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**IMPROVEMENT OF STATISTICS
ON THE OUTFLOW OF TRAINED
PERSONNEL FROM DEVELOPING
TO DEVELOPED COUNTRIES:**

A Technical Report



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NOTE

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PREFACE

The present publication is the third in a series of documents relating to various aspects of migration statistics considered by the Statistical Commission at its nineteenth session held in 1976. 1/ The other two are published under the titles: Statistics of Internal Migration: A Technical Report, 2/ and Recommendations on Statistics of International Migration. 3/ Additional publications are contemplated to help implement the new recommendations on international migration statistics and further improve the statistics on migration.

The present report is based on document E/CN.3/485 prepared for the Statistical Commission in response to the Economic and Social Council Resolution 1904 (LVII) of 1 August 1974 entitled "Outflow of trained personnel from developing to developed countries", particularly paragraph 5 thereof, dealing with the improvement of statistics on the migration of highly qualified persons. The document has been revised to take into account the comments of the Commission as well as the comments of agencies and countries concerning their own work. It has also been revised to take into account the final revisions of the new recommendations on international migration statistics so that the present report and the new recommendations could be used jointly.

In its discussion of document E/CN.3/485, the Commission observed that: "Substantial improvements ... depended upon long-term improvements in basic statistical services both in developing and developed countries. In particular, although the new recommendations on statistics of international migration which the Commission had adopted ... were prepared in the light of document E/CN.3/485, the Commission cautioned that improvements in that area were likely to be slow and that trained, and especially highly-trained, personnel formed but a small part of all international migrants." 4/

The Commission also observed that it "agreed with the conclusion of the report that a number of sources, in addition to statistics of international migration, might be used to generate statistics on the topic. It also agreed that those countries which had received trained personnel from developing countries would be in the best position to develop the required statistics from several of those sources". 5/

1/ Official Records of the Economic and Social Council, Sixty-second Session, Supplement No. 2 (E/5910), paras. 56-68.

2/ United Nations publication, Sales No. E.78.XVII.13.

3/ Statistical papers, Series M. No. 58 (United Nations publication, Sales No. E.79.XVII.18).

4/ Official Records of the Economic and Social Council, Sixty-second Session, Supplement No. 2 (E/5910), para. 65.

5/ Ibid., para. 66.

CONTENTS

	<u>Paragraphs</u>	<u>Page</u>
INTRODUCTION	1 - 5	1
I. THE CONCEPT OF MIGRANT TRAINED PERSONNEL	6 - 41	2
A. Personnel who are "trained"	14 - 25	3
B. Personnel who are "migrants"	26 - 32	6
C. On measuring migration	33 - 41	8
II. PROGRAMMES OF STATISTICAL UNITS OF THE UNITED NATIONS SYSTEM OF PARTICULAR IMPORTANCE TO THIS PROBLEM	42 - 87	10
A. United Nations	42 - 51	10
B. United Nations Educational, Scientific and Cultural Organization	52 - 72	11
C. World Health Organization	73 - 78	15
D. International Labour Office	79	17
E. United Nations Conference on Trade and Development .	80 - 81	17
F. United Nations Institute for Training and Research .	82 - 85	18
G. Technical co-operation projects	86 - 87	19
III. GAPS IN THE AVAILABLE STATISTICS AND POSSIBILITIES OF FILLING THEM	88 - 122	20
A. Statistics on the flow of trained migrants	89 - 98	20
B. Statistics on the total stock of trained immigrants	99 - 103	22
C. Statistics on special groups of trained migrants . .	104 - 121	23
D. Implications of improvements suggested	122	27
IV. SUMMARY INDICATION OF THE RELEVANT DATA AVAILABLE IN COUNTRIES	123 - 146	28
A. Information on migrant flow	125 - 134	28
B. Information on immigrant stock	135 - 146	30

INTRODUCTION

1. The present publication is an abridgement and adaptation of a report 1/ prepared in consultation with the United Nations Conference on Trade and Development (UNCTAD), the United Nations Institute for Training and Research (UNITAR), the International Labour Organisation (ILO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Health Organization (WHO) and the Organisation for Economic Co-operation and Development (OECD), and after discussion with appropriate government officials in Canada, the United Kingdom of Great Britain and Northern Ireland and the United States of America. Abridgement was considered necessary mainly because the original report was written prior to the preparation of the "Draft recommendations on statistics of international migration" (E/CN.3/483), and hence unavoidably duplicated some of the presentation therein.

2. The present publication has been prepared in accordance with a proposal endorsed by the Sub-Committee on Statistical Activities of the Administrative Committee on Co-ordination (ACC) at its ninth session and discussed by the Statistical Commission's Working Group on International Statistical Programmes and Co-ordination at its sixth session (see E/CN.3/470, paras. 57-62). The action has been taken in response to Economic and Social Council resolution 1904 (LVII) of 1 August 1974 "Outflow of trained personnel from developing to developed countries", particularly paragraph 5 thereof, dealing with the improvement of statistics on the migration of highly qualified persons. 2/

3. A summary of the main findings of the original report was presented to the Committee on Science and Technology for Development at its third session, held from 2 to 20 February 1976 (E/C.8/34, annex). Several representatives to the Committee requested that the problem of the outflow of trained personnel from developing countries, together with the provision of relevant statistics, be kept under continuing review by the Committee and to this effect be included on the agenda of future sessions (E/C.8/L.51/Add.14, para. 6).

4. The present publication is necessarily somewhat imprecise, in part, because it deals with only one aspect of the much larger problem of the improvement of international migration statistics. It is, therefore, dealing with details of a subsystem of a larger system which has not yet been standardized. The number of references to the publication Recommendations on Statistics of International Migration 3/ is an indication of the degree to which reliable statistics on the

1/ Prepared by Jack Harewood, Institute of Social and Economic Research, University of the West Indies, acting as consultant to the Statistical Office of the United Nations on behalf of the United Nations and the specialized agencies.

2/ In para. 5 of the resolution, the Council requested the Secretary-General, in co-operation particularly with UNITAR, the ILO, UNESCO and WHO, to examine "... the most suitable means of improving statistics on the migration of highly qualified persons and to submit appropriate recommendations to the Committee on Science and Technology for Development at its third session".

3/ Statistical papers, Series M, No. 58 (United Nations publication, Sales No. E.79.XVII.18).

outflow of trained personnel depend on reliable international migration statistics as a whole. The present publication cannot, in fact, stand on its own and must be examined together with the new Recommendations for a more complete picture of what may be involved in the improvement of statistics on the "brain drain".

5. The present publication contains four chapters in addition to this Introduction. Chapter I examines the problems involved in defining a trained migrant from the statistical point of view. Chapter II presents an overview of what had already been accomplished by the statistical units of the United Nations system in generating and bringing together data on the outflow of trained personnel from developing to developed countries, while chapter III discusses gaps in available statistics and the possibilities of filling them. The last chapter indicates what kinds of data may at present be available in countries for examining the outflow of the trained personnel.

I. THE CONCEPT OF MIGRANT TRAINED PERSONNEL

6. The United Nations and a number of specialized agencies have for some time been engaged in studies of the causes and consequences of the outflow of trained personnel from developing to developed countries and of methods of reducing this outflow. A fundamental handicap for most of these studies has been the lack of adequate basic statistics on immigration and emigration.

7. For a serious study of this international problem, it is essential that there should be a clear and generally accepted definition of the persons to be covered, particularly with regard to (a) who are "trained" and (b) which international travellers should be counted in the statistics of the outflow of trained persons from one country to another.

8. As regards the first point, there is no agreement at this stage on the type of personnel who should be treated as "trained". For example, the Working Group on the Outflow of Trained Personnel of the ACC Sub-Committee on Education and Training has noted some ambiguity as to whether the "brain drain" mentioned in the preamble to Economic and Social Council resolution 1904 (LVII) referred to all persons with any scientific or technical training or only those with advanced training in highly specialized scientific and technological fields. The Working Group commented that this ambiguity reflected the complexity of the phenomenon and its differential impact on individual countries.

9. The second point is part of the more general problem of determining who is a migrant. A migrant may be defined as one who leaves his or her country to settle in another. But this is an ambiguous definition. "The notion of settling implies an intention to reside in the new country permanently or for indefinite future time. It is highly probable that such an intention is often masked behind a declaration that the incoming traveller intends only to reside for a fixed term of years. Indeed it is often necessary for him to do so as an initial declaration of his real intent might prejudice his entry at all. On the other hand it would seem equally probable that many professionals intending to reside in the new country for a fixed term are often classified as immigrants." ^{4/}

^{4/} Scientists Abroad: A Study of the International Movement of Persons in Science and Technology (Paris, UNESCO, 1971), pp. 109-110.

10. There are other groups of international travellers about whom there is still ambiguity regarding whether or not they should be treated as migrants. For example, what should be done about students doing post-graduate work for two years or more? How should persons be classified if they arrive in the country of study before they have concluded secondary education, while retaining their nationality of origin? What should be taken as the country of origin when a person emigrates via a third country?

11. From the above, it is clear that great care is needed to ensure that, in any given study, statistics for different countries or for different periods are based on a clear and consistent set of definitions. But what also appears evident is that, for the study of certain aspects of the problem of the outflow of trained personnel, one set of definitions may be appropriate while for the study of other aspects, it may be imperative to adopt other definitions (see paras. 28-34 below). This, of course, is another indication of the complexity of the problem and implies that it will to some extent be necessary to develop statistics based on different definitions or, where possible, with sufficient detail to permit statistics or tabulations based on alternative definitions to be derived from the same source.

12. The principal data required for a study of the outflow of trained personnel are statistics on migration (the flow of migrants) and on migrants (the stock of migrants in the countries of destination).

13. The matters of coverage, definition and source briefly mentioned above are discussed more fully in the remainder of this chapter.

A. Personnel who are "trained"

1. Qualification or occupation

14. An important first question is whether the criterion of occupation or that of qualification should be used to determine who are "trained" and their level and discipline of training. The more usual approach has been to use occupation as the criterion. Such an approach has certain advantages, including the fact that while there is an obvious relationship between output in a given field and the number of persons working in it, there is no such direct relationship between output and the number of persons educated in the field, since many of these may not be working in this field, if at all.

15. On the other hand, there are major problems of measurement in using occupation. One such problem is that the person's occupation as given at the time of departure from the country from which he is emigrating will presumably be his last occupation in that country, while his occupation as given at the time of arrival at the country to which he is immigrating will often be the intended occupation in that country. Also, it has been found that a large number of migrating dependants are shown in the records of the country of immigration (for example, in statistics derived from applications for visas to the United States of America) as having no occupation even though they may have been employed in their country of origin in occupations requiring advanced training and may again be so employed in due course in the country to which they have migrated. Certainly, if there is concern about the capacity of migrating personnel rather than with what they happen to be doing at the time of migration (or the time of recording in the case of censuses and other stock measures), it is the qualification rather than the more temporary occupation

that is of interest. Finally, it has been claimed that the qualification approach is of much wider interest to the international and government agencies concerned with the problem of the brain drain and that this approach is more manageable from the practical point of view.

16. The difference in coverage between the qualification approach and the occupation approach is made clear by considering the following subgroups: (a) persons who are qualified for and employed in a given occupation; (b) persons who are qualified in a given field but who are not working in that field (these may either be working in another field or not working at all); and (c) persons who are employed in a given occupation but are not qualified in that field. Using the qualification approach, subgroups (a) and (b) will be included; using the occupation approach, subgroups (a) and (c) will be included.

17. In light of the above discussion, it seems advisable that "trained personnel" should in general be defined in terms of qualification (the level and field of education). However, since for some developing countries, and for some studies, persons with experience but no formal qualification may be an important component of the trained manpower in certain fields, information on the basis of occupation would also be useful.

18. To determine who is trained on the basis of qualification, it is necessary to take into account both the level of education attained and the field of education.

2. Level of education

19. Of the seven categories of education based upon levels that are set forth in the International Standard Classification of Education (ISCED), issued by UNESCO, ^{5/} the three categories which appear to cover trained personnel are category 5 (education at the third level, first stage, of the type that leads to an award not equivalent to a first university degree), category 6 (education at the third level, first stage, of the type that leads to a first university degree or equivalent) and category 7 (education at the third level, second stage, of the type that leads to a postgraduate university degree or equivalent).

20. It has been pointed out that the inclusion of category 5 considerably increases the numbers concerned and introduces a large number of diplomas and types of training that are difficult to compare internationally. ^{6/} For developing countries, however, category 5 is likely to be a most important component of the trained manpower and should not be omitted. Indeed, the developing countries will no doubt be concerned with a much wider group of trained personnel than is covered in categories 5 to 7. Thus, UNESCO in its May 1975 questionnaire on scientists, engineers and technicians (STC/Q/751) has defined as a scientist or an engineer any person who has received scientific or technical training in natural sciences, engineering and technology, medical sciences, agriculture, social sciences and humanities, by having: (a) completed education at the third level leading to an academic degree (this is equivalent to ISCED categories 6 and 7); (b) completed

^{5/} International Standard Classification of Education (Paris, UNESCO, 1976).

^{6/} Swedish Committee on Research Economics (FEK) Brain Drain Statistics: Empirical Evidence and Guidelines, FEK Report No. 6, Stockholm, 1975, pp. 198-200.

third-level non-university education (or training) which does not lead to an academic degree but is nationally recognized as qualifying for a professional career; or (c) training and professional experience which is nationally recognized (for example, membership in professional societies, professional certificate or licence) as being equivalent to the formal education indicated in (a) and (b).

21. A technician has been defined as any person who has received specialized vocational or technical training in any branch of knowledge or technology by having: (a) one to two years' training beyond completed education at the second level or three to four years' training beyond the first cycle of secondary education, whether or not leading to a degree or diploma; or (b) on-the-job training and professional experience which is nationally recognized as being equivalent to the level of education indicated in (a).

22. In addition to categories at the levels 5, 6 and 7 of ISCED, the UNESCO surveys cover persons with training and professional experience which is nationally recognized as equivalent to these levels of education (as scientists and engineers or at a lower level as technicians). Clearly, this wider definition greatly increases the problems of consistency of reporting and of international comparisons. It is likely that with this wider definition, a significant number of persons migrating from developing to developed countries will be classified as trained by the former countries but not by the latter. This problem greatly reduces the advantage of depending on the statistics of the developed, receiving countries to indicate the magnitude of the problem of the outflow of trained personnel from developing countries - a proposal discussed in chapter IV below.

23. Despite the problems of consistency and international comparison, it would be useful if a definition of "trained" based on the UNESCO pattern as regards level of education, could be adopted. The various international agencies undertaking surveys in this field already have definitions of trained personnel, reflecting in part the different practices employed at the country level, and attention will need to be paid to making these definitions consistent at both the national and the international levels.

3. Fields of education

24. ISCED divides the levels of education relevant to this study into 20 fields, of which 16 are common to categories 5, 6 and 7, three apply to category 5 only, and one to category 6 only. The 20 fields are: 7/

- 01 General programme (category 6 only)
- 14 Teacher training programmes and programmes in education science and teacher training
- 18 Fine and applied arts programmes
- 22 Humanities programmes
- 26 Religion and theology programmes

7/ International Standard Classification of Education, appendix 1.

- 30 Social and behavioural science programmes
- 34 Commercial and business administration programmes
- 38 Law and jurisprudence programmes
- 42 Natural science programmes
- 46 Mathematics and computer science programmes
- 50 Medical diagnostic and treatment programmes
- 52 Trade, craft and industrial programmes n.e.c. (category 5 only)
- 54 Engineering programmes
- 58 Architectural and town planning programmes
- 62 Agricultural, forestry and fishery programmes
- 66 Home economics (domestic science) programmes
- 70 Transport and communications programmes (category 5 only)
- 78 Service trades programmes (category 5 only)
- 84 Programmes in mass communication and documentation
- 89 Other programmes

25. Developing countries may wish to include all fields of education but the list should be studied to see whether any of these should be omitted. Among those which should be considered for possible omission are: 01 (general programme) since it does not relate to any particular type of occupation and 26 (religion and theology programmes) because of its special nature. Consideration should also be given to limiting the fields of study, at first to those in which the developing countries have special interest, so as to minimize the problems of data collection and processing.

B. Personnel who are "migrants"

26. International travel involves the movement of persons from one country to another but the outflow of trained personnel can occur only when such international travel results in migration as opposed to a short holiday or business visit. Also, an outflow of trained personnel relates to the emigration abroad of trained nationals; for the receiving country, in turn, there is an immigration of trained foreigners into the national territory. To determine exactly when such an outflow of trained personnel occurs and who are involved, it is necessary to define quite explicitly (a) who among international travellers are "migrants"; and (b) who are "non-nationals" (foreigners/aliens). The definition of migrant vis-a-vis international traveller is clearly specified in the publication Recommendations on Statistics of International Migration (paras. 30 and 32).

27. There would undoubtedly be great interest in having statistics on both the short-term and long-term migration of trained personnel. However, despite the interest in and probable importance of short-term migrants, it may be advisable to limit most studies on the outflow of trained personnel from developing to developed countries to long-term migrants.

28. For studies of the outflow of trained personnel from developing to developed countries, it is essential that both the countries of immigration and those of emigration show separately in their migration statistics the migrants who "belong" in the country concerned and those who "belong" in another country. Unless this is done, it is not possible to determine, for developing countries, how many of the emigrating trained personnel are a national loss and how many are merely foreign immigrants leaving and, for developed countries, how many of the trained immigrants are in fact repatriates who have been working abroad.

29. It is therefore critical that there should be a generally accepted and utilized criterion for differentiating those who "belong" from those who do not "belong", that is, a concept of "country of origin". Moreover, it would be necessary for some purposes to relate individuals to the separate countries to which they "belong". One approach which has been adopted has been to use the country of birth as indicating the country of origin. Much of the population census classification of migrants is based on this criterion. The place of last residence has also been used to determine the country to which a migrant "belongs".

30. The group of experts convened under the auspices of the Nordic Contact Group for Studies on the Migration of University Educated Manpower has advised against both of these approaches. As regards country of birth, it was pointed out that where a person has migrated from country A to country B as a small child it would be more relevant, for studies of the brain drain, to consider that person as belonging to country B. The objection to place of residence is largely on the ground that the country of residence could keep changing after training has been completed and, therefore, the country of last residence need not be the country which would be considered as suffering a loss through the emigration; in other words, the migrant from the country of last residence might be a re-emigrant. The experts therefore recommended that the criterion for differentiating nationals from non-nationals should be the place where secondary education was completed. On this basis, "nationals" would be defined as persons who completed their secondary education in the country concerned, and "non-nationals" (foreigners/aliens) would be those who completed their secondary education in another country. 8/

31. The use of country where secondary education was completed has certain problems as well. For example, special consideration would need to be given to persons who received their secondary education in more than one country. While it may not be difficult to determine which of these countries is the one in which the secondary education was completed, it may be misleading to adhere to this where only the last year or two of specialized education was received in the country where this education was completed; the case of students from developing countries taking special university entrance courses in a developed country may be an example. Another problem with country where secondary education was completed, as indeed with country of birth or any other fixed country criterion, is that where an

8/ Swedish Committee on Research Economics (FEK), Brain Drain Statistics ..., pp. 205-206.

individual from a developing country is very mobile, he could be counted as an immigrant into a number of developed countries over time or as an immigrant into the same developed country on a number of different occasions. Unless care is taken to differentiate between the number of moves and movers, the loss from a given developing country could in this way be greatly exaggerated.

32. Despite these problems, it is thought that the country of completion of secondary education is the most appropriate for the study of the outflow of trained personnel from developing to developed countries and that the necessary additional information (for example, on previous movements) should be obtained to permit the compilation of adequate statistics of the numbers of persons migrating as well as the number of migrations. As far as possible, information on country of birth and country of last residence should also be obtained, in the light of the above. The collection and tabulation of information on these three topics have been recommended in the publication, Recommendations on Statistics of International Migration (chaps. III and IV).

C. On measuring migration

33. Studies on the brain drain require gross and net measures of stocks and flows of trained migrants with an indication of how these relate to national stocks and flows of such trained personnel. The total stock of trained personnel on national territory at any given time will consist of trained nationals plus immigrants, while the total stock of nationals who are trained will consist of those trained nationals on national territory plus trained nationals who have emigrated.

34. Changes over time in the national stock of trained personnel will occur as a result of flows of trained personnel. The change in the number of trained nationals on national territory from one period to another will be the result of the following flows:

- (a) Minus deaths of trained nationals on national territory;
- (b) Minus emigrants who are trained nationals;
- (c) Plus new national graduates, trained on the national territory;
- (d) Plus repatriate trained nationals and new graduates trained abroad;

Similarly, changes in the stock of trained non-nationals will be the result of:

- (e) Minus deaths of trained non-nationals on national territory;
- (f) Minus re-emigrants who are trained non-nationals;
- (g) Plus immigrants who are trained non-nationals;
- (h) Plus retained new foreign graduates who have been trained in the national territory.

35. As far as possible, efforts should be made to measure both the stocks and the flows as indicated above. As regards flows, statistics on deaths of highly trained nationals and non-nationals are not normally available but can perhaps be

reasonably estimated where necessary. For the remainder, flow studies would be required to show: (a) the four main flows of migrants, netting out multiple migrants; and (b) the disposition of new graduates trained in the national territory. ^{9/}

36. Stock studies are important not only for the provision of periodic statistics on the stock situation, but also because, where regular stock studies are undertaken, these can provide some information on flows by the comparison of the stock on successive occasions. For this, it is required that the stock surveys should be relatively frequent (say once every five years) and that the required detail is obtained. Even in these cases, however, some flow information must be collected; the disposition of new graduates (both national and non-national) from training institutions within the national territory is a good example.

37. In addition to providing statistics on the numbers of migrants, stock and flow studies can provide some general information about the characteristics of the migrants. The information that would be needed relates to: (a) the country of origin of individuals; (b) the educational background; and (c) other characteristics.

38. As regards country of origin, as indicated above, the prime information needed would be the country of secondary education. In addition, information on country of birth and of last residence would often be desirable, as well as information on citizenship.

39. As regards educational background, the information needed includes the level of education and/or training (in order to determine the number who are trained) as well as the fields of education and the country in which the qualifying education was received. In addition, for many purposes, particularly for assessment of educational investment, it would be very useful to have information on the country in which each stage of education from ISCED category 2 upwards was completed and, as regards education/training at the qualifying level, the source of financial support when this education/training is undertaken.

40. Among the other characteristics on which information should be sought are age, sex, marital status and economic activity. For the last-mentioned characteristic, as far as possible, information should be obtained on whether the individual is economically active and, if so, whether he/she is employed or unemployed and if the former, occupation and industry in which the person is employed.

41. For some aspects of brain-drain analysis, additional information or more details about the above characteristics will be required. For such studies, including particularly studies of motivation, it may be necessary to undertake special migration surveys.

^{9/} Nationals who go abroad for more than one year for training would be treated as emigrants (students) on leaving and as repatriates (trained personnel) on their return. On this basis, the loss of non-returning students would not appear as loss of trained personnel in the statistics of the country of emigration but will be available from the statistics of the receiving country - subgroup (h) above.

II. PROGRAMMES OF STATISTICAL UNITS OF THE UNITED NATIONS
SYSTEM OF PARTICULAR IMPORTANCE TO THIS PROBLEM

A. United Nations

42. The Statistical Office of the United Nations is concerned with statistics on the flow of migrants into and out of a country, that is, international migration statistics and on the stock of immigrants in a country.

43. Recommendations pertaining to statistics of the flow of international migration were first issued by the United Nations in 1953. ^{10/} Revisions of the earlier recommendations are presented in the publication, Recommendations on Statistics of International Migration and include proposals intended to assist individual Governments and their statistical services in the collection and tabulation of statistics on both migrant flow and immigrant stock and also a discussion of possible sources of data. These are not, therefore, repeated here.

44. Also included in the aforementioned publication (para. 13) is a brief statement of statistics of international migration appearing in the United Nations Demographic Yearbook.

45. As regards the particular needs for the study of the outflow of trained personnel from developing to developed countries, a number of additional observations must be made in regard to stock data obtained through censuses and other field inquiries.

46. Information recommended by the United Nations for inclusion in the 1970 round of censuses of population because it is relevant to determining the country of origin of immigrants is (a) place of birth and (b) citizenship. ^{11/}

47. Information on place of birth has been recommended as top priority for censuses of population by the United Nations. As indicated in paragraph 30, however, the country of birth is often not appropriate as an indicator of the origin of immigrant trained personnel. There is also the problem of how to treat persons born in countries of which the boundaries have been changed since the time of their birth. A study of the censuses of countries asking this question ^{12/} indicated that most countries gave no instructions on how to proceed in this contingency, while some required information on the country in accordance with the

^{10/} International Migration Statistics (United Nations publication, Sales No. 53.XVII.10), chap. II, "Recommendations for the improvement of international migration statistics".

^{11/} Principles and Recommendations for the 1970 Population Censuses (United Nations publication, Sales No. 67.XVII.3), para. 175.

^{12/} Handbook of Population and Housing Census Methods, part IV, Survey of Population and Housing Census Experience, 1955-1964, sect. II, Topics Investigated and Classifications Employed in Population Censuses (United Nations publication, Sales No. E.70.XVII.7/Add), pp. 16-20.

boundaries at the time of the census and others in accordance with the boundaries at the time of birth.

48. The United Nations population census recommendations call for the use of national boundaries existing at the time of the census. ^{13/} No country appears to have used the boundaries at the time of emigration, a reference which, for the purpose of study of the outflow of trained personnel, may be more appropriate than either the time of the census or the time of birth. ^{14/}

49. Information on citizenship has been proposed at a lower order of priority (that is, among "other useful topics") for censuses of population by the United Nations and has also been collected by most countries. ^{15/} Citizenship might, in some circumstances, be useful as an indicator of the country of origin of immigrants. If this is to cover all immigrants, however, it would mean that for naturalized immigrants, information should be obtained on previous nationality.

50. There are some problems related to the defining of citizenship, including the treatment of "stateless" persons of dual citizenship and of persons from a country whose national boundaries have changed. These problems do not, however, appear to introduce major complications in the compilation and analysis of statistics related to the brain drain.

51. The country of previous residence is yet another possible approach to determining the country of origin. Information on the country of previous residence has been obtained by some countries in their censuses of population and other inquiries. If this item were to be more generally used, care would be necessary to ensure that the concept was clearly understood and consistently applied. This draws attention to an important advantage of field inquiries for collection data on the outflow of trained personnel from developing to developed countries, in the sense that the definitions and other details can be more easily and directly related to the purpose for which the statistics are required than is possible in most instances with statistics from administrative records etc.

B. United Nations Educational, Scientific and Cultural Organization

1. Surveys of scientists, engineers and technicians

52. UNESCO has been collecting, on a regular basis, data on the total stock of scientists, engineers and technicians in its Member States and the number of those who are economically active. To promote international compatibility of data

^{13/} Principles and Recommendations for the 1970 Population Censuses, Series M, No. 44, para. 251.

^{14/} In the case of Sweden (1950), information was obtained from registration data and was therefore, in accordance with boundaries existing at the time the person was registered in Sweden.

^{15/} While most countries obtained information (1950) on the country of citizenship of aliens, notable exceptions were the United States and the Federal Republic of Germany, which limited this information to a distinction between citizens and aliens.

collected, a set of related concepts and definitions has been developed in collaboration with member States and other international organizations.

53. A breakdown by field of science of qualification is requested for scientists and engineers, whether they are a part of total stock or economically active and distinguishing separately the non-nationals. Previously, this amount of detail was only requested in the biennial survey, the annual survey requesting simply the total stock of scientists, engineers and technicians and those economically active.

54. Since 1975, these two surveys have been combined and in the present statistical survey of scientific and technological activities, member States are requested "to include all scientists, engineers and technicians, regardless of citizenship status or country of origin" and provision is made for information about non-nationals, for in some countries the number of these may be significant. Similar information is requested regarding scientists, engineers and technicians engaged in research and experimental development.

55. In the above-mentioned survey, the relevant table requests information on both total stock and the number of economically active - for scientists and engineers by field of science of qualification and for technicians - and among the economically active, explicitly the non-nationals. Member States are advised that where it will cause difficulty to give information on both, they should provide as much detail as possible for one of the concepts, preferably stock. However, information on non-nationals is required in the table only with respect to the economically active; hence, there is a great likelihood that member States giving information on total stock only will not provide information on non-nationals.

56. On the other hand, while information of the type sought will for the most part be available from the periodic censuses of population, UNESCO recognizes that such information will not normally be readily available every year. UNESCO, therefore, advocates that countries endeavour to keep this type of information up to date through additional ad hoc inquiries or sample surveys, extrapolation or any other methods. UNESCO is, of course, referring here to the totality of information sought and not just to the information on non-nationals. However, a significant effect of these inquiries might be to impress upon member States the importance of their having information of this kind and hence to encourage their keeping up-to-date and accurate information available.

2. Surveys of foreign students

57. UNESCO has, since 1962, regularly collected data on the number of foreign students (third level of education) enrolled in member States. The information collected includes the number of foreign students by country of origin and the number of foreign (and national) students graduating in the year by field of study (humanities, education, fine arts, law, social sciences, natural sciences, engineering, medical sciences and agriculture), as for foreign students graduating, the collection of data is now discontinued. Periodically, the last occasion being for the year 1971/1972, information is sought with respect to foreign students by field of study and country of origin.

58. Information on the students in foreign countries is clearly of considerable importance for studying the over-all problem of the outflow of trained personnel from developing to developed countries. There are, however, some limitations to the information being obtained, a fact which justly concerns UNESCO. First, UNESCO

has defined a foreign student as a person enrolled at an institution of higher education in a country or territory of which he is not a permanent resident. The country of origin is, accordingly, the country or territory in which the student is permanently resident (home country). UNESCO is now aware that, in fact, virtually all countries (Canada being a notable exception) report foreign students based on their nationality, so that long-term residents in the country are reported as foreign. Moreover, for the most part, countries have not directly informed UNESCO of this despite a request that a definition other than that based on residence should be clearly indicated. The indications are that, for most countries, the institutions of higher learning, which are the prime source of the data, do not have the information about individual students which would enable them to be classified on the basis of residence.

59. Another limitation of the statistics derived from this source is that they are figures of stocks with no direct indication of flows. Since information has been collected annually, there is a basis for deriving measures of net flows from one period to another, although there is no indication from this source of whether persons who have left the institution of higher learning have also left the country. The very important information on whether students return to their own country on completion of their training cannot, therefore, be derived from this source.

3. Survey of foreign medical students

60. A study of a subgroup of foreign students (full-time medical students studying for a doctorate or an equivalent first degree in medicine) was undertaken by UNESCO with relation to students enrolled during the academic years 1972/1973 and 1973/1974. The questionnaire sought information for such students by sex, country of origin and year of study. In order to obtain data for reference, the questionnaire also sought information about the number of national students enrolled in medical schools by sex and year of study and about the number of foreign and national students undertaking postgraduate studies in medicine.

61. The report on this study again draws attention to the fact mentioned in paragraph 58 above that most responses gave information on non-nationals as foreign students, rather than on non-residents. In the case of the University of Geneva, "parent's residence" was introduced into the criterion of nationality, making it possible to identify national or foreign students resident in Switzerland or abroad. The report did not, however, use this information, on the grounds that a distinction of this kind does not make it any more possible to draw valid conclusions on where the students themselves intend to live in the future. However, even information on the country of residence, if this were available, could not be taken as being necessarily the country where the foreign student intends to live. In fact, for some purposes, both the country of origin and the country of intended residence will be relevant.

62. Despite the admitted gaps in the data received and other limitations, this study is extremely useful both for the information it provides and for supplying the foundation on which future studies of foreign medical students and foreign students in other disciplines can be undertaken.

4. Study of the international movement of persons in the fields of science and technology

63. A contribution to understanding and appreciating the far-reaching consequences of the "expanding international mobility" of trained personnel has been made by UNESCO in its study of the international movement of persons in science and

technology. 16/ This study is divided into three parts. Part I discusses the permanent migration of talented individuals from the developing to developed countries and part III contains proposals for short-term and longer-term action to minimize the problems of the developing countries emanating from the brain drain. It is, however, part II which is particularly relevant, dealing as it does with the UNESCO survey of persons in the fields of science and technology, travelling abroad.

64. To gather information for the survey, fairly extensive questionnaires were addressed, in the first place, to member States, concerning travel by scientists, engineers and technicians and, secondly, to international organizations and non-governmental institutions dealing with foreign students.

(a) The questionnaire to Governments

65. The questionnaire to Governments sought information from UNESCO member States about students, graduates and professionals. The member States were asked to respond as countries of origin of persons abroad and/or as host countries to persons from abroad. Specific questions were addressed to them in one or the other capacity. As host countries, they were also asked for information about the stocks of scientists, engineers and technicians from abroad.

66. Regarding students, information was sought from countries of origin on (a) the number of nationals enrolled abroad as students at the third level of education, by country of study and subject field; (b) the distribution of the students according to their principal source of financial support (that is, scholarship from country of origin, scholarship from host country, scholarship from a third country, scholarship from an international organization or personal resources); (c) the selection of students for study abroad on public scholarships; and (d) the efforts made (including legal contracts) to ensure that students returned to their country of origin. From host countries, information was sought on the distribution of foreign students according to their principal source of financial support.

67. Regarding graduates, both countries of origin and host countries were asked how many graduates in the academic year 1963/1964 remained in the country of study and how many remained for advanced study. In addition, countries of origin were asked to name the fields of study in which there was a high incidence of graduates remaining abroad. Also, the countries in which the graduates chiefly remained and the host countries were asked the percentage of graduates remaining for further training or seminars among all graduates who had come from abroad.

68. For professionals, information was requested from countries of origin on (a) the number of scientists, engineers and technicians working abroad and how many had left for a period exceeding three months; (b) how many of the professionals referred to left under bilateral or international exchange programmes; and (c) any systematic methods of keeping in touch with professionals abroad. From host countries, information was requested on (a) the number of foreign scientists, engineers and technicians who entered to exercise their profession during 1966 and the number who entered for advanced study; (b) particulars of policies designed to attract foreign scientists, engineers and technicians; (c) the numbers of immigrant

scientists, engineers and technicians by country of origin; (d) the numbers and fields of employment of foreign scientists, engineers and technicians working in their national stock; and (e) the effect of membership in professional bodies on the right to practise professions. Information was also requested on published sources of immigration data.

69. A large number of the States found it impossible to provide the information required in the questionnaire. Thus, of 124 States addressed, 76 made no response at all, and of the 48 that responded, 15 gave negative responses, most of them stating that their statistical departments were not able to answer the questions. Some of these indicated their hope that the relevant statistics would be collected in the future on a regular basis.

(b) The questionnaire to organizations

70. This questionnaire was sent to a large number of organizations which award scholarships or make grants to nationals for study abroad and to foreigners for study outside of their own countries. Information was sought on the number of persons awarded scholarships or grants for longer than six months, by country of study and of origin and subject-field and on the measures taken by the organizations to encourage or ensure the return of those to whom awards are made. The organizations were also asked some general questions about the degree of non-return of students.

(c) The questionnaire to international organizations

71. A questionnaire was also sent to international organizations, both intergovernmental and non-governmental. The response was, however, disappointingly small and yielded no information which could be utilized.

72. The UNESCO study on the international movement of persons in science and technology makes a number of important recommendations on further data and research required, which are taken into account in chapter III of the present report.

C. World Health Organization

73. WHO has carried out a multinational study of the international migration of physicians and nurses. ^{17/} The mandate for the study came from World Health Assembly resolution 25.42 of 25 May 1972, which, "considering that the complexity and magnitude of the problem of international migration of national health personnel calls for a comprehensive study to determine its causes and to find

^{17/} "Multinational study of the international migration of physicians and nurses: second draft general protocol" (HMD/HMP/74.1); "Multinational study of the international migration of physicians and nurses: plan of operations for phase A" (HMD/HMP/75.1); "Multinational study of the international migration of physicians and nurses: analytical review of the literature" (HMD/75.7); "Multinational study of the international migration of physicians and nurses: country-specific migration statistics" (HMD/76.4).

appropriate solutions ...", requested the Director-General "... to continue and intensify the preparation and implementation of a detailed study on international migration of health personnel ...". ^{18/} The study was designed as not merely a means of obtaining a head count of the physicians and nurses who migrate and an investigation of social behaviour, but also as an operation oriented to health manpower planning.

74. The objectives of the study were set out as follows: ^{19/}

- I. to define patterns of migration and to postulate alternative intervention strategies for each pattern of migration;
- II. to determine, to the extent feasible, the dimensions and directions of the international migration of physicians and nurses;
- III. to develop, to the extent feasible, a profile of migrant physicians and nurses in terms of their demographic and social characteristics, level of education, speciality, and employment history, and to ascertain the population at 'high' risk;
- IV. to identify, to the extent feasible, the factors associated with the migration of physicians and nurses and to develop assumptions as to their importance in future migration streams; and
- V. to identify, to the extent feasible, in each country, the consequences and the population groups affected by the migration of physicians and nurses."

75. The populations of prime interest for the study were "foreign medical graduates" and "foreign nursing graduates" construed as comprising those physicians and nurses respectively who, at the time of the survey, were either practising their profession or undergoing post-basic professional education in a country other than that in which they had received their basic professional training. Comparisons were made between the above and "domestic medical graduates" and "domestic nursing graduates", that is, those who, at the time of the survey, were either practising their profession or undergoing post-basic professional education in the country in which they had received their basic professional training.

76. The study included: (a) an analytical review of available published literature on manpower migration including those of the ILO, UNITAR and the United States Department of Health, Education and Welfare; (b) a review of available statistics on health manpower; and (c) an analysis of various other existing materials.

77. The final report of the study will contain the number of professionals in a given country, the percentage of stock who are migrants, the annual production of professionals, the annual loss and the major countries to which professionals go, as well as a set of country specific case studies. It will contain also a proposal for follow-up action in the designing and implementation of measures aimed at overcoming the problems underlying migration and of which migration is but a symptom.

^{18/} Official Records of the World Health Organization No. 201, p. 20.

^{19/} "Report of the consultation of experts on the multinational study of the international migration of physicians and nurses" (HMD/HMP/74.8), Recommendations, para. 1.

78. Since the designing of interventions is essentially the responsibility of national administrations, the follow-up will consist almost exclusively of country-based operations carried out by national staff.

D. International Labour Office

79. In the ILO, the various aspects of migration of trained personnel have been dealt with within the broader framework of migration for employment. The quantification of the net outflow of professional and other highly qualified workers has only been treated as such in the preparatory work performed in connexion with the 1976 Tripartite World Conference on Employment (see Background Papers, vol. II: International Strategies for Employment). Various problems in the field of ILO competence (employment, conditions of work and life, social security etc.) arising in connexion with international migration of workers, which have been the subject of ILO research and advisory services to countries and of technical support to other organizations, have also covered professional and highly trained personnel. At the present time, ILO is reviewing the range of statistical data available concerning international migration for employment, with a view to determining whether greater international co-ordination could be achieved and whether the presentation of global or regional data is a practical objective at the present stage of development of the statistics on foreign migrant workers.

E. United Nations Conference on Trade and Development

80. UNCTAD has prepared two substantive studies on the subject of "reverse transfer of technology" (brain drain). The first of these (contained in document TD/B/AC.11/25/Rev.1) ^{20/} examines the economic effects of the outflow of trained personnel from developing to the developed countries and presents tentative estimates of net income gains and losses associated with the phenomenon. The second study entitled, "The reverse transfer of technology: its dimensions, economic effects and policy implications - a study by the UNCTAD secretariat" (TD/B/C.6/7), which was completed in October 1975, carries the preliminary analysis of the earlier UNCTAD study to a more comprehensive level. First, it provides a broader and more detailed statistical profile of the brain drain phenomenon. Second, it presents estimates of the imputed capital value and net income gained from such reverse transfers by the three main recipients of brain drain: the United States, Canada and the United Kingdom. And third, the study discusses and sets out in a preliminary manner some possible policy approaches for mitigating the adverse welfare effects of brain drain in the developing countries. None of the two studies has required the generation of new data on the magnitude of the brain drain, but rather has utilized the available data for the particular analysis described.

81. Further studies are being undertaken in accordance with paragraph 9 of resolution 2 (I), adopted by the Committee on Transfer of Technology, at its first session (5 December 1975), which requests the Secretary-General of UNCTAD "... in full co-operation with the Under-Secretary-General for Economic and Social Affairs, to carry out studies assessing the magnitude, composition, causes and effects of the

^{20/} "The reverse transfer of technology: economic effects of the outflow of trained personnel from developing countries (brain drain)" (TD/B/AC.11/25/Rev.1).

outflow of trained personnel from the developing countries"; and "to convene a group of governmental experts to examine the studies and to submit, if possible, recommendations to the Committee on Transfer of Technology at its second session". 21/ The studies now under preparation are expected to have a strong accent on policy issues, ranging from proposals for action at the national level to regional and international policies. Particular emphasis is being placed on evolving concrete proposals for action directed towards strengthening collective self-reliance of countries of the third world in the utilization of their skilled manpower resources.

F. United Nations Institute for Training and Research

82. UNITAR has made an important and distinctive contribution to the pool of information on the brain drain. This contribution has been made through a multinational comparative study 22/ dealing with the migration and return of professionals from developing countries who study in developed countries. The first of two earlier studies on the brain drain, "The emigration of highly-skilled manpower from the developing countries" 23/ was prepared in response to General Assembly resolution 2320 (XXII) of 15 December 1967. Following the adoption of General Assembly resolution 2417 (XXIII) of 17 December 1968, UNITAR, in co-operation with the United Nations Department of Economic and Social Affairs, arranged for the preparation of national case studies in five different regions. Reports for Colombia, Lebanon, the Philippines, Trinidad and Tobago and the United Republic of Cameroon were prepared on the basis of available statistics on employment, emigration and return flows. 24/

83. The multinational comparative study has been based on questionnaires to between 500 and 1,500 students from developing countries studying in each of three industrially developed countries, between 75 and 500 professionals from developing countries working in each of these developed countries and between 200 and 600 professionals in each of eight developing countries who returned to their countries after education in a developed country.

84. The types of questions this study was intended to answer are: What are the reasons why persons from developing countries decide to study abroad? What are the effects of the different living conditions and different methods of financial support on the students' educational experiences, orientations and career plans in developed countries? What communications do students from developing countries studying abroad receive from their home Governments and employers? In deciding to emigrate, how many students are influenced by the educational and occupational experiences they encountered abroad, and how many intended to emigrate before leaving home? Are employers in developing countries willing and able to use the skills possessed by returnees? To what extent is the brain drain due to limited opportunities for jobs and promotions in developing countries? Do returnees return with any attitudes and habits that complicate their adjustment? What are

21/ Official Records of the Trade and Development Board, Seventh Special Session, Supplement No. 4 (TD/B/593-TD/B/C.6/17).

22/ UNITAR Research Report No. 22, The Brain Drain: Emigration and Return (New York, Pergamon Press, 1978).

23/ UNITAR Research Report No. 3.

24/ See UNITAR Research Report No. 5, "The Brain Drain from five developing countries: Cameroon - Colombia - Lebanon - The Philippines - Trinidad and Tobago".

the personal and occupational experiences of returnees? In what ways were they helped or handicapped by study abroad? Do they think their skills are being used sufficiently and will be used throughout their future careers?

85. The results of the study bore on such practical issues as, for example: Is the brain drain of those who study abroad large, costly to developing countries, and profitable to developed countries in respect to skills, their use and the motivations behind them? Can any remedies that might be necessary, be applied uniformly among all countries or must they be entirely different, depending on country of origin, country of study and speciality? Should developing countries improve methods for selecting persons for education abroad? Should developing countries try to tailor study abroad more closely to national needs? Should a closer fit be created between each developing country's occupational structure and the curricula in developed countries? Is the brain drain a symptom of a more general lack of fit between a developing country's educational and occupational structure? Should any machinery be created by Governments and employers to communicate with their nationals studying abroad about prospective jobs and life at home?

G. Technical co-operation projects

86. In a discussion of the formidable problem of obtaining data from the developing countries about the international movement of persons in science and technology for the UNESCO survey (see paras. 52-56 above), attention has been drawn to the possibility that in many countries there are relevant but little-known statistics which were not taken into account by the national officials. It is believed that, in such circumstances, "... a considerable amount of the data required could be unearthed by individual consultants searching out in particular countries data which have been collected but the existence of which is not widely known even nationally". 25/

87. It is likely that, in many of the technical co-operation projects undertaken by the United Nations and the specialized agencies in developing countries, such statistics have been obtained, either by direct collection or more often from various existing, sometimes obscure, national sources. Consequently, these technical co-operation projects could, in some cases, be an important source of data on the brain drain. However, these projects and, of course, the types of data that are unearthed in the process of undertaking them differ so widely from one country to another that no meaningful effort can be made here to assess the type of information thus available. It is, however, important that the technical experts on field assignments from the United Nations and the specialized agencies, as well as the appropriate officials in the countries concerned, should be aware of the possible use of the data, that the existence of project reports as a source of data on the brain drain should be known and that these reports should be fully exploited by the national authorities in need of the data.

25/ Scientists Abroad ..., p. 111.

III. GAPS IN THE AVAILABLE STATISTICS AND POSSIBILITIES OF FILLING THEM

88. Chapter I of the present document has set forth the kinds of statistics needed for measuring the dimensions of the outflow of trained personnel from developing to developed countries. Chapter II has examined the programmes within the United Nations system that have attempted to bring together national statistics relevant to this measurement, either by routine inquiry or by special studies. Gaps between the available national statistics revealed by the inquiries and studies and the required statistics have been mentioned in passing in Chapter II. The present chapter attempts to set forth in a more systematic manner the principal gaps in the national statistics known to the United Nations system, to indicate some ways in which the system could encourage and assist countries to fill the gaps and to point out to Governments possible methods of collecting additional data. It also indicates some gaps in the studies of special groups of trained migrants conducted within the United Nations system, which may result in the loss to the United Nations and the specialized agencies of some national statistics that may actually exist within countries.

A. Statistics on the flow of trained migrants

89. The most important gaps in the statistics on migrant flow, of which the flow of trained migrants is only a small part, are the virtual absence of information on emigrants from the flow statistics of most countries, the indifferent quality of the statistics available for many countries and the lack of international comparability in the available data. In the light of these major short-comings, there was an evident need for a revision of the 1953 United Nations recommendations on migration statistics, ^{26/} a revision which would take into consideration the inability of most countries to implement those recommendations.

90. The extent to which countries have deviated from the 1953 recommendations, and the extent to which definitions and practices in the collection of migration statistics vary from country to country (see Series M, No. 58 paras. 12-17) led many to fear that, with the large variety of interests that these statistics serve at the national level, there is little hope for the collection of migration data on any comprehensive, accurate and internationally comparable basis by means of statistics on border crossings.

91. From the point of view of the problem of the outflow of trained personnel from developing to developed countries, statistics on migration at the international level are, of course, not available on a comparable basis for a sufficient number of countries for the information to be useful at this level. Although the importance of international migration statistics as an input into the study of the outflow of trained personnel has been taken into account in the

^{26/} International Migration Statistics (see foot-note 12 above).

preparation of the Recommendations on Statistics of International Migration, the mere publication of these recommendations could not immediately overcome the data problem. The new recommendations are intended for implementation over time in accordance with national abilities and are not expected to be followed in full in the immediate future. Further, many developing countries will have to rely on border-crossing statistics almost exclusively for some time to come because they lack facilities for the regular collection of data on migrant flow from field investigations and registers.

92. The difficulties of identifying migrants at border crossings have been discussed in the aforementioned publication (paras. 44-46). These difficulties are likely to be compounded by the effort to identify trained persons among the migrants. The use of sampling procedures may, however, be of assistance in the endeavour. An example of such a sampling is the United Kingdom's International Passenger Survey (IPS), which is carried out at all major airports and sea-ports and at some of the smaller ports. The survey involves the simple random selection of every in-coming and out-going passenger during the assigned interview periods. Passengers are interviewed immediately after they have been cleared by the immigration authorities.

93. The main objective of the IPS at the present time is the collection of data for use in preparing balance-of-payments estimates. Some limited information is obtained, however, on the place of birth, age, marital status and regular occupation of migrants. Defined as immigrants are foreign residents who intend to stay in the United Kingdom for 12 months or more and as emigrants, are United Kingdom residents who intend to be away from the United Kingdom for 12 months or more. United Kingdom residents born outside of the United Kingdom are also asked the date they came to live in the United Kingdom.

94. The IPS type of survey can be expanded to include more of the information required for studies of migration and, more specifically, the migration of trained personnel. This type of survey has a number of advantages, including the facts that the interviewers are specially trained for the purpose and that the collection of statistical data is their sole objective; it is known that the accuracy of statistics often suffers when their collection is the by-product of an administrative function. As compared with attempting to collect migration information from all passengers through the Immigration Officers, the IPS type of survey has the added advantage that out-going passengers can be covered as completely as in-coming passengers. Because of the extremely limited control over out-going passengers, particularly nationals, in most countries, this particular advantage of the IPS type of survey can be very important. By limiting the number of passengers to be covered, improvements in the quality of the data usually associated with sample - as opposed to census - data can be obtained. On the other hand, in many countries, there may be more difficulty in obtaining adequate funds for surveys of this type than for collecting the required information as part of the administrative process. But perhaps the major difficulty arises from the fact that migrants are in general a small proportion of all international passengers, and trained migrants are a small proportion of all migrants, so that a rather large sample of passengers would be needed. Here again, one approach to keep down costs would be to obtain in the first phase of the interview the very limited information needed to identify the migrants. The second phase, which would be more time-consuming, would be devoted to the collection of information from those identified as migrants.

95. Although it is outside the scope of this document to deal in any detail with the general problem of international migration statistics, a few additional observations in connexion with the collection of information on the migration of trained personnel may be of interest.

96. For international migration statistics to be useful in the study of the problem of the outflow of trained personnel, it is essential that information necessary for identifying trained personnel be obtained with sufficient accuracy and detail. The best method of obtaining information on education should, therefore, be explored, and attention should then be given to setting out adequate instructions on how education and occupation should be recorded.

97. In the light of the proposal in paragraph 32 above, that the country of origin of trained migrants should be taken as the country in which secondary education was completed, this information should be collected in migration flow statistics, in addition to information on country of birth and country of last residence. In the case of emigrants, particular attention should be paid to obtaining country of destination rather than country of disembarkation or of temporary stopover. Information about multiple migrations among migrants is desirable and should be considered.

98. Because of the many difficulties so far experienced in efforts to obtain good flow statistics for studies of the brain drain, it has been proposed that efforts should be concentrated on obtaining information from the major developed, receiving countries only. Since the flow concerned occurs both as an outflow from a developing country and as an inflow into a developed country, in theory, at least, the flow can be measured equally well either at the country of origin or of destination. The main advantage of concentrating on the country of destination is that there are only a few receiving countries, and since these are primarily developed ones, their statistical systems are likely to be more capable of providing the type of information required than the statistical systems of many of the developing countries. There are disadvantages as well. In particular, since national statistics will, of course, reflect national interest, the statistics of the outflow of trained personnel from developing to developed countries derived by this means will most likely be more directly relevant to the interest and/or needs of the developed countries. Any short-term advantage to be gained from obtaining statistics from this source should not, therefore, detract from the need to make every effort to encourage and assist the developing countries, and also, to obtain and tabulate the information needed for this purpose.

B. Statistics on the total stock of trained immigrants

99. The principal sources of information on the stock of trained immigrants are the census of population and sample surveys. The main gap in these sources relates to the country of origin because information on the country where secondary education was completed has not been obtained. If this information is collected in censuses in the future, as has been suggested in Series M.58, considerable data on the stock of trained immigrants will be available because information on education and occupation is normally obtained in sufficient detail. Clearly, the preparation of tabulations that classify the total population by migrant status (that is, whether part of the immigrant stock or not) and by

education and/or occupation would be a massive undertaking if sufficiently detailed classifications of education and particularly of occupation were used. If, however, the tabulation is restricted to the small group of persons considered to be "trained" on the basis of education, the procedure should be quite manageable.

100. There are also gaps related to additional items of information that could be obtained through field inquiries other than population censuses. Information on occupational training and the level of occupational skill could be collected in multi-subject household sample surveys. Topics more specific to the study of the brain drain could be investigated in appropriate specialized sample surveys. These topics include the year in which the relevant education or training was concluded, the country in which each stage of post-secondary education or training was received, the source of financial support during the period of education or training and the motivation for migration.

101. An illustration of a special survey designed to secure data too detailed for investigation in the general census is the 1972 postcensal survey of the United States of America, carried out by the National Science Foundation. This survey aimed at covering all natural and social scientists and engineers in the population at the time of the 1970 census. The survey re-enumerated in 1972 all persons classified at the census as scientists or engineers as well as a small sample of persons who had completed four or more years of post-secondary education but who were in occupations other than the above. It also surveyed persons in occupations not classified as science and engineering who might be classified as scientists, researchers or school administrators.

102. Information was sought on date of birth, sex, marital status, country of birth, citizenship, education and training and employment. The education and training profile provides information on all post-secondary institutions of learning attended, including period of attendance, type and year of degree and major field of study. Information on the country in which each such institution was situated and on the main financial support for attendance was collected in this survey.

103. Another useful illustration of a special survey is the Highly Qualified Manpower Survey of Canada conducted by Statistics Canada in 1973. The Survey covered university graduates residing in Canada and contained a great deal of information on university graduates who have migrated to Canada up to 1971. In particular, information on the country of origin, period of immigration, level, types, fields, dates and countries of all earned university degrees was collected.

C. Statistics on special groups of trained migrants

104. Sections A and B of the present chapter have dealt with gaps in statistics of trained migrants as a whole. The present section is concerned with gaps in the statistics of particular groups of trained migrants, for example, students, medical personnel or persons in other disciplines.

105. The lack of national data, or at least the difficulties faced by Governments in attempting to assemble the data, is evidenced by their inability to provide the information sought by the international agencies, as described in chapter II.

The information required varies according to the discipline of the trained personnel and it may not be amenable to collection even in specialized sample surveys, particularly when it is required at frequent intervals.

106. Consideration might, therefore, be given to proposing the institution of national systems of registers of the scientists, engineers and technicians considered of importance for the study of the flow of trained persons between countries. Particular attention would need to be paid in these registers to additional information that might be required specifically with respect to persons of foreign origin and, of course, attention would have to be paid by the specialized agencies and the Governments to detailed guide-lines about who are to be considered as of foreign origin, so that the information from these and other sources would be compatible for national and international use.

107. In a number of professions, it is necessary to be registered in order to be able to practice. This is true of physicians, nurses (to a lesser extent) and lawyers, among others, in most countries. For some other professions, while there is no statutory obligation to register, there is de facto registration of all or most practitioners with the appropriate professional association. In many countries, this is true of engineers, architects and some others. 27/

108. In theory, registers should be a sound source of information about the stock of the given profession at any given time and hence a good indirect indicator of flows into and out of the stock. For a variety of reasons, however, these professional registers, in very many cases, have been found to be unsatisfactory as a source of statistics to those interested in the brain drain.

109. On the other hand, there are instances where existing professional registers are or can be extremely useful. The United Kingdom is one example. Here, all doctors must be registered with the General Medical Council (GMC) before they can practice medicine in the country. There are at present three types of registration: (a) full registration, which is restricted to persons who have qualified from specified schools - mainly those in the United Kingdom and a few in some other Commonwealth countries, with persons qualifying elsewhere becoming eligible for full registration by successfully taking qualifying courses or postgraduate work in the United Kingdom; (b) provisional registration, which is the registration given for the first year to recent graduates who, during this period, are allowed to practice only in a supervised post in a hospital; and (c) temporary registration, which can be given by the GMC to a doctor who did not qualify from one of the specified schools, provided the GMC is satisfied with

27/ Indeed, the Guidelines for Surveying International Migration of Highly Qualified Manpower, prepared by the experts convened by the Nordic Contact Group for Studies on the Migration of University Educated Manpower recommend that countries with a total of less than 1,000 trained personnel ("selected highly qualified manpower") should establish a register of all such personnel at home and abroad, to which could be added a list of foreign trained personnel who are resident in the country for more than one year. The experts assumed that this register could be established using contacts with university staff, heads of government scientific services, ministries of education etc.

his or her qualification. Such temporary registration is, however, for a specific job and for a specified time (a maximum of one year) but can be renewed an unlimited number of times. Included here will be foreign doctors who have not qualified for full registration. Among these will be those who are in the process of gaining their full qualification, those who are in the country for a short period - often to do postgraduate work - and others.

110. One procedure which assists in ensuring that the registers are kept relatively up to date is that fully registered doctors must pay an annual fee to the GMC, which is at a lower rate if a doctor wishes to maintain his registration while overseas and is waived when the doctor is not practising. The General Medical Council maintains two lists on the basis of this procedure: a principal list of fully and provisionally registered doctors in the United Kingdom and another list of fully and provisionally registered doctors overseas. The Council also keeps records for temporarily registered doctors.

111. Based primarily on information from GMC registers as well as on information they receive directly, the British Medical Association and the Department of Health and Social Security together maintain an index of civilian doctors in Great Britain called the Central Medical Recruitment Council Index, which is kept up to date and includes, inter alia, the following information: country of birth; country of registrable qualification; date of birth and sex; date of entry and exit to the system whether entered from medical school in Great Britain, as an immigrant, or a returned emigrant, or other; if an immigrant, or returned emigrant, country from which he/she has come; for those leaving the system, whether this is through death, emigration or other; if an emigrant, the country to which emigrated; whether working in professional capacity and if so, the branch of medicine. When the present document was prepared, the index was being extended to hold more detailed information; and the way in which the information was held was being changed which would make it possible to make a finer distinction between short-term and long-term migration than in the past.

112. From the point of view of using this index as a source of information on the brain drain, there are two drawbacks. The first, and minor, drawback is that some items of information that could be very valuable are not included, for example, the country of secondary education and the financial support for training. In the past, a serious drawback has been that the index only covered fully and provisionally registered civilian doctors. However, it is currently being extended to include temporarily registered doctors; yet because of the different procedures followed for these doctors, the information available is not as comprehensive as that held for fully and provisionally registered doctors. Of the information set out in paragraph 111 above, only the following are available: country of birth, country of qualification, date of birth, sex, date of certificate (that is, date of entry) and branch of medicine. Investigations are being made as to how the gaps can be filled, but it is expected to take some time.

113. The principal reason for the gaps is that the objective of medical registration is to ensure the quality of medical service in the country while the possible use of the related records for information on migration, and more particularly on the brain drain, has not so far directly influenced the record keeping. If it is decided that information on the immigration and emigration of medical personnel is vitally required for studies on the brain drain, it should not be very difficult to arrange the records so that some useful additional information can be obtained for fully and provisionally registered doctors, as

well as for temporarily registered doctors and that maximum use is made of the information. Even if these changes cannot be made, the registers and the index make up a useful frame for further sample investigation to collect additional information on the persons registered.

114. Stock registers of this nature are, of course, more appropriate for countries that are receivers of trained migrants than for the developing countries that lose trained personnel through migration. A variant kind of register, more appropriate for the developing countries, is that found in India, which is a major loser through the brain drain. Most of its analysis and action on the brain drain are based on the "Indians Abroad Files" of the National Register of Scientific and Technical Personnel. The information for these files is derived partly from periodic surveys of Indian personnel who are abroad and partly from the Scientists Pool which the Government of India operates.

115. The experience of India could be of beneficial interest to other developing countries, for whom knowledge of the pool of their trained nationals abroad is of vital importance. In this connexion, national embassy and consulate records could be a possible source of data on trained residents who are living abroad. The source would be most useful in those instances where most of the nationals resident abroad follow the practice of registering with their national embassy or consulate in the country in which they reside. In such cases, if the embassy/consulate register includes information on education or occupation, very useful information may be obtained.

116. In most countries, the most important source of inflow of trained personnel will be persons graduating from the education system. Countries should be encouraged and assisted to ensure that the universities and other institutions graduating "trained" personnel keep records which are adequate to provide the kind of data needed relevant to the brain drain.

117. There are a number of other steps that could be taken by the international agencies that might bring about improvements in the quantity of data made available to them by Governments. It would, for example, be useful for the international bodies to inform Governments far enough in advance, of any special data that would be requested, so that the Governments could take measures to ensure, to the extent possible, that the available data could be assembled by the time they are requested.

118. Because several specialized agencies deal with statistics of trained personnel, the possibility exists of gaps in and duplication of coverage among agencies. The appropriate interagency committee should be responsible for ensuring that all relevant levels and disciplines of trained personnel are covered in the statistical programmes of the United Nations system and that there is no duplication.

119. Some apparent gaps in national statistics may actually represent the fact that the United Nations system has not actually inquired about certain topics or certain categories of trained personnel.

120. In regard to topics, information requested on "country of origin" has sometimes been restricted to country of birth, with no investigation of country of last residence or of citizenship. On the critical item of country of secondary education, information has been obtained only for students. Information

about the country in which professional education was received has been only indirectly obtained when the number of professionals born and educated abroad has been requested. Over-all data collected on the economically active population do not yet differentiate between nationals and non-nationals.

121. In regard to the categories of personnel for whom information has been sought, some of the studies have inquired only about foreign professionals working in a country, so that no information has been obtained about the foreign professionals who were either unemployed or not in the labour force. In the medical field, there appears to have been a concentration on physicians and nurses but there is also a need for studies of other medical and para-medical personnel.

D. Implications of improvements suggested

122. The preceding sections of this chapter have offered a number of suggestions for filling gaps in the available statistics through national and international action. Each of the suggestions, however, requires action beyond what is at present being undertaken at the respective levels. The extent to which any action can be carried forward would, therefore, depend on the allocation of resources at both levels. Further, the improvement of national statistics on the outflow of trained personnel is a relatively small element in the improvement of international migration statistics and is, therefore, dependent to a great extent on developments in the latter.

IV. SUMMARY INDICATION OF THE RELEVANT DATA AVAILABLE IN COUNTRIES

123. Chapter II covered in some detail the types of information available to the United Nations and the specialized agencies either through routine collection from national sources or as a result of special studies undertaken by the United Nations system. In chapter II, an indication was given of the kinds of information assembled in the Central Medical Recruitment Council Index of the United Kingdom and in the 1972 post-censal sample survey of the United States carried out by the National Science Foundation and in the Highly Qualified Manpower Survey of Canada conducted by Statistics Canada, as examples of special national investigations.

124. The present chapter rounds out this picture by summarizing the kinds of information on international migrants relevant to the study of the outflow of trained personnel known to be regularly collected by countries.

A. Information on migrant flow

125. A recent study undertaken by the Statistical Office of the United Nations has yielded provisional information on national practices in the collection of statistics on the flow of international migration. The replies to a questionnaire on national practices are discussed in Recommendations on Statistics of International Migration (paras. 15, 16, 20-21, 41, and 76). Among the replies received were from developed countries likely to be significant receivers of trained migrants from developing countries. These are Australia, Belgium, Canada, Denmark, the Federal Republic of Germany, France, Luxembourg, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom and the United States.

126. Of the 14 countries, 12 collect information on both immigration and emigration, but the United States of America and Canada collect information only on immigration. The latter has estimates of emigration based on British and American figures of immigrants from Canada and an assumed volume of emigration to all other countries.

127. Each of the 14 collects information from immigrants on sex, age and nationality, while information is not collected with respect to emigrants by three countries. Most of these countries also collect information on country of last residence of immigrants, country of intended residence of emigrants and marital status. About 10 of the 14 countries collect information on occupation and country of birth and three obtain information on industry.

128. If the available data on international migration are to be relevant and useful for studies of the brain drain, they must be reasonably accurate and, in addition, it must be possible to use them to provide statistics based on the concepts and definitions and with cross-classifications according to the characteristics discussed in chapter I above.

129. Attention has already been drawn in the aforementioned publication, to the unsatisfactory quality of many of the data available on international migration and to some of the factors that appear to be responsible. The unsatisfactory quality of

data on the total numbers of migrants among many countries of the Economic Commission for Europe (ECE) is described in paragraph 14 of the publication and will not, therefore, be repeated here. Given those short-comings, it is to be expected that the rest of the world, with generally less sophisticated statistical systems, would have much less satisfactory migration statistics. On the other hand, the clear evidence of incompleteness and inconsistencies in the migration data of the developed countries reduces the attractiveness of the proposal to rely on the statistics of developed, receiving countries for studies of the brain drain.

130. In view of the problems of obtaining satisfactory migration statistics as a whole and the fact that trained migrants constitute such a very small proportion of international travellers into and out of any one country, it is extremely difficult to envisage accurate statistics on the brain drain being obtained from migration statistics within the near future. Even in those cases where the available international migration statistics seem most satisfactory, there are serious problems.

131. The statistics of the United States are a case in point. The basic demographic data on annual immigration and on the alien population in the country are taken from the Immigrant Visa and Alien Registration forms. About 20 per cent of immigrants in recent years do not apply for an immigrant visa at an overseas consulate but apply for a change of visa status after they are already in the United States, and the required information is obtained at this stage. In cases where labour certification is required for a visa, the labour certification form can also provide useful information on immigration. Information from these three sources is used by the Immigration and Naturalization Service (INS) of the Department of Justice to develop its basic data file. Since the function of the INS is first and foremost to enforce the immigration law, data collection and publication of statistics are not given high priority and are geared towards the administrative function of INS rather than towards being a basic source of data on immigrants. Furthermore, the complete lack of information on emigrants has led to appreciable over-estimation of the inflow of foreign trained personnel.

132. The usefulness and limitations of the statistics on the brain drain which are available from international migration data as a source of information on immigration of skilled personnel from developing countries and as a possible source of information on emigration for individual developing countries can be indicated by reference to the Canadian data. Information is obtained from immigrants to Canada about their number of years of schooling and whether they are university graduates. While this information can be of some use in determining "training", it is not at present published in the Canadian migration reports. The alternative criterion of "training" - the occupation of the migrant - is obtained in the case of Canadian immigrants with respect to the intended occupation in Canada but not with respect to the occupation in the previous country of residence. While the occupation will undoubtedly be the same in a number of instances involving highly qualified manpower, for example migrating doctors and engineers, the intended occupation could be misleading as an indication of the level and type of training for many others, particularly in the case of migrating wives who might migrate with their husbands but not go immediately into an occupation. In this way, there could be the loss of some female professionals who are migrating to Canada. However

the loss should not be very great because, in practice, most of the female immigrants in the professional category are destined for the labour force. The intended occupation also would be misleading in all those instances where the migrants are moving into a job at a lower level of training than their qualifications. This for example, may be the case with some migrants not able to obtain suitable employment at their previous level before migrating. The information collected on years of experience in the intended occupation can be of assistance here. These data are reasonably accurate because officers probe for this information during interviews and require documentation to substantiate any claims.

133. The Canadian immigration statistics do include some fairly detailed tables cross-classifying immigrants by intended occupation and country of last permanent residence, which can be very useful for studies of migration to Canada from developing countries. These migration records do not include information on the country in which secondary education was completed and, therefore, it is not possible to determine the country of origin as thus defined. This is not, however, a major drawback as it would be possible at least to determine from the questions on the level of education which immigrants arrived before completing their secondary education.

134. Tables are also available showing immigrants by country of last residence, cross-classified by age and sex. Other cross-classification of characteristics investigated (such as marital status, citizenship) could, no doubt, be made available.

B. Information on immigrant stock

135. Two studies conducted by the Statistical Office have provided information about the types of data relevant to immigrant stock collected in population censuses and in population registers.

1. Population censuses

136. The immigrant stock enumerated at censuses of population can usually be identified on the basis of questions on place of birth and/or place of last residence. In the United Nations study of the topics investigated by 155 countries in their 1955-1964 round of censuses, 28/ it was found that 131 countries collected information on place of birth, including the country of birth in the case of foreign-born persons. There was considerable diversity as regards treatment of persons born in countries the boundaries of which have since changed so that their birth-places are now in different countries. In most cases, no specific instructions were given; in 11 countries, birth-place related to boundaries existing at the time of the census, while in three countries, it was the boundaries existing at the time of birth of the person that were used.

28/ Handbook of Population and Housing Census Methods, part IV, sect. II.

137. In connexion with the study of the brain drain, it is, of course, the information about immigrants that is obtained by the developed countries which is of prime importance. Of the 14 countries mentioned in paragraph 125 above, as developed and likely to receive significant numbers of trained migrants from developing countries, all collected information on place of birth except the Federal Republic of Germany.

138. But, as was pointed out in paragraph 30 above, country of birth is not very suitable for studying the brain drain. For many aspects of such a study, country of last residence, though not the ideal recommended, is more appropriate. However, only 18 countries among the 155 for which information is shown in the United Nations Handbook obtained information on place of previous residence, while a further 16 countries obtained information on place of residence at a specified time in the past. Of the 14 countries mentioned in paragraph 125 above, only Belgium obtained information on place of last residence, while three others (France, the United Kingdom and the United States) obtained information on place of residence at a specified time in the past. Clearly, not much information was available about place of last residence, and even where data were collected, they were particularly associated with the study of internal migration. If, therefore, an immigrant had lived in more than one place within the country, it was the previous residence within the country which would have been recorded.

139. In chapter I above, it was proposed that the country in which secondary education was completed should be taken as the country of origin as far as possible. There is no evidence that this information was obtained at censuses of population in the period 1955-1964.

140. While census information on country of birth or country of last residence can be used to indicate the number of immigrants in the population at census time, to determine how many of these are "trained immigrants", it would be necessary to cross-classify the immigrants by education and/or occupation. Of the 155 countries for which information was shown, 100 collected information on the highest level of school attended or the equivalent level of education received, while another 9 countries obtained information on the total number of years of schooling completed.

141. A total of 53 countries collected information on educational qualifications (specific degrees, diplomas, certificates etc. earned), though it is possible that in not all of these countries was it required to specify the field of study. Of these 53 countries, 46 are among those which also obtained information on educational attainment, while the remaining 7 did not obtain such information. Most of the 14 developed countries listed in paragraph 125 above acquired information on both educational attainment and educational qualifications, the principal exceptions being Switzerland and the United States, which collected information on attainment but not on qualifications and Australia, Denmark, Luxembourg and New Zealand, which collected information on neither.

142. The other criterion which may be used to identify the trained immigrants is occupation. Obviously, this criterion can be applied only to those who are classified as economically active at the time of the census or at some stated previous period. Immigrants who have not yet taken up employment in the country

and some who previously worked but were not economically active during the reference period would therefore be excluded. Also, since immigrants are sometimes forced to take up employment at a lower level than that for which they are trained, particularly in the early years of the immigration, the use of occupation may underestimate the number of skilled immigrants. However, information on occupation is much more universally collected than information on educational attainment. Thus, of the 155 countries studied, 145 collected data on occupation. Seventy-six of these countries asked only for the "principal or main occupation" and 11 for the "usual or normal occupation". Twenty-seven countries asked also for the secondary occupation. All of the 14 developed countries listed earlier obtained information on occupation, some indicating "principal or main occupation" and others the "present occupation".

143. Unfortunately, the publication does not provide information on the detail in which educational attainment and occupation were coded by the different countries. Clearly, the usefulness of the census tabulations for the study of the brain drain will depend on the extent to which this coding permits the trained immigrants to be identified. There is also no information on what tables have actually been prepared on the basis of the information collected in the different countries. From the point of view of general census tabulations, meaningful tables for the brain drain will require a two-way classification merely to identify the trained immigrants, for example, country of origin by educational attainment or occupation and further cross-classification to derive information on the characteristics of those so identified. It is unlikely that many countries will include such elaborate cross-classifications of the relatively small number of immigrants in their general census tabulations but, as long as the data are available on tape or punch cards, special tabulations for the study of the brain drain problem can be derived.

144. Since the census gives information on immigrants, it is an obviously useful source for measures of the stock of trained personnel from developing countries who are in the developed countries. Developing countries would, however, need to have information on their own stock of trained personnel at home, as well as the presence of trained personnel from other countries in their home population as complementary information on the brain drain.

2. Population registers

145. A study of national population registers or similar systems in effect at the end of 1967 ^{29/} showed that the systems of 51 countries or areas collected information on place of birth. Of the 51, there were 19 that also had information on place of previous residence. Two additional systems contained information on place of previous residence but not on place of birth. Information on occupation appeared on 37 registers, 14 of which also indicated place of birth and place of previous residence, while 22 also indicated only place of birth and one also indicated only place of previous residence. Education attainment was covered by a dozen systems, of which four had information on place of birth and on place of previous residence, six only on place of birth and two only on place of previous residence.

^{29/} Methodology and Evaluation of Population Registers and Similar Systems (United Nations publication, Sales No. E.69.XVII.15), table 5.

146. The accuracy of the registers and the ease with which the relevant statistics could be extracted and assembled undoubtedly vary considerably from country to country. Since it is known, however, that a number of European countries regularly obtain statistics on migrant flow from their national population register systems, it is likely that for some countries, at least, registers could provide information on the stock of trained immigrants.