during previous surveys or through regular reporting should be analysed before the programme for a new survey is planned. It is not reasonable to start a survey without considering previous ones even if they were unsatisfactory.

A survey, at all stages - planning, operating and evaluating - is group work. The "group" here does not only mean the workers of the institution or agency by which it is organized. Specialists must play an important role in planning, operating and evaluating the survey. The type of specialist, of course, depends on the subject and the problems involved.

It has already been sufficiently stressed that the collaboration of statisticians is essential.

In organizing a survey, it is necessary to seek a large number of collaborators for consultation in planning and establishing the programme and a large group for implementing it. Too often efficient team work at the planning stage is lacking.

The definition of the statistical unit to be surveyed and that of its attributes must be clearly stated. Sometimes it is not easy to define. A survey on morbidity may be taken as an example. A survey on morbidity without definition - which should be the morbid condition surveyed - is without value. It may happen that a definition may not hold from a particular point of view but it is better to define the statistical unit and its attributes from the start of the survey than to let the surveyor apply his own definition later. The definition of the subject (statistical unit) to be surveyed depends on the real purpose of the survey and must be clearly stated.

The items in the questionnaire and its technical form must be thoroughly studied. The questionnaire is the result of team work. General principles on how to prepare a questionnaire are found in every textbook on statistical methods and yet it is not rare to find questionnaires in use which are a striking example of what they should not be.

It is not easy to prepare a questionnaire which has to be filled in by specially trained field workers who have received uniform instructions on how to do it. Even more difficult is the preparation of the inquiry form which has to be filled in directly by the person furnishing the information. To ensure the necessary uniformity in giving the answers to items on the questionnaire, is in this case a special problem, which has to be solved when planning such a survey.

It is not possible here to describe these difficulties in detail. Only two of the most common mistakes may be mentioned. The first consists in asking too many questions. The second mistake is that sometimes questions are asked which cannot be answered in a way which might be utilized for statistical processing. When asking questions, it is necessary to do it in such a way that all possible answers are thought of in advance and the possibility for their classification considered.

A pilot study in the field should be performed before the survey proper is started. In this pilot study, the final draft of the questionnaire together with all the instructions on the collection of data have to be put on trial to prove their adequateness for the actual field conditions. It has to indicate whether some of the questions have to be modified or, left out if it is found impossible to obtain the information in the required forms.

Pilot surveys usually bring to light facts which are important for the preparation of definite instructions on how to make a survey. Not rarely are cases found to which the drafted definitions cannot be applied. Answers may be obtained which had not been expected and which may require a change in the drafts for grouping and tabulation. Sometimes such a pilot survey may show that a complete survey will not give any result. It is therefore wrong to start a complete survey without a previous pilot study.

One of the most difficult questions to settle when organizing a survey is how broad it should be to produce data representative enough to justify general conclusions and not particular only to the conditions existing in the surveyed mass. For this, we have to decide first what kind of representativeness we wish to obtain. There is a wide choice in this regard. We may desire to get the representativeness of a definite administrative area (district, town, province or two of these) for the

whole population of that area or for some specific population group (social, biological, professional). Representativeness means that the data collected give us the right to generalize for the whole administrative area, the results obtained from the sample survey of that area and do so either for the whole population or for specific groups of that population, depending on the plan fixed beforehand. It is indispensable to decide what kind of representativeness is required before making the final plan for the survey.

Generally, a survey is organized to obtain the frequency of the events or things under survey (statistical units) together with some of their attributes as they occur or exist in a given territory. It is, therefore, very simple to collect the data on each single statistical unit which occurs or exists in that territory. For instance, to introduce mass trachoma treatment aiming at the eradication of the disease, it is necessary to know who has to be treated on the territory and where that treatment has to be performed. In this case, all trachoma cases have to be found and recorded.

In this kind of investigation, there is no difficulty about who and how many have to be included since all the cases which by definition form the statistical mass have to be recorded. Here, of course, we are faced with the problem of how to reach all the statistical units under investigation to obtain the relative data. This constitutes the problem of completeness. The census survey is mentioned here to keep it strictly distinguished from the sampling survey.

As mentioned above, the census survey is methodologically the simplest way of obtaining the desired data. The only obstacles to a census survey sometimes lie in the fact that the work to be done is immense or that it requires large expenditure. However, this overall survey is not necessary except in cases as mentioned above, since we can obtain representative data for the whole mass by surveying only a part of this mass. If this part (sample) is selected properly and if the observations are correctly registered, conclusions can be drawn which can be applied to the whole statistical mass. Generalization of the data obtained is permissible if these are based on the well established statistical methodology particular to the subject under survey.

There is a very large literature on the methodology of sampling surveys. The general principles to be applied are to be noted as follows :

1) If a survey is organized for which the data will not be utilized operatively for each single case, there is no need to survey each single statistical unit but only a certain part (sample) of them. The concrete number of units (the size of the sample) to be surveyed is obtained by applying the method of random sampling.

2) The size of the sample depends on the number of items to be analysed, the variability of each item (attribute) under consideration and on the degree of precision we wish to obtain.

3) The selection of single units from the basic statistical mass must be done in such a way that equal opportunity is ensured for each statistical unit to be selected as the sample, i.e. selection at random. The random sampling is the only method which permits generalization of the results for the whole basic statistical mass.

4) This random sampling can be selected from the whole mass or from the groups and sub-groups (geographical, social, etc.) as well; in that case the number of units selected at random in groups or sub-groups has to be in the same proportion as the group or sub-group to the whole entity. Such a group or sub-group is in part observed as an independent sample but in such a way that the results for all groups (and/or sub-groups) can be used for the obtention of results for the whole mass also. In making the decision about the procedure to follow, it is necessary to take into account the possibilities of work and the expenditure.

In organizing surveys, very often the selection of the sample to be surveyed is not done according to the general principles described above. It is forgotten that only the random selection of statistical units permits a generalization of results for the whole statistical mass. We are often confronted with the subjective selection of so-called "typical" villages ("typical" in the opinion of the organizers) or group of the population.

The selection is made by various criteria, which are thought to bear some influence on the subject under survey (e.g. surveying the nutrition status in villages, in the hills or in the plain, near or far from main traffic lines, villages according to different nationalities, etc.). These criteria can sometimes be objective also, but are usually subjective.

The "selection" of statistical units in such surveys is very often made from units which are most accessible. Such units differ in one way or another. By taking only such units as a "sample", no representativeness is ensured. On the contrary, it is a strongly biased sample which, in fact is being surveyed. The following example describes such a situation very clearly.

A survey of frequency of abortions is organized in an area consisting of seven districts and the following plan has been designed. It is decided to take three villages in each of the districts - one village of good, one of poor and one of medium economic level. Three groups of villages of different economic level will thus be obtained.

Twenty women in each village should be surveyed which would give 140 surveyed women for each economic group of villages, in the whole area under survey.

If the statistician were asked how to select these twenty women in each village, he would suggest the right way to do it. But very often, he is not asked or it is thought that his suggestion "would complicate the whole work far too much". Consequently, the "selection" is made in such a way that the women who are surveyed are those who come into contact with the surveyor because of simultaneous medical examination. It is obvious that these women differ from other women in the village in some respects which certainly have some influence on the incidence of abortion. Those women who appear for medical examination are likely to be among those who are sick, who suffer because of frequent abortions or who are of a higher educational standard and therefore are more prompt to have themselves examined. They are in no way a random sample of the women in the village; they cannot therefore represent the women of those villages with regard to frequency of abortions. Therefore, it is absolutely wrong, on the basis of the data obtained by such a sample of women, to make valid conclusions on the frequency of abortions in the area surveyed or even in the villages alone.

The best planned and prepared survey will not and cannot give good results if the field work is not done well. The efficiency of the field work depends on:

1) the cooperation of the population from which the data are obtained (persons under survey);
2) the surveyors.

The importance of the role of surveyors in the collection of data is agreed upon and usually the necessary steps are taken to instruct them for this work. The other most important condition for the success of the survey is usually neglected. It is forgotten that ultimately everything depends on the persons being surveyed giving correct information. This is especially important in health surveys in which many data cannot be checked at all and the surveyor - although cautious - has to take the information as given.

Previous preparation in order to get the collaboration of the persons who have to be surveyed is therefore a basic requirement for the success of the field work. It is necessary to arouse their interest, gain their confidence and get them to feel safe that their information will be treated strictly confidentially. In short, the field work of the survey has to start with the psychological preparation of the persons to be surveyed.

Some general principles on how to ensure the collaboration of the population under survey are :

1) The person surveyed has to be informed why the survey is being made. The explanation need not be detailed but put in such a way that its purpose and importance can be easily understood.

2) The surveyed person needs to know why he only is being asked for this information, when this is the case (as in random sampling).

3) The surveyed person must be sure that the information he will give will be treated strictly confidentially, and that no one in his place of residence or occupation will have access to it. No third person should be allowed to be present when the data are being taken.

4) The person surveyed should be moved to cooperate by doing him some little favour (medical examination, giving him advice, etc.) and by being shown friendly attention by the surveyor.

5) The field work may be started with the more influential persons living in the survey area. It is therefore necessary for the surveyor to be informed of the situation and to obtain their cooperation.

6) Effort should be made to write as little as possible during the first meeting with the person surveyed. This first meeting, in fact, should be only a

friencly introduction for the next visit and may serve to get only a general impression. Its main purpose is to facilitate the acquisition of the facts to be recorded.

It is true that such preparation requires more time and more labour from the surveyor. It is also true that it incurs larger expenditures. But it should be asked: Do we really seek objective, true and reliable data or do we only want to complete the questionnaires? Without such psychological preparation of the population under survey, we receive only the questionnaires duly filled in. That has often been proved.

In the selection of surveyors, the main point to be taken into account is whether they are able and inclined to do the necessary psychological spadework. The selection is indicated primarily by the subject of the survey. On most subjects, only medical or health personnel are expected to obtain the necessary confidence of the persons under survey. This does not mean, however, that medical or health education in itself makes a good surveyor.

The best surveyors can be made out of those professions which are used to approaching people. Supposing the subject of the survey is in the field of health, the best surveyors would be, in the first place, public health nurses or sanitarians (for a subject dealing with environment).

To conclude the discussion on special surveys, it can be stated briefly as follows :

A field survey may be organized if data are definitely needed which are not obtained from regular reporting means or which cannot be obtained from the existing records of the health service. A survey is to be regarded as an expensive and difficult task for which a detailed plan and programme have to be elaborated after the scope of the survey has been precisely defined.

Experts well aware of the problem as well as statisticians experienced in the methodology of field surveys must collaborate in designing the programme and plan of operation. Foregoing consultations must be made on a broad basis.

The frame of the survey (size of the measured mass) has to be established and the selection of statistical units made in accordance with the statistical methodology. The size of the surveyed mass and its selection depend on the

number of items, the variation of each item and the margin of error which is expected in the analysis.

For efficient field work, it is necessary to pay attention to the psychological preparation of the persons who will be questioned in order to obtain their effective collaboration. That has to be done in addition to the special training of surveyors.

The funds for the necessary statistical processing after the data have been collected must be provided at the beginning of the survey, parallel with the elaboration of the tabulation programme. Since the amount of funds available decides the whole tabulation programme this programme as well as the extent of the data to be collected have to correspond to the existing facilities.

The point should be stressed that the importance of statistics in maternal and child health services has been recognized from the very beginning. Epidemiological and tuberculosis services have also shown a keen interest in statistical evaluation; at first they were elementary in their approach but lately they have developed to a high standard. With this example before us, we should make every effort to raise the standard of statistical evaluation in the Eastern Mediterranean Region.