Suggested Sampling Procedure For Agriculture in Iraq

by

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A Thesis submitted to the Department of Economics at the American University of Beirut in Partial fulfilment of the requirements for the Degree of Master of Arts.

May 1953.

American University of Beirut.

ACKNOWLEDGEMENT

My deepest thanks are due to my advisors, Professor Charles W. Churchill and Mr. Asad Y. Nasr for their valuable guidance and assistance in preparing this Thesis.

I also have to thank Dr. Fuad Messah of the Department of Population of Iraq and Abdul Karim M. Rabi'i of the Principal Bureau of Statistics of Iraq for the information they have supplied to me.

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The purpose of this thesis is to consider the problems of procuring adequate agricultural statistics in Iraq. These problems are:

1. Agricultural statistics to be obtained: Complete, reliable and adequate agricultural statistics are necessary for setting up development plans for Iraq, such statistics are also of great use to the public, social reformers, international organization, foreign governments etc.

Our discussion is based on what statistics should be collected with particular reference to economic development. The possibility of collecting each item directly from the farmers through sampling technique is taken into account in determining the items to be collected. For instance information which would require the farmers to evaluate or to refer to past records is not included. Items which can be better estimated by agricultural experts are omitted.

Having determined the items of agricultural statistics to be obtained, two main techniques of securing them from the Iraqi farmers are considered, namely the personal interview and the mailed questionnaire. The first technique is found to be the only practicable one in Iraq. As this method is relatively more expensive and require more time, a questionnaire farm was designed in such a way as to offset partially the high cost in money and time. The bases on which the questionnaire form was constructed are:

a. It should be easily checkable

b. It should be ready for tabulation

Instructions about each question as well as a system of field checking which should be followed by the enumerators are fully discussed.

2. Sampling procedure:- The writer recommends that stratified multistage sampling is the best method of collecting agricultural information in Iraq. This is based on the following facts:

   i. Iraq is composed of many areas which differ greatly in agricultural conditions and activities. Thus these areas should be classified in order to be represented adequately in the sample. Therefore the sample should be stratified.

ii. Iraq is in need of trained personnel. Thus the field work should be confined to limited areas as much as possible in order to impose adequate system of supervision. This supervision can be effedtive only through multistage sampling.

Once the type of sampling is decided the next step is to determine what units should be sampled first. On the basis of having fixed boundaries administrative units (Liwas, Qadhas and Nahiyas) were preferred to villages.

It has been found that Liwas cannot be used as first stage sampling units because they constitute a very heterogeneous population. Thus any sample of them will not be representative. As to Qadhas, they were inadequte ~~also~~ because the coefficient of variation of their population amounts to 75% whih is very big.

Qadhas' Center and Nahiyas were found to be the only adequate sampling units because of the followings:

i. They constitute a less heterogeneous population.

ii. They reconcile to a great extent the two conflicting requirements accuracy and confining the field work to some areas.

On the basis of their geographical location these administrative units are sub-divided into two stratums: The Northern and Southern.

In order to get a minimum standard deviation of the population of these units each stratum is subdivided into three sub-stratum. The first includes each unit with a population of less than 20000, the second consists every unit whose population is more than 20000 but less than 80000. The third includes all units whose population is above 80000 each.

The size of sample which yield tolerable standard errors of estimates (ten per cent of the mean at 95% level of confidence) is calculated. It is found to be 71 Nahiyas and Qadhas Center. Then a sample of 71 first stage sampling unit (Nahiyas & Qadhas Center) is selected at random. This sample consist of 3573 villages and 165 Quarters. These villages & Quarters were grouped under two different strata. Furthermore each strata is sub-divided on the basis of their geographical location into two sub-stratum: The Northern and Southern.

Villages or quarters in every sub-stratum were made into frequency distribution. Then the size of the second stage sample which yields tolerable standard errors of estimated is found to be 886 villages and quarters).

In order to secure representativeness for the sample, variable sampling fractions are determined for the various size classes in the four sub-stratum. These sampling fractions are directly proportional to the class interval and to the number of units included in each size class.

Having determined the sampling fractions, a sample of 886 units were selected systematically from lists prepared for this purpose.

As regards raising factors, the actual total numbers of villages and quarters were used instead of those estimated from the sample. This is followed because ~~this~~ the latter contains sampling errors.

CHAPTER I

INTRODUCTION

1.1 The Principal Bureau of statistics of Iraq publishes some items of agricultural information in its annual Abstract. These items are collected and supplied to the Bureau by the Ministry of Agriculture, the Veterinary Department, the Department of Irrigation and the Chambers of Commerce of Baghdad, Basrah and Mosul. In addition of being incomplete, most of these items were found to be unreliable and out of date[1]. In brief, they are unreliable because the statistical officers do not use reliable methods of collecting them but estimate them from their personal knowledge. They are out of date because in spite of their being supposedly current statistics they are usually published after a lapse of two years.

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1. Each item is discussed fully on pages 28-32.

Besides publishing some agricultural statistics the Bureau has undertaken only two agricultural censi since it was established. The first census was in 1943. It failed for the following reasons[1]:

i. The police and heads of administrative units interfered in the affairs of the Census.

ii. The survey was done during World War II. Farmers were afraid to give accurate information about their farms and activities during the war.

iii. There was an absence of field checking and a lack of trained personnel.

iv. The questionnaire was not pretested.

The Bureau realized the unreliability of the information obtained and did not publish the results.

Due to the large expenses of a complete enumeration of agriculture and to the bad financial condition of the government, the Bureau did not try to undertake another census until the end of 1951. Unlike the first census it was

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1. The writer studied these causes when he was an employee in the Principal Bureau of statistics (1950-1951).

well planned. But the success or failure of this survey cannot be adequately judged now, because the information collected has not yet been completely checked and published. However the delay in publishing the current statistics would render them obsolete.

1.2 The purpose of this thesis is to consider the problems of procuring adequate agricultural statistics in Iraq.

Complete, reliable and adequate agricultural statistics are necessary for setting up development plans for Iraq. Such statistics are also of great use to the public, foreign governments, social reformers etc. Our discussion will be based on what statistics should be collected with particular reference to economic development. Also, the possibility of collecting each item directly from the farmers through sampling technique will be taken into account in determining the items to be collected. Furthermore, items which can be better estimated by agricultural experts will

not be included.

Two main techniques of securing information are considered namely the personal interview and the mailed questionnaire[1]. This discussion is carried out mainly on the basis of the practicability of collecting agricultural information from the Iraqi farmers.

A questionnaire form has been designed to carry out the technique which is recommended[2]. The bases on which the questionnaire was constructed are considered[3].

Instructions for each question are stated together with a system of field checking which should be used by the enumerators[4].

The reasons for using sampling technique instead of a complete census are considered[5]. Then, the main types of samples are discussed on the bases of fulfilling certain conditions which exist in Iraq. This discussion has lead the writer to suggest a stratified multistage sampling. As this procedure means that the sampling

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1. infra P. 59-63.
2. See appendex B.
3. infra P. 63.
4. infra P. 182.
5. infra P. 65-66.

process should be carried out through many stages the following main problems will rise in every stage.

i. Which units should be sampled?

ii. Is there available an adequate frame?

iii. What measures should be taken to reduce the heterogeneity of sampling units? What are the bases on which these measures should be carried out?

iv. On what principles will the size of the first, second or third stage sample be determined?

v. To what extent should each stratum and sub-stratum be represented in the sample?

vi. What methods or method should be followed in selecting the samples?

vii. Do the selected samples yield reliable estimates? Is the sampling error due to chance alone or to bias?

viii. What are the raising factors[1]?

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1. In this study, this problem is encountered once only (see page 167 - 171).

As there are two sampling stages in our survey, each of the above mentioned problems will be faced twice. Either the same or different techniques will be followed in every stage in order to solve each problem. These measures are dependent mainly on some or all of the following:

i. The nature of the problem.

ii. The local conditions in Iraq relating to this problem.

iii. The stage of the survey.

iv. The reliability of the survey.

v. The economy of the survey.

1.3 A pilot survey has to be undertaken in order to pretest the questionnaire form and the instructions and to train some of the field workers. Above all a pilot survey is necessary for estimating the costs in money and time required for the whole survey.

Usually a few final sampling units should constitute a pilot survey. For the purpose of our survey, it is preferable to chose a village and a quarter from every liwa. Thus fourteen

villages and fourteen quarters have to be surveyed. As no supplementary information about these sampling unit is available except the size of the population of each, it is preferable to select those whose population are each about average. This procedure is recommended for the following reasons:

i. Money and time estimates on the bases of sampling units scattered over a wide area are more accurate than those confined to limited ones.

ii. A quarter as well as a village will be selected because each unit has different agricultural conditions.

iii. The reactions of all the Iraqi farmers toward the questionnaire can be better understood.

Although this procedure weakens the control of the sponsor on the pilot survey, this can be overcome by strict supervision of the interviewers. Furthermore detailed reports on the reactions of these farmers should be supplied by these interviewers.

The money costs of the whole survey can be estimated as follows:

The questionnaire form should include a question on the number of people working on the farms. Through collecting this information, the number of farms in all the selected second stage units can be estimated on the bases of the following formula

$$N = \frac{rP}{a}$$

where N is the number of farms in all the selected second stage sample (villages or quarters)

r is the percentage of the agricultural population in the villages or quarters which constitute the pilot survey

a is the average number of agricultural population people working on per farms in the villages or quarters surveyed.

P is the total size of the population of the villages and quarters in the second stage sample.

It must be noted that this procedure has to be followed for villages and quarters separately, because the first type of unit is rural and the second, semi-rural.

Then the money cost

$$C = Nc + N_1C_1$$

where C is the money cost

N is the number of farms in the villages included in the sample

c is the average cost of filling up a questionnaire in a village as estimated from the pilot survey

N_1 is the number of farms in quarters included in the sample

C_1 is the average cost of filling up a questionnaire in a quarter as estimated from the pilot survey.

The time cost is

$$T = Nt + N_1 t_1$$

where

T is the time required for the whole survey

t, t_1 is the average time consumed in filling up a questionnaire in a village and a quarter repectively

N, N_1 is the number of farms in the villages and quarters included in the sample.

These costs are rough estimates. Thus additional amounts of money should be reserved in a contingency fund.

CHAPTER II

Agricultural Information to be Collected through the sample

2.1 Topography and Agricultural Conditions.

Iraq is one of the countries of the Middle East. It lies in the south west of the continent of Asia. It extends northwards from latitude 30° to latitude 37° and extends eastwards from longtitude 41° to longtitude 48 covering an area 435 415 sq. kms.[1]

This area can be divided geographically and topographically into four main regions[2]. First there is the desert region lying in the west and south west of the country. Second there is the plain region extending from the Persian Gulf up to a line of latitude passing through the Nahiya of Baiji which lies on the northern boundary of the liwa of Baghdad. Third there is the upland region which extends northward and eastwards from the plain region to the mountenous region. Lastly the mountenous region which lies in the north and north east of the Country.

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1. Iraq Government, Principal Bureau of Statistics, The statistical Abstract for 1950 (Baghdad, Government Press, 1952) P.1.
2. The Royal Institute of International Affairs, The Middle East, a Political and Economic Survey, (London: The Royal Institute of International Affairs 1951.) P. 236-238.

Two of these regions, the desert and the mountainous are for our purposes not important as they are very thinly populated and the activities of their inhabitants from agricultural and economic points of view are almost insignificant. Therefore it has been seen appropriate to divide the country for the purposes of our study into two divisions, the northern division and the southern division.

Administratively this large and extensive strech of land is divided into fourteen units called Liwas. The northern region comprises the liwas of Mosul, sulaimaniyah, Arbil and Kirkuk with a total area of about 75 121 sq. kms. and a total population of 1350472.[1] The southern region comprises the liwas of Baghdad Diala, Dulaim, Kerbelah, Hillah, Kut, Amarah, Muntifiaq Diwaniyah and Basrah with a total area of 157037 sq. kms. and a total population of 3449028.[2]

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1. Iraq Government, Principal Bureau of Statistics, op.cit., P.P. 1 and 18.
2. Ibid.

Climatically, the two regions differ as to temperature, humidity and rainfall. In general the northern region is cooler and more humid and receives more rain. The statistics we have on Mosul and Baghdad support this.

Table 1.[1]

Rainfall, Temperature and Relative Humidity for Baghdad and Mosul in 1950.

Liwa	rainfall (mm)	mean monthly temperature at 6 a.m. (F°)	mean monthly temperature at 3 p.m. (F°)	mean monthly relative humidity at 6 a.m. %	mean monthly relative humidity at 6 p.m. %
Mosul	421.4	53.7	60.4	74	34
Baghdad	120.8	60.5	84.8	57	27

1. Ibid., P. 7-12.

The differences between the two regions as to temperature, humidity and rainfall cause further differences between the two regions as to agricultural conditions and activities.

The total cultivable land in the two regions is about 48.1 million donums but not all of it is actually cultivated.[1] Only about 17.1 million donums are under cultivation.[2] This is due to lack of sufficient irrigation systems, credit facilities, in sufficient mechanization etc. Out of the area which is actually cultivated only about half is cultivated annually due mainly to the lack of drainage systems. There are about 16 millions of donums of cultivable land in the northern region out of which only 3.5 millions are cropped and about 32.1 millions of donums in the southern region out of which only 7.6 millions are cropped.[3]

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1. Report of Mission Organized by the International Bank for Reconstruction and Development at the request of the Government of Iraq, The Economic Development of Iraq,(Baltimore:The Johns Hopkins Press, 1952.) P.137.
2. Ibid.
3. Ibid.

The cultivable lands in each of the two regions are scattered all over the region and are separated from each other by natural barriers; in the north by mountains, hills and valleys; and in the south by deserts, swamps and rivers. This geographical separation is made more marked by the fact that in Iraq the means of transportation are not yet highly developed. Thus in some areas in both regions and at certain times of the year many of the actually cultivated lands are inaccessible or difficult to reach.

This extensive area of cultivable land comes under different types of tenure. These types are the followings:[1]

i. Mulk land (absolute ownership)

ii. Matruka land (Land preserved for some public utility)

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1. Ibid., P. 138-139.

iii. Waqf land

a. Waqf Sahih (land dedicated to some pious purposes)

b. Waqf Ghair Sahih (some rights over the land are dedicated to some pious purposes).

iv. Miri Land

a. Miri Land granted in Tapu (state land the usufractuary possession of which was granted during the Ottoman Regime).

b. Miri Land granted in Lazma (state land the usufractuary possession of which is granted to the person who cultivated it within fifteen years before the declaration of land in question being under settlement in lieu of a price paid in installments).

c. Miri sirf land (state lands which are usually rented to private persons for not more than three successive years).

This extensive area of cultivable land in both regions is unequally distributed. The size of land holding ranges from less than one donum up to two hundred thousand donums.[1] The table on the following page

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1. Khayat, Ja'afar, The Iraqi Village (Beirut: Dar El-Kashaf, 1950), PP.56.

shows the distribution of private land holdings in Iraq (except in Muntifaq Liwa).

Table 2.[1]

Total Areas of Holdings Whose Areas Are less than 501 and More than 501 Donums Expressed as Percentages of the Total Area Settled in Each Liwa.

Liwa	percentage of land settled	less than 501 percentage	more than 501 percentage
Mosul	64.2	21.2	78.8
Arbil	31.7	32.6	67.4
Kirkuk	44.4	46.3	53.7
Sulaimaniyah	14.3	42.8	57.2
Diala	37.9	13.9	86.1
Dulaim	46.6	60.3	39.7
Baghdad	68.7	30.9	69.1
Kut	100.0	7.2	92.8
Hillah	94.0	32.1	67.9
Kerbelah	42.5	23.3	76.7
Diwaniyah	26.2	35.4	64.6
Basrah	20.6	42.0	58.0
Amarah	37.7	5.6	94.4
Total	48.4	30.00	70.0

1. Report of a Mission organized by the I.B.R.D. at the request of

After perusal of the above mentioned table it will be gathered that settlement operations have not yet covered all the areas of each liwa with the exception of Kut Liwa. For instance only 64.2 percent of the area of Mosul has been settled and only about 31.7 percent of Arbil Liwa has been settled etc. It must be noted also that the sum total of the area of land settled constitutes 50 per cent of the total area of Iraq.

It follows from the above mentioned facts that the 30 per cent which represent the ratio of small holdings (less than 501 donums) and the 70 per cent which represent the ratio of big holdings (more than 501 donums) are the ratios for the areas already settled. But it is believed that we can take these figures and ratios to represent the ratios of small and big holdings to the whole of Iraq, because the areas which have already been settled are taken from all the parts of Iraq and from different places in each Liwa.

Having accepted this proposition and if these statistics are applied to all Iraq then it will be obvious that land distribution is different in the different Liwas of Iraq and that the big holdings in Iraq constitute the greater part of land holdings.

On further analysis of the above mentioned table it must be noted that the percentage of small land holdings in the northern region is greater than that in the southern region. The small land holdings in the North constitute 35.7 percent while in the south they constitute 27.8 percent of the total area.

These land holdings are mainly controlled by sheikhs, townsmen and pump owners who have little or no agricultural experience. Most of them live in the cities (Baghdad, Basrah and Mosul) far away from their lands. Consequently they employ sirkals whose main task is the management of production. These sirkals act as middlemen between the landlords and the farm laborers for a certain percentage of the land produce.

The farm laborers who actually work the land constitute the overwhelming majority of the agricultural population. Most of these farm laborers are employed on a share-tenancy basis. That is they are not paid a fixed money or real wage but they are paid a certain percentage of the produce. Thus the farm laborers' incomes depend on the agricultural conditions and prices of agricultural products. So in good seasons the income is greater than in bad seasons. Furthermore it varies from place to place but is in general more in the northern region than in the southern region.[1]

Usually share bargaining does not take place between the sirkal and the farm laborer individually. It takes place between the sirkal and the head of a family or a chief of a clan of farm laborers.[2]

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1. Ibid., P. 143.
2. Ibid.

These farm laborers who in the majority of cases work the land on a share tenancy basis are not tenants in the strict sense of the term.[1] They are not free in the use of the land. Usually the landlords or the sirkals assign to them each season the parts of land, which should be planted and the kinds of crops to be raised.[2]

The main crops that these people raise can be divided into winter and summer crops. The main winter crops are wheat, barley, linseed, lentils and checkling vetch. The main summer crops are rice, cotton, sesame, maize, green grain, millet and tobacco. The table on the following page shows the areas and quantities of each of the above mentioned crops.[3]

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1. Ibid., P. 141
2. Ibid., P. 143.
3. Although these statistics are not reliable, yet they are used to show the relative importance of each crop.

Table 3.[1]

Production and Areas under the Principal Winter and Summer Crops in Iraq for 1949.

Crops	area in donums	quantities in tons
Winter Crops		
Wheat	3493220	450000
Barley	4813717	750000
Linseed	6218	305
Lentils	43240	4764
Chickling vetch	21000	2798
Summer Crops		
Rice	617263	212000
Cotton	42398	(Bale)1855
Sesame	175519	9350
Maize	60340	9896
Green Gram	110625	11305
Millet	165155	18376
Tobacco		

1. Iraq Government, Principal Bureau of Statistics, op.cit., P.121-123

Although some or all of these crops can be found in each of the fourteen Liwas, yet each liwa by the nature of its resources and customs has specialized in the production of certain crops. For instance one might find rice in almost all the Liwas but Amarah Liwa alone produces about fifty percent of the total quantity produced in the whole of Iraq.[1] The following table shows the Liwas arranged according to their importance in producing the various winter & summer crops.

Table 4.[2]

Liwas Arranged According to Their Importance in Producing the Main Crops.

Crop	Liwas arranged according to their importance in producing the crop.
Wheat	Mosul, Kut, Kirkuk, Baghdad, Diwaniyah, Diala, Arbil, Muntifaq, Sulaimaniyah, Hillah.
Barley	Mosul, Kut, Diala, Muntifaq, Baghdad, Kirkuk, Amarah, Hillah, Sulaimaniyah, Diwaniyah, Arbil, Dulaim.
Linseed	Kut, Hillah, Baghdad, Diala, Diwaniyah.
Lentils	Mosul, Arbil, Sulaimaniyah, Kirkuk.
Vetch	Kut, Diwaniyah, Hillah, Baghdad, Dulaim, Diala.
Rice	Amarah, Diwaniyah, Muntifaq, Mosul, Sulaimaniyah,
Gaint Millet	Hilla, Kut, Diala, Arbil. Amarah, Muntifaq, Diwaniyah.

1. Ibid. P.124.
2. Ibid. P.125.

Table 4.(concl.)

Liwas Arranged According to Their Importance in Producing the Main Crops.

Crop	Liwas arranged according to their importance in producing the Crop.
Maize	Baghdad, Dulaim, Diala and Kut.
Green Gram	Kut, Diwaniyah, Hillah, Baghdad, Dulaim and Diala.
Millet	Muntifaq, Diwaniyah, Baghdad, Dulaim, Kut and Amarah.
Cotton	Bahgdad, Kut, Diala, Hillah, Mosul, Sulaimaniyah, Basrah, Muntifaq.
Tobacco	Sulaimaniyah and Erbil.

From a study of the above mentioned table one will see that although each Liwa differs in the kinds and quantities of crops it produces, yet there is a resemblance among the Liwas of the northern region in their production on one side and the Liwas of the southern region on the other side. For instance lentils are raised only in the Liwas of the northern region while linseed is raised only in the Liwas of the southern region.

Dates are found only in the southern liwasand especially in Basrah, which is considered the main

producer of dates. The main kinds are: Zahdi, Khistovei, Sayer.

The main kinds of vegetable are tomatoes, spinach, Cabbage, potatoes and okra. These are rised mainly near the cities[1].

Besides these products, the agricultural people raise livestock. But up to the present time the greatest number of livestock are kept by nomads. Livestock raised by farmers constitutes a small percentage of the livestock of Iraq.[2] Consequently the products of livestock such as milk, butter, cheese, semmah, meat, wool etc. on farms are comparatively speaking slight. A considerable part of them are consumed locally.

2.2 Information to be Collected.

Agricultural statistics may be defined as quantitative data which describe and evaluate the prevailing agricultural conditions and activities of a country. Livestock statistics are integrated with agricultural statistics. Thus agricultural statistics consist mainly of numerical data concerning land distribution land te-

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1. Report of a Mission organized by the I.B.R.D. at the request of the Government of Iraq., op.cit., P. 225.

2. Ibid., P.P. 148.

nure, means of production, types of water supply, quantities and prices of production, areas under crops, labor statistics, livestock statistics etc.

Some of the agricultural statistics measure agricultural conditions which slowly change over time and so they need not be collected often. The others measure agricultural activities which are subject to many quick changes; hence they should be collected regularly. Thus agricultural statistics can be divided into two main classes:[1]

1. "Basic agricultural statistics" which consist of information concerning the characteristics of land, means of production, types of water supply, species and numbers of livestock on farms and the number of farmers, farm laborers and other people who are dependent on agriculture. It is obvious that these statistics measure relatively slow changeable facts and so they are usually collected at intervals of every five or ten years. These periods are recommended by the Food and Agricultural Organization.[2]

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1. Food and Agricultural Organization, "General Aspect of Agricultural Statistics", Seminar on Price and Production statistics organized by the United Nations Secretariat, Beirut, 1-14 July 1952, ST/STAT/Conf.2/A/L1, P.2.
2. Ibid., P.3.

ii. "Current agricultural statistics" which consist mainly of information concerning quantities and prices of agricultural products, areas under crops, labor statistics such as wages, work hours, credit and indebtedness of agricultural population and quantities and prices of livestock products. As these statistics measure mainly agricultural activities which are subject to exterior forces which change rapidly such as weather, agricultural pests and deseases and non-agricultural activities, they are usually collected every year[1].

The main divisions and items of agricultural statistics being known, it is necessary to determine what items of information are to be collected through our sample. It is to be noted here that if there are available reliable and adequate items of agricultural statistics which are collected and published regularly in Iraq, they need not be recollected through the sample as this will lead to unnecessary expenditure of time, labor and money.

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1. Ibid.

A survey of the Annual Statistical Abstracts of Iraq which are published by the Principal Bureau of statistics indicates that the following items of agricultural statistics are regularly published:[1]

i. Quantities of agricultural produce (only for the main winter and summer crops).

ii. Areas under the principal winter and summer crops and of forests.

iii. Production per donum (only for the principal winter and summer crops).

iv. Number of water pumps and their horse power installed in each Liwa.

v. Number and type of imported agricultural machines and implements.

vi. Number of combines, harvestors, tractors and thrashors which are let by the Department of Agricultural Machines.

vii. Estimates of livestock (only for sheep, goats, cattle, water buffaloes, cameles, horses, mules and donkeys).

viii. Number of livestock (only sheeps, goats, cows, water buffaloes and camels) which are slaughtered in abattoirs classified according to Liwas (only Baghdad, Mosul and Basrah).

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1. Iraq Government, Principal Bureau of Statistics, op.cit., P.114-168 and 286-315.

ix. Wholesale average prices (in Baghdad, Basrah and Mosul) for agricultural and industrial products.

x. Wholesale price indexes for agricultural and industrial products.

It is our purpose now to test the above mentioned items and decide whether they are reliable and adequate or not.

Item No.1 and No.2 (quantities and Production per donum) are estimated by the Superintendents of Agriculture in the different administrative areas. They estimate it on personal knowledge and experience and not on objective measurement. The Superintendent visits the area passes quickly through some of the farms and asks the mukhtars about the season whether it is good or bad. He then makes estimate relying on the common understanding that a donum of land produces from five to ten times the quantity of seed sown of a certain crop[1].

Item No.2 (areas under crops) is calculated according to the common rule that a donum of land takes a definite quantity of a certain kind of seed[2]. For

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1. Rabii, A.M., A superintendent of statistics in the Principal Bureau of statistics, Ministry of Economics of Iraq, a personal interview, (Baghdad, Feb.10, 1953).
2. Ibid.

instance it is considered that one donum requires fifteen kilos of wheat but twenty kilos of barley, twelve kilos of chickling vetch, twenty kilos of rice, five kilos of sesames, twelve kilos of maize, twelve kilos of green grain, four kilos of millet and four kilos of cotton. On this basis, if the land is planted for instance with wheat, the Superintendent of Agriculture divide the total quantity of wheat sown by fifteen. The result will be an estimate of the area under wheat.

This method of calculation is wrong for two important reasons. First, it is not true that the quantity of seed sown per donum for a certain crop is fixed or followed in all parts of Iraq[1]. Second the data gathered about the total quantity of seed sown is unreliable because it is to the interest of the farmers to lessen the quantity of seed sown under the prevailing system, where there is no checking on the information given by the farmers.

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1. Report of a Mission organized by the I.B.R.D. at the request of the Government of Iraq, op.cit., P.P. 115-116.

Item No.4 (water pumps and their horse power) is collected by the Department of Irrigation[1]. In accordance with the law, it is the duty of the Department of Irrigation to issue licenses for the installation and use of water pump. In doing so it collects all the application; these must contain the name of the applicant and the number, make and horse power of the pump. These are considered by the department as the statistics of the water-pumps for that certain year. Then these are added to the previous statistics and make the data for item No.4.

Certainly this is not a satisfactory system for collecting data. It does not show the right number and horse power of the pumps in use in the various administrative units, because many changes and alterations are taking place all the time, as will be explained, while this method of collecting data describes a static condition. During usage, a number of pumps have fallen out of use and are sold as scrap, or a number of the pumps have been sold or transferred to another administrative area.

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1. Rabii, A.M., op.cit.

As to item No.5 (imported agricultural machines) the data of the imported agricultural machines and implements do not reflect the actual state as not all the imported machines are sold, and not all the machines sold are in use.

Item No.6 (Agricultural machines that let by the Department of Agricultural machines) is reliable in so far as the machines and implements of the Department are concerned. No farmer hires a machine or implement from the Department without using it and in any such transaction there are sufficient administrative and financial controls. However, it is incomplete because not only the Department lets such machines and implements. There are many big farmers who own such machines and implements who also rent them to other small farmers.

The data of item No.7 (estimates of livestock) are collected in two ways:[1] The first is through a personal interview of the owners of livestock by the Veterinary officer. In second way the Veterinary officer estimates the number of the animals according to his general knowledge about his area and its

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1. Ibid,

history and development.

It must be noted here that most of the livestock is owned by nomadic or semi-nomadic people as has been mentioned in section 2.1. Therefore the second method is not suitable or reliable, because these tribes are continually moving from one place to another. This makes it very difficult for the Veterinary Officer to give a good estimate. As to the first method it is believed that it is suitable and can be made reliable if some steps are taken to improve the method. These steps will be mentioned at the end of this section.

Item No.8 (livestock slaughtered in abattoirs) is reliable but incomplete for it does not show the true number of the animals slaughtered in all Iraq. It only shows the number of animals slaughtered in big cities. Besides it does not show the amount of meat and other by-products supplied in all Iraq, as it only gives the number and not the weight. Therefore the authorities should collect additional information on the animals slaughtered.

Item No.9 (wholesale average price) represents average whole sale prices received by the merchants and is collected by the Chambers of Commerce in Baghdad, Mosul and Basrah. It is reliable for the Chambers of Commerce are the best sources of such information.[1]

Item No.10 (wholesale price index) is reliable. But the base year (1938) is out of date and should be changed. The new base year should be selected from among the post war years and should be relatively stable as regards prices and economic activities.

We conclude that most of the above-mentioned items of agricultural information which are collected by the Departments of Irrigation, Agriculture and Veterinary and published by the principal Bureau of Statistics are unreliable or inadequate. Therefore most of them should be collected through sampling.

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1. The Principal Bureau of statistics computes these indices. The base year (1938) is out of date and should be changed also.

To determine what items of agricultural information are to be collected through the sample, it is preferable to choose those items which are vital for setting up development plans for Iraq. Furthermore these items should be easy to collect from the farmers and not require the farmers to refer to past periods or records or to give subjective opinions or to evaluate the data. Most of the farmers are very ignorant and illiterate and do not keep records for their business.

On the above-mentioned bases the following items of agricultural information should be collected through sampling.

It has been mentioned at the beginning of this section that the data required is divided into two main divisions, basic statistics and current statistics. In accordance with this division it is proposed to begin with basic statistics. However before dealing with each item separately it must be noted that all of them should be collected at an interval of five or ten years.[1]

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1. Supra P. 26.

1. "Characteristics of Land Holdings":- This item includes the size of land holding, the type of tenure and the kind of use of the land.[1]

a. The size of land holdings:- It has been mentioned in section 2.1 that land holdings vary greatly in size. This inequality in the distribution of land causes many social, political and economic problems for the Government and the public. The Government has felt the need for wiping out this inequality and has actually began certain schemes and projects such as the Dujaila project as experiments, but these were on a very small scale. It is proposed that no permanent and successful scheme for adjusting the inequalities in land holdings can be effectuated without complete data concerning the size of land holdings in all Iraq.

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1. Food and Agricultural Organization, op.cit., P.2.

b. The type of tenure: The types of land tenure as mentioned in section 2.1 are: mulk, Waq sahih Waq Ghair Sahih, matruka, miri lazma, Miri tapu and Miri Sirf. These types of land tenure have created social, political and economic problems such as disorder and armed quarrels among tribes and destruction of land and control of land by a few persons.

For scientific and intelligent solutions of these problems, it is incumbent upon the government to have complete data on land tenure. This information is very important also for the study of tenancy and farm labor as most of the rural population are landless in Iraq.

c. Kind of use of the land: This information tells us how much of the land is cultivated, used as pastures and left fallow because of the salinity of land. We also would know the amount out of use because of lack of fertilization, how much is used as orchard land and how much used for housing

and other purposes.

From what has been said, it is apparent that this kind of information is necessary to show the kind and degree of utilization of land. This will very much help the Government and reformers to suggest and take measures for the improvement and development of land utilization. For instance the Government local authorities and those interested in development of livestock will benefit by getting information about the area of pasture-land and estimates the possibilities of integrating it with agriculture. If housing conditions are known the authorities can study intelligently housing conditions and see if they are healthy and sufficient or not. Through having information about the areas left fallows because of salinity, the Government will understand the extent of this agricultural problem and think seriously of solving it according to scientific methods.

2. Types of water supply: Land in Iraq is irrigated mainly by rainfall, river flow and water pumps. Other methods are water wheels, springs

and wells. Data should be collected to show the areas irrigated by each type. Furthermore, it is very advisable to have detailed information about water pumps, their power and their prices in order that the Government can take measures to encourage their use; their devices can put new areas of land under cultivation by sending water to higher levels.

This information is necessary to enable the government to undertake sufficient irrigation systems and make more use of land and water.

3. Means of Production:- This item includes information mainly on agricultural machines and implements and draft animals. Detailed information about the above mentioned means is very necessary for any improvement in the means of production.

As to agricultural machines, the government has to know at least the make, type and horse power of each agricultural machine in order to be able to encourage and assist in the mechanization of agriculture. The mechanization of

agriculture in Iraq is very important at the present time, because agricultural machines give better qualities and more quantities of crops with less effort and money.

It is believed that in the future mechanization will be more important to the country as Iraq is an under-populated country. As agriculture develops and as more land is brought under cultivation the labor supply will become more inadequate. It will be the duty of the Government to take necessary measures for mechanizing agriculture in order to overcome the lack of labor and not to impede the development of the country[1].

4. Agricultural population: This item includes information on the people who derive their living from agriculture with knowledge about their sex and age[2]. This population consists of landlords, pumps owners, sirkals and farm laborers.

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1. Report of a Mission organized by the I.B.R.D. at the request of the Government of Iraq, op.cit., P.19.
2. Food and Agricultural Organization, op.cit. P.2

When collecting the age data it is believed that it is impractical to collect very detailed information, because the majority of the people are very ignorant and do not know their exact ages. Therefore it is thought sufficient to divide the age data into two main classes, less than fifteen years and more than fifteen years. The age fifteen has been chosen because first it gives a natural division between boys and girls on one hand and men and women on the other. Secondly, it will not make the farmers feel that there are other motives behind this question such as military service.

As Iraq is mainly an agricultural country it is necessary for the Government to know accurately the number and sex of people who are engaged in agriculture. This is useful for the study and control of population movements from agriculture to non-agricultural occupations and vice versa. Besides, this information is very important for it enables the Government to know how many of its citizens own land, how many are

landless and how many are pump-owners and sirkals.

5. Livestock: The data to be collected under this item must include the number and kind of livestock and poultry.

It must be noted here that most of the livestock in Iraq is held by nomadic people. As these people are continually moving from one place to another in Iraq and even outside Iraq it is believed that an accurate estimate of all livestock in Iraq cannot be collected through the sample. Therefore it has been decided that information about the number and kind of livestock among the nomadic people should not be collected by our sample but left to the prevailing methods which have been already described.

It has been said that the first method is suitable if certain steps are taken to insure its accuracy. These steps are: First, it is suggested that a law should be enacted to make the owners of livestock give accurate information. It is proposed that this law should include provisions which make the sheikhs of the tribes respon-

sible fpr locating the owners of livestock in their tribes. Secondly it is not advisable to have the collection of the data to the personal caprice of the Veterinary officers. A simple and definite questionnaire should be constructed and supplied to these officers.

The livestock on farms has to be enumerated by our sample. The main kinds are sheep, goats, cows, water buffaloes, horses, mules, donkeys and others. It is proposed that the questionnaire besides including these kinds should include questions about the number of the various sub-species.

The same information should be collected on poultry.

This item of information is useful to the Government to enable it to take wise steps to integrate livestock and poultry with agriculture. This idea has been suggested by the International Bank of Reconstruction and Development Mission[1].

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1. Report of a Mission organized by the I.B.R.D. at the request of the Government of Iraq, op.cit., P.245.

Having finished the Basic Statistics, we now turn to the Current Statistics which have to be collected regularly at an interval of one year as has been mentioned above.

B Current Statistics:- This division has been explained and its constituent parts have been enumerated.

1. Crop statistics: In the United Nations Secretariat Seminar on prices and Production Statistics which was held in Beirut during the period 1-14 July 1952, it was recommended that crop statistics should include "a) area under crops b) reports on conditions of crops and forecasts of yields and c) estimates of final crop yields and of total production"[1].

Reports on conditions of crops and forecasts of yields need continuous work all through the year and need agricultural experts which make the process very expensive. At the present time it is believed that the Government cannot under-

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1. Food and Agricultural Organization, "Crop Statistics", Seminar on Production and Prices Statistics organized by the United Nations Secretariat, Beirut, 1-14 July 1952, ST/STAT/conf.II/A/L/3; P.P.1-2.

take it because of lack of such experts and the great expenses which would be incurred.

Area under Crops includes "area tilled/for sowing, area sown, area under crops at a given time and area harvested".[1] This information should be collected on the main winter and summer cereals and vegetables.

Here a word should be mentioned about the special position of tobacco in Iraq. Since 1936 the Government has been the sole controller and purchaser of tobacco. No land owner or farmer can plant tobacco without first acquiring a license from the Government. Besides the Government has a monopoly of purchasing and selling tobacco. The Government has also established a special system for collecting data on tobacco. There is no need to duplicate the work and increase the expenses by recollecting it though the sample. But the tobacco Monopoly administration should collect the data in the light of the above mentioned conditions.

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1. Ibid.

The first two items, the area tilled for sowing and the area sown measure the volume of agricultural activities[1]. The area under crops at a given time shows the extent of success or failure of crops[2]. The area harvested shows the amount produced per donum and helps to indicate the capacity for extension and development[3]. Therefore it is incumbent upon the Government to collect all these items in order to be in a position to increase the productivity of land by controlling unfavourable forces which cause the failure of crops and bringing more land under cultivation.

Estimates of crops: This item should include amounts of each of the principal agricultural winter and summer crops and their totals. Furthermore the amount of vegetables citrus fruits and dates should also be collected.

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1. Ibid.
2. Ibid.
3. Ibid.

This item is very important because it is the ultimate and substantial measure for all the various agricultural activities of the country. Besides, it is of special importance to Iraq, because as has been mentioned above the majority of the farm laborers receive a certain percentage of the amount of the produce as wages.

Therefore the Government has to collect this item in order to improve agricultural activities and conditions by encouraging certain plantations or limiting others as it sees fit. Furthermore it is of use to the public because this item of information enables them to forecast the ~~demand and~~ supply of various products in the future.

2. Labor statistics: This item consists mainly of wages received by farm laborers. These should be classified according to age, sex, type of work (skilled and unskilled) and hours of work.

In most of the cases in Iraq, money wages cannot be collected directly from the farm laborers, because their wages consist of a certain percentage of the produce. It is believed that the best way of getting the money wage is to collect the actual amount of the produce received as wages by the farm laborers and value it by the whole sale price which is received by the farmers. The money wage (value of the farm laborers share) represents the wage for the whole season. As a wage is the amount of money received for a unit of time either a day, a week or a month, to get this wage one must know the lenght of the season. And as seasons of the different crops ~~are~~ are known, our questionnaire should not include questions about the length of the season of each crop. By dividing the value by the period we get the wage.

This wage in the majority of cases belongs to a family or a clan of farm laborers, as it has been mentioned[1].

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1. Supra 20.

Therefore we have to divide this wage by the number of farm laborers concerned in order to get the money wage of each, be it a man, a woman, a boy or a girl. An attempt might be made to get the man-wage, woman-wage and the boy-wage but there seems no accurate and mathematical criterion by which we can measure this. If a difference is to be made at all, it is suggested that this can be made on the basis of money wages received in some cases by the different age and sex groups of farm laborers.

As to the type of work no information can be collected about it because of what had been said above. In addition all the farm laborers do the same kind of work with the exception of two limited classes which are not members of families or clans.

The first class consists of those who work on machines and pumps and get a fixed money wage. As regards this class detailed information about their wages can be collected directly. Therefore the questionnaire should include questions about it.

The second class consists of sirkals who are the managers of production and the landlords' agents and who can be considered as skilled farm laborers. These receive, like the farm laborers, a certain percentage of the produce. Therefore the only information that can be procured is the value of their share which represent their wage for the whole season. However here the money wage can be calculated with ease, because there is only one sirkal and not a family or a clan of sirkals as is the case with the other farm laborers.

As to the hours of work, again there seem to be no accurate methods of getting them, because all or some of the farmers work all day. They have no fixed periods for work and follow no regular schedule.

From the above mentioned discussion it has been shown that not all the items of labor statistics can be collected directly or even indirectly from the farmers. The items that can be collected are: the value of the

farm laborers' share, the value of the sirkals' (skilled laborers) share, money wages and work hours of some farm laborers and workers on machines and pumps.

This information is of great value to the government and to the public. It is useful to the Government because farm laborers constitute the majority of the population of Iraq. These farm laborers are in a very bad condition and the Government is serious in wanting to improve their conditions. We believe that no intelligent reforms can be introduced without knowing at least the above mentioned information. This information is also useful to the public, because it gives information about the cost of a major factor in production and helps the employers and labourers to forecast the supply and demand of labor.

3. Credit and indebtedness of the farmers: This item consists of the amounts of money borrowed or lent to farmers.

As the farm laborers are in general extremely poor and cannot by any means offer to get capital on their personal initiative, the custom has been that the landlords advance the necessary capital and other means of production like seeds, draft animals, fertilizers and other machines and implements. These constitute the major items of loans. Obviously this is not a money loan and therefore it is necessary to express this loan in terms of money. To arrive at this the questionnaire should include questions about the money value of constituents of the loan when it is received.

Usually the farm laborers repay this loan from their share of the produce of land at a price already fixed, much below the current price at the time of the harvest, with a fixed rate of discount.

In some cases landlords lend farm laborers money by which the farm laborers provide themselves with the required seeds and implements. In this case the farm laborers are supposed to repay the money loan from their share of

the produce also at a discounted price.

Thus in both cases the interest rate takes the form of buying the farm laborers share at a highly discounted price. Therefore the interest rate can be calculated on the basis of collecting information on the discounted prices.

Landlords and farmers do not always have adequate capital to lend to share tenants. In many cases they borrow in order to lend, and they either borrow from the Agricultural Bank or from other sources. If they borrow from the Agricultural Bank, the interest rate does not raise any problem for it is fixed by law at seven percent. However if the debt is from other sources, then the interest rate has to be stated.

Knowledge about the amount borrowed or lent for agriculture and the interest rate on such loans and debts are of great importance to the Government and people.

In the light of such knowledge the Government will be able to evaluate the credit facilities it has already established and can plan

improvements by introducing new measures or encourage the creation of new cooperative credit societies. This will undoubtedly benefit the farm laborers who constitute the majority of the population.

This information is also very useful to the capitalists and money lenders, because by knowing the interest rate and the amount of capital lent in the field of agriculture they can decide intelligently on how far it is beneficial for them to lend capital to agriculture or other economic fields.

4. Products of livestock:- This item consists of information on milk, butter, cheese, semmah, meat, skins and hides, intestines, wool, chicken meat and eggs.

It has already been mentioned that most of the livestock is owned by the nomadic tribes consequently most of the livestock come from these tribes[1]. It was also been men-

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1. Supra P. 25.

tioned concerning the number of livestock held by the nomads that the best way of estimating it, is through the Veterinary Officers. It is suggested here that the data concerning the various products of livestock held by the nomadic tribes be collected again through the Veterinary Officers.

As to livestock products on farms, it is suggested that this information be collected through sampling.

As the farmers are on the whole illiterate and do not keep records of their business as when collecting the data, the questions should be about a short and recent period such as the previous week.

Livestock products constitute a very substantial part of the food of the country and not an insignificant part of the income of the farmers. Therefore it is essential for the Government to have full information about them. By knowing such information it can take measures to improve the quantity and quality of these products and by so doing provide the country with an

essential source of food. The public, besides benefiting from this, can have a clear idea about the supply and demand of such products.

Agricultural Prices: This item consists of wholesale or retail prices of agricultural products received by farmers as buyers or sellers, prices of dealers in agricultural products as buyers or sellers or those supplied by market reporters or Government Officials.[1]

It has been mentioned on page (34) that the wholesale prices received by dealers in agricultural products as buyers and sellers are already available in Iraq and are supplied regularly by the Chambers of Commerce of Baghdad, Basrah and Mosul and are published by the Principal Bureau of Statistics.[2] Hence there is no need to collect such information again. Also the Principal Bureau of Statistics is concerned with these prices and regularly collects

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1. United Nations Secreteriat, "Statistics of Agricultural Prices", Seminar on Production and Prices statistics, Beirut, 1-14 July 1952, ST/STAT/conf.2/A/L.5.P.3.
2. Supra P.

the prices of some of the Agricultural products and issues a wholesale price index regularly every month. These prices are collected through sending Government Officials to the market twice a week (Monday and Tuesday) who report these as the prices during that week.

Each type of the above mentioned prices is significant in certain economic analysis.[1] For instance retail prices received by dealers in agricultural products as sellers are needed in constructing the cost of living index etc.

It must be noted here that the prices which are collected by the principal Bureau of stastics and by the Chambers of Commerce need not be collected again. These prices cannot be collected through our sample as the sample includes only those who pursue the work of farming (i.e. farmers and landlords).

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1. Ibid., P.4.

The types of agricultural prices which can be collected through the sample are the wholesale and retail prices of agricultural products received by farmers as buyers and sellers. These prices are useful mainly in:

i. enabling us in getting the money wages of the farm laborers.

ii. enabling us to estimate the values of crops.

iii. enabling the farmers and dealers in agricultural products to forecaste future prices.

iv. enabling the Government to take measures to stabilise agricultural prices at given levels.

Retail prices by farmers as sellers of agricultural products are not important from the standpoint of evaluating the crops and of estimating the money wage received by farm laborers, because most of the agricultural products are owned by big landholders who sell the produce in big quantities. What is sold in retail constitutes only a small percentage of the total produce.

Therefore wholesale prices exfarm received by the farmers as sellers or buyers of agricultural products should be collected through sampling. It must be noted here that these prices are the prices of the quantity of the crops without being standardized, because it is not yet the custom among farmers to standardize their crops.

2.4 Method of Collecting the information.

There are two main methods through which statistical information can be collected. These are mail questionnaire and personal interview.

The Mail questionnaire method means that questionnaires are sent by mail to the informants who answer the questions and return them to the sender.[1]

Collecting information through this method has the following advantages:[2]

1. It takes less time and costs less money than the personal interview method. This is due to the fact that trained interviewers

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1. Parten, Mildred, Surveys, Polls and Samples:Practical Procedures, (New york:Harper & Brothers,1950), P. 93.
2. Ibid., P.94.

and supervisors are not needed and a wider area can be surveyed much faster.

ii. It relieves the informants from the influence and effects of the interviewers.

On the other hand we should not overlook the many serious disadvantages inherent in this method. Most outstanding of these are the followings:[1]

i. A considerable percentage of the questionnaires will not be sent back by the informants, and consequently the returned ones are not representative. Experience has shown that a small percentage of all questionnaires sent to informants in a survey are returned.[2]

ii. The returned questionnaires contain inaccurate or incomplete information due to the absence of field checking and supervision and to the misinterpretation or misunderstanding of the questions by the informants.

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1. Ibid., P.95.
2. Ibid., P.

Besides the disadvantages mentioned, this method presupposes that the informant can read and write. This requirement renders this method absolutely an impractical way of collecting agricultural information in Iraq because the majority of the Iraqi farmers are illiterate.

The personal interview method means that the interviewers ask the informants (the farmers) certain specified questions and note down the answers in the questionnaire forms designed for this purpose.[1] In other words this method does not require that the farmers be literate, because the interviewers themselves fill in the questionnaire forms.

In addition to the above mentioned advantage of this method, speaking in relation to Iraq and other underdeveloped areas, we can point out the following advantages:[2]

1. It ensures a high degree of accuracy of the information given by the informants due to the presence of field checking and

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1. Ibid., P.72.
2. Ibid., P.79-80.

supervision, to the possibility of interpreting ambigious questions, and to the ease of correcting wrong answers and filling up incomplete questionnaires.

ii. The interviewers can report the reactions of the farmers toward the different questions. Knowledge about these reactions enables the sponsors of the surveys to clarify some questions, modify others and omit or add some at any stage of the survey as they see fit.

iii. It ensures a high percentage of respondents. This merit has to be explained in relation to sampling. Having a certain percentage of non-respondent in a sample survey is a serious problem, because it may destroy the representativeness of the sample. By using the personal interview method it is very simple to locate non-respondents who could be contacted easily and made cooperative. There are several ways to get the cooperation of these non-respondents. Interviewers should

fully explain the purposes of the survey and that it will not harm the informants. Suspicions such as increased taxation and military service should be fully cleared from the minds of the informants. The disadvantages of this method are as follows:[1]

i. It is more expensive and requires more time. More time and money are needed because interviewers and supervisors should be well trained. Moreover traveling of the interviewers from one place to another increases the expense of the survey.

ii. A larger and more specialised staff is necessary for the completion of the survey.

This method can be made relatively less expensive in money and time through designing the questionnaire form in such a way as to make it easily checkable and ready for tabulation (see Appendix B). To make the questionnaire easily checkable it is proposed that all related questions should be grouped together. To make it ready for tabulation it is advisable to put the questionnaire in its final form while the words of each question should be put in the instructions.

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1. Ibid., P.81.

CHAPTER III

Suggested Sampling Procedure: First Stage Sampling

3.1 To overcome the main obstacles (the high costs in money and time) to the establishment of a regular recurring system of collecting agricultural statistics in Iraq[1], partial enumeration is rdcommended instead of a complete one. In India, for example, experience has shown that the costs of a sample survey of agriculture which yielded reliable estimates amounted to only 1/15 of the total costs incurred in a complete census.[2] This however does not mean that the same reduction in costs will happen in Iraq due mainly to the different agricultural conditions prevailing in each country and to the different designs of the surveys followed.

Another advantage of sampling technique is that more detailed information about the population studied can be secured provided that the fund to be alloted for a sample survey is the same as that for a complete census.[3] Furthermore the information delivered by the informants may be

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1. Supra P. 2-3
2. Roa, R. "Basic Ideas of sampling and Errors in Sample Survey", International Statistical Education Center -(Calcutta: 1950-1951.) P.1.
3. Parten M.J. op.cit., P.109.

more accurate in a sample survey than that obtained through a complete census due to the possibility of imposing a system of internal and external checkings in the case of sampling[1].

To decide on the sampling procedure to be followed in collecting agricultural information in Iraq, the writer deems it necessary to discuss the main types of samples. These are as follows:[2]

i. Judgment sample: This type needs agricultural experts who can make comparative studies of the different agricultural areas in a country. Then on the basis of their study, they can select some areas which represent the whole country.

The sampling errors of estimates yielded by samples of this type are incalculable.[3]

ii. Random sample: the units which constitute the sample are determined by chance alone. Consequently the sampling er-

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1. Ibid., P.110.
2. Deming, W.D., Some theory of Sampling (New York: John Whily & Sons 1950) P.9-10.
3. Ibid.

ror can be calculated on the basis of probality theory.

A judgment sample is not recommended for Iraq for three reasons. First, Iraq is lacking in agricultural experts. Second, if such experts be found or brought from foreign countries, it will be costly in money and time to perform a detailed study of the agricultural conditions and activities which exist in the various parts of Iraq. Finally as the sampling error is incalculable, the results yielded by this sample cannot be trusted at any level of confidence.

On the other hand as a random sample is relatively inexpensive in money and time and as sampling errors of the statistics yielded by it are calculable, it is recommended for Iraq.

Random samples are of many types. The main types are: simple random sample, stratified sample, multistage sample, area sample, etc. To decide on the type of random sample

to be followed in Iraq two facts should be taken into account:

i. Iraq is composed of many areas which differ greatly in agricultural conditions and activities[1]. Thus these areas should be classified in order to be represented adequately. Therefore the sample should be stratified.

ii. Iraq is in need of trained personnel. Thus the field work should be confined to limited areas as much as possible in order to impose adequate supervision. This supervision can be effective through multistage sampling.

Therefore the type of sample which has to be followed in Iraq in order to survey agriculture should be a stratified multistage one. Beside fulfilling the above mentioned requirements, this type of sample requires less money and time than other types of samples[2].

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1. Supra P. 11-25
2. Deming, W.D., op.cit., P.136.

Once the type of sample is decided, the next step is to determine what units should be sampled first. On the basis of having fixed boundaries, administrative units were selected. But what type of administrative units are most adequate for this purpose?

3.2 First stage sampling units:- To define clearly the first stage sampling units which should be used in a sample survey of agriculture in Iraq, it is necessary to begin first with a survey of the different administrative units in Iraq.

It has been said that Iraq is sub-divided into fourteen administrative units called Liwas. Each Liwa has a center called the Liwa's Center. A Liwa Center consists administratively either of a city alone or of a city with many villages attached to it. Baghdad and Mosul are of the first type while Hillah, Kerbelah and Kut are of the second type.

Each of the fourteen Liwa is sub-divided into relatively many small administrative units called Qadhas. The number of Qadhas into which a Liwa is sub-divided varies. One of the Liwas, Mosul, is sub-divided into eight Qadhas whereas

the Liwa of Kerbelah is sub-divided into two Qadhas only. Also each Qadhas has a center called the Qadha's Center. It must be noted here that the centers of the fourteen Liwas are at the same time the centers of fourteen Qadhas. For example the Center of Kut Liwa is the town of Kut which is at the same time the Center of Kut Qadhas. However for convenience they will be called Qadha centers only.

Likewise each of these Qadha centers consists administratively of either a small town alone or a small town with many villages. For instance the Qadha center of abu Sidhair consists only of a small town while the Qadha center of Rifai consists of the town and many villages.

Going further into the administrative subdivisions each Qadha is also subdivided into smaller units called Nahiyas. A Nahiya includes a center and a certain number of villages. These differ from one to another. We may have less than ten villages or more than a hundred forming a Nahiya.

The centers of either a Nahiyas or Qadhas are subdivided into Quarters. The number of quarters into which a Qadha Center (the town only) of a Nahiya center is subdivided varies greatly. For instance Baghdad city is subdivided into 76 quarters whereas Samarrah center is subdivided into three quarters.

Therefore we conclude, from the administrative angle, that

i. Iraq is subdivided into fourteen Liwas.

ii. These fourteen Liwas are subdivided into sixty Qadhas[1].

iii. These sixty Qadhas are subdivided into 132 Nahiyas and 60 Qadhas Centers[2].

iv. These Nahiyas and Qadhas Centers consist of 9235 villages and 614 quarters[3].

Having examined the various administrative units in Iraq, the second step is to determine which unit (the Liwa, Qadha, Nahiya and Qadha Center or villages and quarters) should be used as first stage sampling units when a sample survey of agriculture has to be undertaken in Iraq.

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1. Iraq Government, Department of Population, Unpublished Data supplied personally to the writer,(Baghdad: Feb.1953).
2. Ibid.
3. Ibid.

It has been shown that Liwas differ from each other in respect to the kind of crops raised, distribution of land, amounts of shares received by the different classes of agricultural population and other agricultural conditions and activities.[1] Furthermore these Liwas differ greatly from each other in population and area. For instance Baghdad Liwa has a population of 817205 and an area of 16325 sq.kms. whereas the Dulaim liwa has a population of 192983 and an area of 39294 sq.kms.[2]

Thus if a sample of these Liwas is chosen at random, it will not be representative of all Liwas. In other words the agricultural information which has been mentioned in section (2.2) cannot be estimated accurately through a random sample of Liwas. For instance if a sample of Liwas is taken and if Amarah Liwa does not happen to be included in the sample, statistics on rice which would be estimated from the sample could not be applied to all Iraq, as Amarah Liwa is the main producer of rice. Or if Bas-

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1. Supra P. 11-25
2. Iraq Government, Principal Bureau of Statistics, op.cit., P.19.

rah Liwa is not included in the sample, the quantities of dates produced in all Iraq which will be collected through a sample of Liwas will be underestimated. Or if Kut Liwa is by chance missed from the sample, statistics on the distribution of land in Iraq will be unreliable if they are estimated from a sample of Liwas etc.

Therefore it is proposed that Liwas should not be taken as first stage sampling units because they are very hetrogeneous units and so any sample of them chosen at random will not be representative of all Liwas.

As regards Qadhas they also differ from each other in population and area. The population of these Qadhas ranges from 6604 up to 558820 and their areas range from 508 sq.kms. up to 20341 sq.kms.[1] This shows that the difference in area and population is great.

In spite of the apparent great variability in the population of these Qadhas, an attempt was made to estimate the standard deviation of the population. The purpose of this is to find out whether

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1. Ibid.

it is possible to get the mean of the population of these Qadhas through choosing at random a sample of them or not. But the result was that any sample whatever its size may be will not yield adequate estimate of the mean of the Qadhas' population due to the intolerable standard error of the mean yielded by the sample. For it has been found that the standard deviation which is computed from the frequency distribution of these Qadhas equals to 57700. This is quite a big standard deviation because it amounts to 75 percent of the mean of the Qadhas' population[1].

That if a sample of twenty five Qadhas were chosen at random, the standard error of the mean will be equal to $\frac{57700}{\sqrt{25}}$ (i.e. 11540) which is an intolerable standard error at the 68 percent level of confidence. Furthermore if we double the size of the sample the standard error will still be intolerable, because it equals 10.7 percent of the mean at the 68% level of confidence.[2] As statisticians tolerate only 10 percent of the actual mean at

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1. See Appendix(D)
2. See Appendix(D)

95 percent level of confidence[1], it follows that the mean of Qadhas' population estimated from a sample of fifty Qadhas possesses an error of 21.4 per cent of the actual mean at 95 per cent level of confidence which is intolerable. Therefore we can safely say that a random sample of Qadhas' population will give results which cannot be generalized on all Qadhas. That is any sample of Qadhas can not be representative because of the great variability in their population. The same conclusion is reached if the areas of these Qadhas are substituted for the population because they vary greatly too.

These big differences in the populations and areas of the Qadhas reveal further differences in agricultural conditions and activities. For instance labor is scarce in big but thinly populated Qadhas like the Akkar Qadha but is abundent in small but crowded Qadhas like Baqoba. These differences in the supply of labor and land have affected the amounts of shares received by the different classes of the agricultural population, the types of crops raised, methods of production etc.

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1. From a personal Interview with Mr. Nasser, A.(Beirut 1953).

The Qadhas of the same liwa may differ in agricultural conditions and activities. For instance Kerbelah is subdivided into two big Qadhas each one having its own geographical and natural resources. Of Basrah Liwa is subdivided into three Qadhas which may differ from each other in agricultural conditions and activities. Although we may find that two of the three Qadhas may have almost similar characteristics and differ from the third one, we should know which two of them are similar in order to choose only one from them and include it with the third in our sample to get representativeness. This procedure should be followed in all Liwas of Iraq if a sample of Qadhas is to be taken.

To follow such a procedure the services of agricultural experts are needed. The duty of the experts is to make a comparative study of these Qadhas and group them under different categories on the basis of their agricultural conditions and resources. Due to the lack of such qualified experts in Iraq at present, the procedure cannot be recommended. Moreover it would cost too much and take too long.

The heterogeniety of the Qadhas in population, area, and natural resources makes it unadvisable to take them as first stage sampling units in a survey of agriculture.

On the basis of their convenience and adequacy the Nahiyas and Qadhas' centers are taken as first stage sampling units. There are several reasons for their selection. The following are the most important of them:

1. Each Liwa consists of several Nahiyas and Qadhas centers. For instance the Liwas of Mosul, Diala, and Muntifaq consist of thirty, fourteen, and twelve Nahiyas and Qadhas' centers respectively[1]. The average number of Nahiyas and Qadhas center per Liwa is about fourteen. It follows that these units are relatively small and, consequently, less variable than the preceding units.

   As the total number of Nahiyas and Qadhas centers is relatively large (193) the standard errors of statistics yielded by a sample of them can be reduced through

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1. Iraq Government, Department of population, op.cit.

increasing the size of the sample.

ii. These units are preferred to villages even though the latter are smaller and less hetrogenous than the Nahiyas and Qadhas' centers. This is due to the fact that as Iraq has no qualified personnel, it is deemed necessary to confine the field work to certain limited parts in order to control and supervise the interviewers. Moreover this procedure reduces the expenses of the survey a great deal.

iii. Even though the Nahiyas and Qadhas centers differ from each other in agricultural conditions and activities and in population, this variability can be much reduced through multiple stratification.

3.3 Stratifications of First Stage units:

It has been mentioned that Iraq can be divided into two regions on the basis of agricultural conditions and activities. These two regions are the the Northern and Southern Region. The two said re-

gions as was mentioned, above differ from each other in climatic conditions, water supply, kind of crops raised, distribution of land etc. In addition to this, the productivity of land in the two Regions is not the same. The available statistics show that in the southern region the production per donum of land of wheat and barley are 250 and 350 respectively while they are considerably less in the other Region[1]. Therefore by grouping all Nahiyas and Qadhas' centers of each region under one stratum, their variability in agricultural conditions and activities is much reduced.

In this study, all Nahiyas and Qadhas' Centers are grouped under two strata: the first includes 73 in the Northern Region and the second comprises 115 in the Southern Region.

The variability of the population of these units could be reduced if the following steps were taken.

i. It is proposed that each unit with a population of less than 3000 be combined with another adjacent unit or units. In doing so the standard deviation of the population of

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1. Khayat, Ja'afar, op.cit., P.11.

these Nahiyas and Qadhas' Centers will be the smallest if no other steps are taken. It must be noted here that this procedure is of value in assigning equal probabilities to less inequal units when a sample of them has to be drawn.

Such a combination was made and it was found that the following Nahiyas and Qadhas centers had to be incorporated in order to form one first stage sampling unit.

a. Amadia Center and Torirkan

b. Zeebar center, Barazan and Bazyan

The above mentioned units fall in the Northern Region (stratum No.A). As regards the southern region (stratum No.B) the following combinations are made:

a. Hashimiyah Center with the Nahiya of Qasim

b. Abu Sidhair Center with the Nahiya of Hirah.

It must be noted here that through these combinations the seventy eight Nahiyas and Qadhas Centers which come under the first stratum were reduced to seventy five first stage sampling units and which come under the second stratum were reduced from 11½ to 11.

ii. The second step of reducing the variability in the population of the first stage sampling units is through stratifying them on the basis of their population. It has been found that through the following stratification, the least possible standard deviation will occur. These stratifications are:-

a. All units whose populations are less than 20000 each are grouped together under the first substratum.

b. All units whose populations are more than 20000 but less than 80000 each are grouped under the second substratum.

c. The third substratum consists of every unit with a population of more than 80000.

It must be noted that the above mentioned stratification are applied to the two said strata (the Northern and Southern strata). The size of each substrata varies. For convenience the following table is inserted in order to show the numbers of first stage units which come under the different sub-strata.

First Stage Units Which Come Under
The Different Substrata.

Code No.of substrata	size of population	stratum (A)	stratum (B)
1	3000 - 20000	59	47
2	20001 - 80000	14	62
3	more than 80000	2	3
		75	112

Having stratified sampling units as discussed before, it is deemed necessary to draw a sub-sample from each substratum in such a way as to have each sub-stratum adequately represented. This is accomplished by the combination of these sub-samples. The resultant sample is consequently representative of each unit in the population and the all different sub-strata. In addition to being representative the sample should be economical and yield estimates with tolerable standard errors.[1] In order to be economical the size of the sample should be

1. Parten, M., [illegible], op.cit., P. 290.

small. This condition conflicts with the requirement that it should be large enough to produce tolerable standard errors of estimates. In other words, any decrease in the size of the sample will affect the reliability of the results and vice versa. Therefore the designer of the survey has to reconcile between these two conflicting requirements on the basis of the amount of money assigned for the survey and the range of tolerable standard error requested.

It is impractical now to determine actually what should be the size of the sample of first stage units in Iraq which reconciles the above mentioned two contradictory requirements because of the following reasons:

i. No such sample 's Survey of agriculture was undertaken in Iraq in order to estimate the money cost of a sampling unit on the basis of its cost record.

ii. If there is no cost record of a previous survey, a pilot study should be

made to achieve the end mentioned in No.i. This is not within the limit of this thesis.

iii. As it is neither possible to suppose that funds alloted for the survey are determined nor is it practical to foretell the cost of either adding or diminishing a sampling unit from the sample, it is proposed that the size of the sample should be determined only on the basis of tolerable standard errors. This does not mean that adjustment of the size of the sample to the assigned fund cannot be carried out. For adjusting the size of the sample to the available money can be done through either adding or ignoring some units included in the sample.

Therefore the determination of the size of the sample only on the basis of tolerable standard error is now inevitable.

Statisticians have actually proved that the standard error of the mean is directly proportional to the standard deviation of the population and inversely proportional to the sequare root of the number of units included in the sample. Or to put in a formula.[1]

1. Croxton, F.E. & Cowden D.J., Applied General Statistics, (New York: Prentice Hall 1939) P.

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{N}}$$

where $\sigma_{\bar{x}}$ is the standard error of the mean

σ is the standard deviation

N is the number of units included in the sample.

It is axiomatic that if any two of the above mentioned three variables are known, the third one could be easily calculated. Thus to compute the size of the sample of the proposed first stage units it is necessary to know both, the standard deviation of the population and the amount of tolerable standard error.

It has to be noted here that the smaller the standard deviation is, the smaller the number of units included in the sample will be; this requires that the standard error remains the same. Thus stratification of the first stage sampling units into six substrate have been done[1].

Furthermore it has been found that in excluding two substrata (namely those including every first stage unit with a population of more than 80000 in the

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1. Supra P. 78 - 82

Northern and Southern Regions) the standard deviation of the population will be very much reduced. Fortunately this can be done because of the following reasons:

i. The number of sampling units included in these two substrata is five which is a very small number.

ii. These units are the centers of the Qadhas of Baghdad, Mosul, Kirkuk, Basrah and the Nahiya of Kerradah. Most of these units are urban areas and they need not be covered.

Therefore it is proposed that the above mentioned two substrata should not be sampled. These units will be treated on pages (162 - 166).

Thus the standard deviation of the population of the units in the remaining four sub-strata is computed.[1]

As to the amount of tolerable standard error, it has been said that statisticians accept a mean with a standard error of not more than ten percent of the actual mean at the 95 per cent level of con-

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1. see appendix (F).

fidence. Thus the actual mean of the population of the proposed first stage unit was computed from government records, and it has been found to be 20900.[1] An error of ten per cent of the actual mean at 95 per cent level of confidence is 2090. At 68 percent level of confidence the standard error is equal to 1045.

Having known the standard deviation and the amount or tolerable error of the mean, the size of the sample can be found by applying the formula mentioned on page (86). That is

$$1045 = \frac{8800}{\sqrt{N}}$$

$$\sqrt{N} = \frac{8800}{1045}$$

$$N = 71$$

Therefore the number of the proposed first stage units which should be included in the sample is equal to seventy one. As the total number of all first stage units is 182, the size of the sample will be a little less than two fifths.

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1. see appendix (E)

In more specific words, the exact sampling fraction is $\frac{71}{182}$ i.e. 39% of the total number of sampling units.

It has been previously stated that a separate sample should be drawn from within each substratum. Therefore the determination of the sizes of these sub-samples is necessary provided that their total size does not exceed seventy one units. As the number of sampling units in each substrata varies, it is suggested that the size of each sub-sample should be proportional to the number of units included in that substratum from which it is drawn. Since the total size of these sub-samples is about 39 percent of the whole units, as stated above, it follows that each sub-sample should include 39 per cent of the units of its sub strata. The table on the following page shows the sizes of these sub-samples and the number of units in the sub-stratum from which each one is drawn.

Table 6.

The Sizes of Sub-Samples and Their Respective Sub-Strata.

	sub-strata	stratum (A)		stratum (B)	
		units in a sub-strata	unit in the sub-sample	units in a sub-strata	units in a sub-sample
1	less than 20000	59	23	47	19
2	20000-80000	14	5	62	24
		73	28	109	43

Having known the sizes of sub-samples of all sub-strata and what should be the size of the resultant overall sample, the next step is actually to draw these sub-samples from their respective sub-strata.

All units in all sub-strata were given sequence numbers from 1 to 182. By the use of random table (we used random number of three digits only), the writer selected those sampling units whose code numbers are given by the Table from the four sub-strata. When the required number of sampling units to be chosen from a sub-stratum were exhausted, any further units whose code number had been given by the table and included in that substratum were ignored, while we continued choosing from the other sub-strata until the required numbers of sampling units to be chosen from each of the remaining sub-stratum had been exhausted. For instance, it happened that the five required units to be chosen from stratum A substratum two were already chosen, while the other required numbers from their respective sub-stratum had not yet been selected. What was done, was that any unit from stratum A substratum two whose code number was given by the table was ignored while the writer continued choosing from the other

substrata. This procedure was followed until the required numbers of sampling units from each sub-strata were chosen.

This procedure was followed in order to give equal probalities for each unit in a sub-stratum. The equal probalities assigned to the units of a sub-stratum are different from the equal probalities of another substratum etc. This means that each unit in a substrata is given equal chance to be included in the sample but less or more chances than that assigned to units in other substrata. By doing so, the sample chosen at random is unbiassed.

As a result of the above mentioned procedure of drawing a sample at random from a stratified population, the first stage sampling units on the following page were chosen[1]

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1. It has to be noted that information about the population of every Nahiya, Qadha Center, village or quarter which will be mentioned in the following pages was taken from the records of the Department of Population of Iraq.

Table 7.

A Stratified Sample of 71 Out of 182

First Stage Sampling Unit.

Stratum A

Sub-Stratum 1.

A Sub-Sample of 23 Out of 59 First Stage Sampling Units.

Liwa	Qadha	Sampling unit	Population (X)	(X^2)
Mosul	Amadia			
		Barwari Bala	11638	135300000
Mosul	Zakhu			
		Silivani	8917	79520000
Mosul	Zakhu	Al-Gilli	5358	28710000
Mosul	D'hok			
		D'hok	14229	202200000
Mosul	Aqra			
		Al-Ashayer Sab'a	10271	105500000
Mosul	Aqra	Bira Kabrah	8832	78010000
Mosul	Sinjar			
		Al-Shimal	10920	119200000
Mosul	Shikhan			
		Al-Quosh	11720	138500000
Mosul	Tall'afar			
		Al-Iyadiyah	9534	90900000
Arbil	Rawanduz			
		Balak	9751	95080000

A Stratified Sample of 71 Out of 182

First Stage Sampling Units (Cont'd.)

Stratum A

Sub-Strata 1.(Cont'd.)

Liwa	Qadha	Sampling unit	Population (X)	(X^2)
Arbil	Rawanduz	Merga Sor	4158	17290000
Arbil	Ranish			
		Ranish(Center)	13431	180400000
Arbil	Ranish	Chanaran	4736	22430000
ulaimaniyah	Sulaimaniyah			
		Tanjru	10490	110100000
ulaimaniyah	Halabcha			
		Khormal	19577	383000000
ulaimaniyah	Halabcha	Warmawa	6857	47400000
ulaimaniyah	Shaharbazar			
		Shaharbazar (Center)	17341	300000000
ulaimaniyah	Bishder			
		Mirgah,(Bankard)	13471	181500000
Kirkuk	Kirkuk			
		Altoon Kopri	14955	223400000
Kirkuk	Kufri			

A Stratified Sample of 71 Out of 182

First Stage Sampling Units (Cont'd.)

Stratum A

Sub-Strata 1.(Cont'd.)

Liwa	Qadha	Sampling unit	Population (X)	(X^2)
Arbil	Rawanduz	Merga Sor	4158	17290000
Arbil	Raniah			
		Raniah(Center)	13431	180400000
Arbil	Raniah	Chanaran	4736	22430000
Sulaimaniyah	Sulaimaniyah			
		Tanjru	10490	110100000
Sulaimaniyah	Halabcha			
		Khormal	19577	383000000
Sulaimaniyah	Halabcha	Warmawa	6857	47400000
Sulaimaniyah	Shaharbazar			
		Shaharbazar (Center)	17341	300000000
Sulaimaniyah	Bishder			
		Mirgah,(Bankard)	13471	181500000
Kirkuk	Kirkuk			
		Altoon Kopri	14955	223400000
Kirkuk	Kufri			

A Stratified Sample of 71 Out of 182

First Stage Sampling Units (Cont'd.)

Stratum A

Sub-Stratum 1.(Cont'd.)

Liwa	Qadha	Sampling unit	Population (X)	(X^2)
		Kufri(Center)	4760	22660000
Kirkuk	Chemchemal			
		Chemchemal (Center)	11943	143500000
Kirkuk	Chemchemal	Aghjlar	9567	91520000
Kirkuk	Chemchemal	Singawa	8301	68910000
			240757	2865030000

Table 8.

Stratum A

Sub-Stratum 2.

A Sub-Sample of 5 Out of 14 First Stage

Sampling Unit.

Liwa	Qadha	First Stage Sampling Unit	Population (X)	(X^2)
Mosul	Mosul			
		Al-Shorah	26109	681200000

A Stratified Random Sample of 71 Out of 182

First Stage Sampling Units (Cont'd.)

Stratum A

Sub-Stratum 2. (Concl.)

Liwa	Qadha	First Stage Sampling Units	Population (X)	(X^2)
Mosul	Mosul	Al-Hamdaniyah	42715	1824000000
Arbil	Knaisanjaq			
		Knaisanjaq(Center)	20106	404000000
Sulaimaniyah	Sulaimaniyah			
		Sulaimaniyah (Center)	43049	1852000000
Kirkuk	Daquq			
		Tuz Khormato	29693	877400000
			161672	5638600000

Table 9.

Stratum B

Sub-Stratum 1.

A Sub-Sample of 19 Out of 47 First

Stage Sampling Units.

Liwa	Qadha	First Stage Sampling Units	population (X)	(X^2)
Baghdad	Baghdad			

A Stratified Random Sample of 71 Out of 182
First Stage Sampling Units(Cont'd.)

Stratum B

Sub-Stratum 1. (Cont'd.)

A Sub-Sample of 19 Out of 47 First
Stage Sampling Units (Cont'd.)

Liwa	Qadha	First Stage Sampling Units	Population (X)	(X^2)
		Al-Dorah	16090	259000000
Baghdad	Samarrah			
		Al-Dujail	7373	45360000
Baghdad	Tikrit			
		Tikrit(Center)	15377	236300000
Kerbelah	Kerbelah			
		Ain Al-Tamur	5336	28470000
Dulaim	Fallujah			
		El-Garmah	12402	153800000
Dulaim	Anah			
		Haditha	14077	198000000
Kut	Badrah			
		Zerbatiyah	3255	10590000
Hillah	Musayab			
		Musayab(Center)	9797	95980000
Hillah	Musayab	Sadat Al-Hindiyah	16463	271200000
Diala	Khalis			

A Stratified Random Sample of 71 Out of
182 First Stage Sampling Units (Cont'd.)

Stratum B

Sub-Stratum 1.(concl.)

A Sub-Sample of 19 Out of 47 First
Stage Sampling Units (Cont'd.)

Liwa	Qadha	First Stage Sampling Units	population (X)	(X^2)
		Beni Sa'ad	16711	279200000
Diala	Khanqim			
		Quorah to	12810	164000000
Diala	Muqdadiyah			
		Kin'an	10761	115800000
Basrah	Quornah			
		Quornah(Center)	3156	9961000
Amarah	Ali Al-Gharbi			
		Ali Al-Gharbi	18824	354100000
Muntifaq/Suq Al-Shi-yokh				
		Suq Al-Shiyokh (Center)	8795	77350000
Muntifaq	Shatrah			
		Dowayah	6024	36290000
Diwaniyah	Samawah			

A Stratified Random Sample of 71 Out of
182 First Stage Sampling Units (Cont'd.)

Stratum B

Sub-Stratum 1. (concl.)

A Sub-Sample of 19 Out of 47 First
Stage Sampling Units (Cont'd.)

Liwa	Qadha	First Stage Sampling Units	population (X)	(X^2)
		Samawah(Center)	15292	233800000
Diwaniyah	Samawah	Al-Khidir	9396	88260000
Diwaniyah	Shamiyah			
		Shamiyah(Center)	6520	42510000
			208458	2699771000

Table 10.

Stratum B

Sub-Stratum 2.

A Sub-Sample of 24 Out of 62 First Stage
Sampling Units.

Liwa	Qadha	First Stage Sampling Units	population (X)	(X^2)
Baghdad	Samarrah	Samarrah(Center)	30014	900000000

Table 10.(cont.)

A Stratified Random Sample of 71 Out of 182

First Stage Sampling Units (Cont'd.)

Stratum B

Sub-Stratum 2.(concl.)

Liwa	Qadha	First Stage Sampling Units	Population (X)	(X^2)
Baghdad	Samarrah	Balad	27517	756800000
Kerbelah	Najaf			
		Najaf(Center)	57947	3757000000
Kut	Kut			
		Kut (Center)	56105	3147000000
Kut	Kut	Namaniyah	25283	619300000
Kut	Suwairah			
		Aziziyah	22214	493200000
Hillah	Hillah			
		Hillah(Center)	51314	2633000000
Hillah	Hillah	Mahawil	28703	823700000
Hillah	Hindiyah			
		Kifil	22056	484000000
Diala	Baghdadi	Baqobah(Center)	42515	1810000000
Diala	Khalis			

A Stratified Random Sample of 71 Out of 182

First Stage Sampling Units (Cont'd.)

Table 10. (Cont'd.)

Stratum B

Sub-Stratum 2. (Concl.)

Liwa	Qadha	First Stage Sampling Units	population (X)	(X^2)
		Khalis(Center)	31141	969700000
Diala	Muqdadiyah			
		Abu Saidah	35406	1253000000
Basrah	Basrah			
		Hartha	55648	3095000000
Amarah	Amarah			
		Musharrah	21769	473900000
Amarah	Amarah	Kahla'a	48992	2400000000
Amarah	Qal'at Saleh			
		Majar Al-Kabir	44508	1980000000
Muntifaq	Nasiriyah			
		Albu Saleh	23208	538200000
Muntifaq	Rifa'i			
		Rifa'i(Center)	41736	1742000000
Muntifaq	Suq al-Shiyokh			
		Garmat Bein Sa'ad	33538	1124000000
Muntifaq	Suq al-Shiyokh	Al-Chibayish	29100	846900000

A Stratified Random Sample of 71 Out of 182 First Stage Sampling Units (Concl.)

Table 10. (concl.)

Stratum: B

Sub-Stratum 2.(concl.)

Liwa	Qadha	First Stage Sampling Units	population (X)	(X^2)
Diwaniyah	Afaq			
		Dagharah	25026	628100000
Diwaniyah	Samawha			
		Rumaitha	30049	900000
Diwaniyah	Shumiyah			
		Salahiyah	41777	1745000000
Diwaniyah	Shumiyah	Abassiyah	27038	730600000
Total			852604	33850300000

The standard deviation of the population is estimated from the above mentioned sample on the basis of the following formula[1].

$$\sigma^2 = \frac{\Sigma x^2_{a1} + \Sigma x^2_{a2} + \Sigma x^2_{b1} + \Sigma x^2_{b2}}{(N_{a1} - 1) + (N_{a2} - 1) + (N_{b1} - 1) + (N_{b2} - 1)}$$

1. Croxton, F.E. & Cowden D.J., op.cit., P.325.

where

$\Sigma x^2_{a_1}$, $\Sigma x^2_{a_2}$ .... are the sums of the squared deviations of all units from the means of their respective sub-strata. N_{a_1} , N_{a_2} .... are the numbers of units included in sub-strata a_1 , a_2 etc.

$\Sigma x^2_{a_1}$, $\Sigma x^2_{a_2}$, $\Sigma x^2_{b_1}$ & $\Sigma x^2_{b_2}$ are computed as follows

1. Stratum: A

Sub-Stratum: 1

$$\bar{X}_{a_1} = \frac{240757}{23} = 10500$$

$$\Sigma x^2_{a_1} = 2865030000$$

$$N_{a_1}\bar{X}^2 = 2535750000$$

$$\Sigma x^2_{a_1} = 329280000$$

2. Stratum: A

Sub-Stratum: 2

$$\bar{X}_{a_2} = \frac{161672}{5} = 32300$$

$$\Sigma x^2_{a_2} = 5633600000$$

$$N_{a_2} \bar{x}^2_{a_2} = 5216450000$$

$$\Sigma x^2_{a_2} = 422150000$$

3. Stratum: B

Sub-Stratum: 1

$$\bar{X}_{b_1} = \frac{208458}{19} = 11000$$

$$\Sigma x^2_{b_1} = 2699770000$$

$$N_{b_1} \bar{x}^2_{b_1} = 2299000000$$

$$\Sigma x^2_{b_1} = 400770000$$

4. Stratum: B

Sub-Stratum: 2

$$\bar{X}_{b_2} = \frac{852604}{24} = 35500$$

$$\Sigma x^2_{b_2} = 33850300000$$

$$N_{b_2}\bar{X}^2_{b_2} = 30246000000$$

$$\Sigma x^2_{b_2} = 3604300000$$

Having known $\Sigma x^2_{a_1}$, $\Sigma x^2_{a_2}$, $\Sigma x^2_{b_1}$ and $\Sigma x^2_{b_2}$ the standard deviation as estimated from the sample is

$$\bar{\sigma}^2 = \frac{329280000 + 422150000 + 400770000 + 3604300000}{(23 - 1) + (5 - 1) + (19 - 1) + (24 - 1)}$$

$$\bar{\sigma}^2 = \frac{4756500000}{67}$$

$$\bar{\sigma} = 8400$$

The mean population yielded by the sample is estimated as follows:-

$$\bar{X} = \frac{1403491}{71}$$

$$= 20600$$

The standard errors of the estimates (the mean and the standard deviation) are calculated as follows:

i. The standard error of the mean is given by the following formula[1]:

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{N}}$$

$$\text{Thus } \sigma_{\bar{x}} = \frac{8400}{\sqrt{71}}$$

= 1000 at 68% level of confidence

= 2000 at 95% level of confidence

Thus the sample yields a mean population whose standard error is equal to about ten per cent of the actual mean at the 95 per cent level of confidence.

ii. The standard error of the standard deviation is given by the following formula:-[2]

$$\sigma_{\sigma} = \frac{\sigma p}{\sqrt{2N}}$$

---

1. Ibid., P.307
2. Ibid., P.339

where σ_{σ} is the standard error of the standard deviation

σ_{p} is the standard deviation of the population

Thus

$$\sigma_{\sigma} = \frac{8800}{\sqrt{142}}$$

$$= 733$$

Furthermore the sample is verified in the following ways:

1. The standard errors of the mean and of the standard deviation are not due to a bias in the sample but to chance only. This conclusion was arrived at by applying the following two formulas:[1]

a. $$\frac{X}{o} = \frac{Xp - Xs}{\sigma_{\bar{x}}}$$

where Xp is the actual mean population

Xp is the mean yielded by the sample

$\sigma_{\bar{x}}$ is the standard error of the mean

Thus

$$\frac{X}{o} = \frac{20900 - 20600}{1000} = \frac{300}{1000} = .3$$

---

1. Ibid., P.308 & 333.

By referring to the table of the areas under the Normal Curve[1], the writer found that 11.79 per cent of sample means drawn from the population will be included within the range 20900 - 20600. This means that 88.21 per cent of samples means drawn from the same population might either be more than 20900 or less than 20600. Thus the error of the sample mean (300) is due to chance only and the sample is not biased in any way.

b. $$\frac{x}{\sigma} = \frac{\sigma p - \sigma s}{\sigma \sigma}$$

where σp is the actual standard deviation

σs is the standard deviation estimated from the sample

$\sigma \sigma$ is the standard error of the standard deviation

Thus

$$\frac{8900 - 8400}{733} = .55$$

---

1. Ibid., P.873.

The table of the area under the Normal Curve[1] denotes that 79.12 per cent of samples of the same size drawn from the same population may yield standard deviations with standard error of more or less than 8400 - 8800. Therefore the standard error of the standard deviation estimated from our sample is due to chance only and nothing else.

ii. It has been found that the mean number of villages included in a first stage sampling unit as estimated from the sample is equal to 50.3. As the actual mean is 50, it follows that the difference is very small.

iii. The mean number of quarters as estimated from the sample is 2.3. This differ from the actual mean by.1. This is also an insignificant error due to the chance only.

Therefore we gather from the above discussion that the sample is not biased in any way and yields estimates with tolerable standard errors.

---

1. Ibid.

CHAPTER IV

Suggested Sampling Procedure(cont.)

Second Stage Sampling.

4.1 Second stage sampling units: The first stage sampling units included in the sample consists of 3573 villages and 165 quarters[1]. These villages and quarters constitute the second stage sampling units. They were taken on the following grounds:

i. A sample of villages and quarters including a certain number of farms is less expensive than one which has the same number of farms in all villages and quarters. This is due to the additional expenses of travel in surveying farms scattered over a large area. This is avoided in surveying all farms in some villages.

ii. A sample of villages will facilitate supervision because the field work will be confined to small areas.

iii. As there are no up to date and reliable lists of the names and addresses of all farmers and the size of their holdings included in the selected first stage sampling units, it is very difficult to sample farms.

Now having shown the basic reasons for our selection of villages and quarters, the writer deems it necessary to go further and classify them into the following categories:-

i. Southern and Northern Strata: Geographical location is taken as the basis of this stratification. This is explained on pages (78-79).

ii. Each one of the two strata is sub-divided into villages and quarters. This division was felt necessary to differentiate between semi urban areas - quarters - and the rural areas - villages.

Following the above mentioned classification, four sub-strata are obtained. The sizes of these sub-strata are shown below.

Table II

Second Stage Sampling Units included in each sub-stratum.

	sub-stratum (1) villages	sub-stratum (2) quarters
Stratum A (North)	1917	54
Stratum B (South)	1656	111
	3573	165

Then a frequency distribution of the population of these villages or of quarters in each of the afore mentioned sub-strata is constructed. This helps us in estimating the standard deviation. Moreover these frequency distributions are of great use in selecting a representative random sample of these villages and quarters as will be explained later.

In constructing each of the four frequency distributions the following principles were observed:

i. As the ranges of the population of villages and quarters are very large, an open end class in each frequency distribution was used. This is of value in reducing the number of classes in each frequency distribution in order to summarize the data.

ii. The class interval is determined in such a way that its mid-point is about the actual mean population of villages and quarters in that class.

iii. The number of villages or quarters in every class is made as large as possible in order

to be adequately sampled.

Taking into account these three bases the following four frequency distributions of the population villages and quarters included in the sample of First Stage Sampling Units were constructed.

Table 12.

Stratum: A

Sub-Stratum: 1

Population of the Northern Villages Included in the Sample of First Stage Units.

population	villages (f)	mid-point m	fm	deviation from $\bar{x}(d)$	(d^2)	(fd^2)
1-100	832	50	41600	- 130	16900	14060800
101-200	576	150	86400	- 30	900	518400
201-400	369	300	110700	120	14400	5313600
401-800	117	600	70200	420	176400	20638800
800-1600	18	1200	21600	1020	1040400	18727200
More than 1600	5	2660(1)	13300	2480	6150400	30752000
	1917		343800			90010800

$$\bar{X} = \frac{343800}{1917} = 180$$

$$s^2 = \frac{90010800}{1916} - \frac{200}{12}^{(2)} \qquad s^2 = 46962 \qquad S = 216$$

(1) Actual Mean (2) Correction to the Second moment.

Table 13.

Stratum: A

Sub-Stratum: 2

Population of the Northern Quarters Included in the Sample of First Stage Units.

population	Quarters (f)	mid-point (m)	(fm)	deviation from $\bar{x}$ (d)	(d^2)	(fd^2)
1-1000	33	500	16500	-930	864900	28541700
1000-3000	16	2000	32000	570	324900	5198400
ore than 3000	5	5770(1)	28850	4340	18853600	94918100
	54		77350			128658200

$$\bar{X} = \frac{77350}{54} = 1430$$

$$s^2 = \frac{128658200}{53} - \frac{2000}{12}(2)$$

$$s^2 = 2427347$$

$$s = 1558$$

(1) The actual mean
(2) Correction to the Second moment.

Table 13.

Stratum: A

Sub-Stratum: 2

Population of the Northern Quarters Included in the Sample of First Stage Units.

population	Quarters (f)	mid-point (m)	(fm)	deviation from $\bar{x}$ (d)	(d^2)	(fd^2)
1-1000	33	500	16500	-930	864900	28541700
1000-3000	16	2000	32000	570	324900	5198400
more than 3000	5	5770(1)	28850	4340	18853600	94918100
	54		77350			128658200

$$\bar{X} \tilde{=} \frac{77350}{54} = 1430$$

$$s^2 \tilde{=} \frac{128658200}{53} - \frac{2000}{12}^{(2)}$$

$$s^2 \tilde{=} 2427347$$

$$s \tilde{=} 1558$$

(1) The actual mean
(2) Correction to the Second moment.

Table 14.

Stratum:B

Sub-Stratum:(1)

Population of the Southern Villages Included in the Sample of First Stage Units.

population	villages (f)	mid-point (m)	(fm)	deviation from $\bar{x}$ (d)	(d^2)	(fd^2)
1-100	264	50	13200	- 445	198025	52278600
101-200	393	150	58950	- 345	119025	46776825
201-600	652	400	260800	- 95	9025	5884300
601-1000	178	800	142400	305	93025	16558450
1001-1400	71	1200	85200	705	497025	35288775
1400-2000	45	1700	76500	1205	1452025	65341125
More than 2000	53	3460	183380	2965	8791225	465934925
	1656		820430			488063000

$$\bar{X} = \frac{820430}{1656} = 495$$

$$S^2 = \frac{488063000}{1655} - \frac{200}{12}^{(2)} \qquad S^2 = 294892 \qquad S = 543$$

(1) The actual mean
(2) Correction to the Second moment.

Table 14.

Stratum:B

Sub-Stratum:(1)

Population of the Southern Villages Included in the Sample of First Stage Units.

population	villages (f)	mid-point (m)	(fm)	deviation from $\bar{x}$ (d)	(d^2)	(fd^2)
1-100	264	50	13200	- 445	198025	52278600
101-200	393	150	58950	- 345	119025	46776825
201-600	652	400	260800	- 95	9025	5884300
601-1000	178	800	142400	305	93025	16558450
1001-1400	71	1200	85200	705	497025	35288775
1400-2000	45	1700	76500	1205	1452025	65341125
more than 2000	53	3460	183380	2965	8791225	465934925
	1656		820430			488063000

$$\bar{X} = \frac{820430}{1656} = 495$$

$$s^2 = \frac{488063000}{1655} - \frac{200}{12}^{(2)} \qquad s^2 = 294892 \qquad s = 543$$

(1) The actual mean
(2) Correction to the Second moment.

Table 15.

Stratum: B

Sub-Stratum: (2)

Population of the Southern Quarters Included in the Sample of First Stage Units.

Population	Quarters (f)	mid-point (m)	(fm)	deviation from $\bar{x}$ (d)	(d^2)	(fd^2)
1-1000	42	500	21000	- 1775	3150625	132326250
1001-2000	24	1500	36000	- 775	600625	14415000
2001-3000	18	2500	45000	225	50625	911230
3001-5000	17	4000	68000	1725	2975625	50585625
More than 5000	10	3695 (1)	36800	6420	41216400	412164000
	111		256800			610402105

$$\bar{X} = \frac{256800}{111} = 2275$$

$$s^2 = \frac{610402105}{110} - \frac{1000}{12}^{(2)} \quad s^2 = 5549027 \quad s = 2355$$

(1) The actual mean
(2) Correction to the Second moment.

Table 15.

Stratum: B

Sub-Stratum:(2)

Population of the Southern Quarters Included in the Sample of First Stage Units.

population	Quarters (f)	mid-point (m)	(fm)	deviation from $\bar{x}$ (d)	(d^2)	(fd^2)
1-1000	42	500	21000	- 1775	3150625	132326250
1001-2000	24	1500	36000	- 775	600625	14415000
2001-3000	18	2500	45000	225	50625	911230
3001-5000	17	4000	68000	1725	2975625	50585625
more than 5000	10	8695(1)	86800	6420	41216400	412164000
	111		256800			610402105

$$\bar{X} \tilde{=} \frac{256800}{111} \tilde{=} 2275$$

$$s^2 \tilde{=} \frac{610402105}{110} - \frac{1000}{12}^{(2)} \quad s^2 \tilde{=} 5549027 \quad s \tilde{=} 2355$$

(1) The actual mean
(2) Correction to the Second moment.

The variance of the stratified second stage units is computed on the basis of the following formula[1].

$$\bar{s^2}_s = \frac{Na_1 s^2 a_1 + Na_2 s^2 a_2 + Nb_1 s^2 b_1 + Nb_2 s^2 2}{Na_1 + Na_2 + Nb_1 + Nb_2}$$

where $s^2 a_1$, $s^2 a_2$ = the variance of sub-stratum a_1 , a_2 etc.

Na_1, Na_2 etc. are the number of items included in sub-stratum a_1 , sub-stratum a_2 etc.

Thus

$\bar{s^2}$ of the stratified second stage sampling unit is =

$$\frac{90026154 + 131076738 + 488329362 + 615941997}{1917 + 54 + 1656 + 111}$$

$$\bar{s^2} = \frac{1325374251}{3738}$$

$$\bar{s^2} = 354567$$

$$\bar{X} \text{ population} = \frac{343800 + 77350 + 820430 + 256800}{3738}$$

$$= 400$$

---

1. Croxton, F.E., And Cowden D.J., op.cit., P.325.

A Sample of Second Stage Sampling Units:

Having known the standard deviation and the mean population of villages and quarters (second stage sampling units) it is advisable to determine the size of a sample of those which yields tolerable standard errors of estimates on the same bases, as were used in computing the size of the sample of first stage units. Thus

$$\sigma_{\bar{x}}^2 = \frac{S_s^2}{N}$$

where $\sigma_{\bar{x}}^2$ is the variance of the mean

S^2_s variance of the stratified second stage sampling units

Thus

$$400 = \frac{354567}{N}$$

$$N = 886.4$$

Thus the size of a sample of villages and quarters which yields a mean population with an error of not more than ten percent of the actual mean population at the 95 percent level of confidence is equal to 886. As the total number of

the second stage sampling units is 3738, therefore the second stage sampling fraction is equal to .237.

To secure representativeness of all size classes included in the four sub strata, variable sampling fractions had to be determined. This procedure was followed for two main reasons. First, the numbers of villages and quarters in the various size classes are different. For instance, there are 332 villages in one size class while there are only five in the other. If a proportional sampling fraction for example of one fifth is determined for the two size classes, the sample will include 166 villages from the first group but only one from the other. In doing so, the sample will not represent the small size class adequately. Thus the sampling fraction for this class should be much more than one-fifth in order to secure its representativeness in the sample.

The second reason for applying variable sampling fraction is that the class intervals vary from some size classes to others. The larger the class interval, the greater the dispersion in the population of villages or quarters of that class will be and vice versa.

Thus the sampling fraction would be proportional to the class interval in order to secure adequate representativeness of the various size groups in the sample.

Having known the basic principles for determining variable sampling fractions for the different size classes, the tables on the following pages show the size classes and the number of units to be selected from each class. It must be noted here that these fractions are determined in such a way that the total selected units from all size classes in the four sub-strata should not exceed 886 (the determined size of the sample).

Selection of a Second Stage Sample.

The previous tables show the various sampling fractions which were used in determining the required number of second stage sampling units from each size class. This procedure is followed, as has been mentioned before, in order to represent adequately each size class in the sample. As to the first stage sampling units, they must also be well represented in the

Table 16.

Stratum A

Sub-Stratum: 1

Second Stage Units (Northern villages)

Which Should Be Selected from Each

Size Class.

Population	Villages	sampling fraction %	units to be selected
1-100	832	15	125
101-200	576	20	115
201-400	369	25	92
401-800	117	40	46
801-1600	18	60	10
above 1600	5	100	5
	1917		393

Table 17.

Stratum A

Sub-Stratum: 2

Second Stage Units (Northern Quarters)
Which Should Be Included in the
Sample.

Population	Quarters	sampling fraction %	units to be selected
1-1000	33	40	13
1001-3000	16	70	11
above 3000	5	100	5
	54		29

Table 18.

Stratum:B

Sub-Stratum:(1)

Second Stage Units (Southern Villages)

To Be Included in the Sample.

Population	Villages	sampling fraction %	units to be selected
1-100	264	20	53
101-200	393	20	79
201-600	652	25	163
601-1000	178	30	53
1001-1400	71	30	21
1400-2000	45	40	18
above 2000	53	40	21
	1656		408

Table 19.

Stratum:B

Sub-Stratum:(2)

Second Stage Units (Southern Quarters)

To Be Included in the Sample.

population	Quarters	sampling fraction %	units to be selected
1-1000	42	40	17
1001-2000	24	40	10
2001-3000	18	50	9
3001-5000	17	60	10
above 5000	10	100	10
	111		56

sample.

The fulfillment of the above mentioned requirements are attained through a systematic selection of villages and quarters from lists prepared for this purpose. These lists are prepared as follows: Villages or quarters of eahc size class in every sub-stratum were put on a separate list. Then by using the sampling fraction determined for a size class, the required number to be selected from that class was obtained. For example, if the determined sampling fraction for a size class is 1/5, a random between 1 and five is selected from a random table. Then every fifth villages is systematically chosen from this list.

It has to be noted here that when the sampling fractions are 40% or 60%, the writer selected the selected the second s tage units at interval of 1/2. Then he ignored or added the required villages by the use of random tables.

Table 20.

A Sample of 886 Second Stage Sampling Units of 3738

Stratum:A

Sub-Stratum:1

Size Class 1-100

A Sample of 125 Out of 832 Northern Villages of the Size Class (1-100)

	Liwa	Qadha	Nahiya	second stage sampling unit	population
	Mosul	Amadia	Barwari Bah		
1.				Urmah Daoud	59
2.				Yalougah	40
3.				Chem Waizki	16
4.				Hatarti	8
5.				Malkhah	38
			Silivani		
6.				Chailah Asi	45
7.				Hachiyah	79
8.				Shakrafah	81
9.				Iftahl	96
10.				Yajdiraf	88
			Silli		
11.				Jinain	52
12.				Doriya	61
13.				Diri Sik	17
14.				Zaiwak Sindi	50
15.				Bair Bla	71
16.				Yauk Chem sour	47
			Dhok		
17.				Kailek	21
18.				Seid Tahir sufla	25
19.				Barakat	18
20.				Jididah	91
21.				Shandoukhah	81
22.				Sorka	83
23.				Simik	26
			Al-Ashayer		

Table 20.

A Sample of 886 Second Stage Sampling Units of 3738

Stratum:A

Sub-Stratum:1

Size Class 1-100

A Sample of 125 Out of 832 Northern Villages of the

Size Class (1-100)

	Liwa	Qadha	Nahiya	second stage sampling unit	population
	Mosul	Amadia	Barwari Bah		
1.				Urmah Daoud	59
2.				Yalougah	40
3.				Chem Waizki	16
4.				Hatarti	8
5.				Malkhah	38
			Silivani		
6.				Chailah Asi	45
7.				Hachiyah	79
8.				Shakrafah	81
9.				Iftahl	96
10.				Yajdiraf	88
			Silli		
11.				Jinain	52
12.				Doriya	61
13.				Diri Sik	17
14.				Zaiwak Sindi	50
15.				Bair Bla	71
16.				Yauk Chem sour	47
			Dhok		
17.				Kailek	21
18.				Seid Tahir sufla	25
19.				Barakat	18
20.				Jididah	91
21.				Shandoukhah	81
22.				Sorka	83
23.				Simik	26
			Al-Ashayer Saba		

Table 20.(cont.)

Stratum A

Sub-Straum:(1)

Size Class (1-100) continued.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
24.				'A Kar Bahrawah	71
25.				Zolyan	82
26.				Sikerdak	61
27.				Mamouzin	56
			Bira Kabra		
28.				Lanka	17
29.				Sirkendal	100
30.				Defri	75
31.				Toushgah	44
32.				Khanki	22
33.				Yamishmish	65
34.				Komkah	16
35.			Al-Shimal	Ikchaich	78
36.				Bakran	94
			Al-Quosh		
37.				Khra'ij	42
38.				Deir El Seijidah	67
39.				Jlifan	93
40.				Beyoz sufla	20
41.				'Aqar Ghenter	57
42.				'Aqar Musharrafah	58
			Iyadiyah		
43.				Tel Ghazou	9
44.				A breshiyah	83
45.				Tel-Sinjar	16
46.				Kharbat Na'as	70
			Shorah		
47.				Ikjaij	78
48.				Mahaba Haman Alil	31
49.				El-quaitrah	89
50.				Zakrutiyah	58
51.				Abu 'Arayis Jnubi	52
52.				Zuwairij	45
53.				Saf El-Toot	33

Table 20.(cont.)

Stratum A

Sub-Straum:(1)

Size Class (1-100) continued.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
24.				'A Kar Bahrawah	71
25.				Zolyan	82
26.				Sikerdek	61
27.				Mamouzin	56
28.			Bira Kabra	Lanka	17
29.				Sirkendal	100
30.				Defri	75
31.				Toushgah	44
32.				Khanki	22
33.				Yamishmish	65
34.				Komkah	16
35.			Al-Shimal	Ikchaich	78
36.				Bakran	94
37.			Al-Quosh	Khra'ij	42
38.				Deir El Seijidah	67
39.				Jlifan	93
40.				Beyoz sufla	20
41.				'Aqar Ghenter	57
42.				'Aqar Musharrafah	58
43.			Iyadiyah	Tel Ghazou	9
44.				A breshiyah	83
45.				Tel-Sinjar	16
46.				Kharbat Na'as	70
47.			Shorah	Ikjaij	78
48.				Mahaba Haman Alil	31
49.				El-quaitrah	89
50.				Zakrutiyah	58
51.				Abu 'Arayis Jnubi	52
52.				Zuwairij	45
53.				Saf El-Toot	33

Table 20.(cont.)

Stratum A

Sub-Stratum:(1)

Size Class (1-100) continued.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
			Hamdaniyah		
54.				Taujnah	64
55.				Sherrkan	86
56.				Chokerchi	88
57.				Zaraqhaj	90
			Balak		
58.				Goumah	55
59.				Chouman Mulla Ismail	20
60.				Kawlan	44
61.				Chomyalouk	45
62.				Sayah	26
			Mirgah sor		
63.				Laylouk	86
64.				Mamsik	61
65.				Mranah	67
66.				Kawlan	18
67.				Kain Deir	39
			Ramia		
68.				Isterblan	72
69.				Deirah	28
70.				Dalah Raqah	98
71.				Doukertan	29
72.				Rayez Agha	99
73.				Zenkernakeh	59
74.				Bairan	66
			Chanaran		
75.				Khalkan	65
76.				Pilkawi	34
			Knaisanjaq		
77.				'Alyawah	47
78.				Dar Barou	87
79.				Chnarok	15
80.				Kain Soskah	37

Table 20.(cont.)

Stratum A

Sub-Stratum:(1)

Size Class (1-100) continued.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
			Hamdaniyah		
54.				Taujnah	64
55.				Sherrkan	86
56.				Chokerchi	88
57.				Zaraqhaj	90
			Balak		
58.				Goumah	55
59.				Chouman Mulla Ismail	20
60.				Kawlan	44
61.				Chomyalouk	45
62.				Sayah	26
			Mirgah sor		
63.				Laylouk	86
64.				Mamsik	61
65.				Mranah	67
66.				Kawlan	18
67.				Kain Deir	39
			Ramia		
68.				Isterblan	72
69.				Deirah	28
70.				Dalah Raqah	98
71.				Doukertan	29
72.				Rayez Agha	99
73.				Zenkernakeh	59
74.				Bairan	66
			Chanaran		
75.				Khalkan	65
76.				Pilkawi	34
			Knaisanjaq		
77.				'Alyawah	47
78.				Dar Barou	87
79.				Chnarok	15
80.				Kain Soskah	37
81.				Yamourtkan	32

Table 20.(cont.)

Stratum A

Sub-Stratum:(1)

Size Class (1-100) continued.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
			Tanjru		
82.				Qasarti Sdrou	74
83.				Ahmad Awah	82
84.				Da'i Ramadan	69
85.				Hanjirah	41
			Khormal		
86.				Shamlu	31
87.				Shanderi Srou	78
88.				Keilik	74
89.				Hawarkon	44
			Warmawah		
90.				Touqout	15
91.				Wazoul	74
92.				Kolan Kouk Ula	41
			Shaharbazar		
93.				Kain Kozkuh	55
94.				Riwi	25
95.				Bnawilah	68
96.				Kain Sheerin	76
97.				Malaktein	29
98.				Dlauah	74
			Mirgah (Bankarel)		
99.				Mul Shalu Boutan	92
100.				Chailah Sourah	47
101.				Kani Hanjir	60
102.				Ser Chiyah	70
			Sulaimaniyah		
103.				Kain Ghanah	44
104.				Klaunan	33
105.				Zayer	50
106.				Kani Pirah	37
107.				Bauah Merdah Srou	45
			Altoon Kopri		
108.				Idris Khayar	73

Table 20.(cont.)

Stratum A

Sub-Stratum:(1)

Size Class (1-100) continued.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
				Ismail Awah	91
109.				Mar'ai	86
110.				Qizlqayah	49
111.			Chunchemal		
				Kain Kochlah	70
112.				Koshqot	97
113.				Maroulah	82
114.			Aghjlar		
				Bawah Qiz Ulija	76
115.				Kani Spilkah	64
116.				Tepah Sourah Haji	67
117.				Tepah Sourah	74
118.				Fatkah	23
119.				Hinjirah	39
120.				Hezah Roumi	86
121.				Khail El Haj Said	23
122.			Tuz Khormato		
				Bashtepah Kebir	79
123.				Moftoolah Kabir	79
124.				Qla'a	34
125.				Pulkanah Salim	100
126.					

A Sample of 886 Out of 3738 Second Stage

Sampling Units (cont.)

Stratum: A

Sub-Stratum: (1)

Size Class 1-200

	Liwa	Qadha	Nahiya	second stage sampling unit	population
			Barwari Bala		
127.				Deir Shki Islam	167
128.				'As'hi	162
129.				Chem Saida	114
130.				Briefka	197
131.				Kilwah Islam	103
			Silivani		
132.				Touyan	103
133.				Bawird	179
134.				Paizin	128
135.				Batershah	147
136.				Ishkefdel	125
137.				Qaryah S'pi	166
			Gilli		
138.				Ifki	149
139.				Rouss	106
140.				Blayman	120
			Dhok		
141.				Ronk	140
142.				Delb	127
143.				Bakouz	127
144.				Bakhryouf	105
145.				Iyhouki	152
146.				Fa'idah	110
147.				Bakhah	173
			Al-Ashayer Sab'a		
148.				'Akar Kanilan	158
149.				Zeelka Sheikh	155
150.				Qaryat Asmawah	134
151.				Morilan	198
			Bira Kabra		
152.				Kashkawah	162

A Sample of 886 Out of 3738 Second Stage

Sampling Units (cont.)

Stratum:A

Sub-Stratum:(1)

Size Class 1-200

	Liwa	Qadha	Nahiya	second stage sampling unit	population
			Barwari Bala		
127.				Deir Shki Islam	167
128.				'As'hi	162
129.				Chem Saida	114
130.				Briefka	197
131.				Hilwah Islam	103
			Silivani		
132.				Touyan	103
133.				Bawird	179
134.				Paizin	128
135.				Batershah	147
136.				Ishkefdel	125
137.				Qaryah S'pi	166
			Gilli		
138.				Ifki	149
139.				Rouss	106
140.				Blayman	120
			Dhok		
141.				Ronk	140
142.				Delb	127
143.				Bakouz	127
144.				Bakhryouf	105
145.				Iyhouki	152
146.				Fa'idah	110
147.				Bakhah	173
			Al-Ashayer Sab'a		
148.				'Akar Kanilam	158
149.				Zeelka Sheikh	155
150.				Qaryat Asmawah	134
151.				Morilau	198
			Bira Kabra		
152.				Kashkawah	162
153.				Khoshanah	118
154.				Dinartah	141

A Sample of 886 Out of 3738 Second Stage

Sampling Units (cont.)

Stratum:A

Sub-Stratum:(1)

Size Class 1-200

	Liwa	Qadha	Nahiya	second stage sampling unit	population
				Kochar	187
155.			Al-Shimal		
				Shnanik jumubi	105
156.				'Alaniya	191
157.				Chailah Sahdu	178
158.			Al-Quosh		
				Chekan	158
159.				'Aian Baqarah	105
160.				Biyoz Uliyah	112
161.			Iyadiyah		
				Qermiz	128
162.				El-'Abrah El-Saghirah	152
163.				'Abrat Hamash	146
164.				Faqirok	119
165.			Shorah		
				Tlul Irnbar	131
166.				Mangoyah Jadid	130
167.				El-Merj	131
168.				Taq Taq	147
169.				'Aian El-Baida'a	137
170.				Qarayat Taybah	132
171.				El-Shek	106
172.				Betrah	156
173.				'Ain Wadi jah-anam	198
174.			Hamdaniyah		
				Qarah Tepak Shik	159
175.				Asandich	137
176.				Tel Aswad	191
177.				Qal'a Touk	137
178.				El-Nemrud	118
179.				El-Bajour	184
180.			Balak		
				Sakri Skran	104

A Sample of 886 Out of 3738 Second Stage

Sampling Units (cont.)

Stratum: A

Sub-Stratum: (1)

Size Class 1-200

	Liwa	Qadha	Nahiya	second stage sampling unit	population
				Kochar	187
155.			Al-Shimal	Shnanik jumubi	105
156.			'Alaniya	'Alaniya	191
157.				Chailah Sandu	178
158.			Al-Quosh	Chekan	158
159.				'Aian Baqarah	105
160.				Biyoz Uliyah	112
161.			Iyadiyah	Qermiz	128
162.				El-'Abrah El-Saghirah	152
163.				'Abrat Hamash	146
164.				Faqirok	119
165.			Shorah	Tlul Irnbar	131
166.				Mangoyah Jadid	130
167.				El-Merj	131
168.				Taq Taq	147
169.				'Aian El-Baida'a	137
170.				Qarayat Taybah	132
171.				El-Shek	106
172.				Betrah	156
173.				'Ain Wadi jah-anam	198
174.			Hamdaniyah	Qarah Tepak Shik	159
175.				Asandich	137
176.				Tel Aswad	191
177.				Qal'a Touk	137
178.				El-Nemrud	118
179.				El-Bajour	184
180.			Balak	Sekri Skram	104
181.					

A Sample of 886 Out of 3738 Second Stage

Sampling Units (cont.)

Stratum:A

Sub-Stratum:(1)

Size Class 1-200

	Liwa	Qadha	Nahiya	Second stage sampling unit	population
182.				Sreishman	150
183.				Gonah Khan	180
184.			Miragah sor	Herfi	176
185.			Rania	Ser Kikan	177
186.				Drangah Ulish Wa suflah	168
187.				Subrah	115
188.			Chanaran	Qamishah	200
189.				Mula Omar	106
190.			Kuaisanjaq	Drash	121
191.				Mam Qalakh	161
192.				Sheewah Pyran	101
193.				Chailah Spi	114
194.			Tanjru	Deelah Keh	114
195.				Balul	185
196.				Razyaniah	125
197.				Boushin	188
198.			Khormal	Kecha lee	102
199.				Reisheen	180
200.				Sheermur	190
201.				Benjo'y Drah	117
202.				Amourah	128
203.				Balanyan	171
204.			Warmawa	Yakhshi	136
205.			Shaharbazar	Pyri Sik	134
206.				Zah lan	101

A Sample of 886 Out of 3738 Second Stage

Sampling Units (cont.)

Stratum:A

Sub-Stratum:(1)

Size Class 1-200

	Liwa	Qadha	Nahiya	Second stage sampling unit	population
182.				Sreishman	150
183.				Gonah Khan	180
			Miragah sor		
184.				Herfi	176
			Rania		
185.				Ser Kikan	177
186.				Drangah Uliah Wa suflah	168
187.				Subrah	115
			Chanaran		
188.				Qamishah	200
189.				Mula Omar	106
			Kuaisanjaq		
190.				Drash	121
191.				Mam Qalakh	161
192.				Sheewah Pyran	101
193.				Chailah Spi	114
			Tanjru		
194.				Deelah Keh	114
195.				Balul	185
196.				Razyaniah	125
197.				Boushin	188
			Khormal		
198.				Kecha lee	102
199.				Reisheen	180
200.				Sheermur	190
201.				Benjo'y Drah	117
202.				Amourah	128
203.				Balanyan	171
			Warmawa		
204.				Yakhshi	136
			Shaharbazar		
205.				Pyri Sik	134
206.				Zeh lan	101
207.				Grah Dei	178

A Sample of 886 Out of 3738 Second Stage

Sampling Units (cont.)

Stratum:A

Sub-Stratum:A

Size Class 1-200

	Liwa	Qadha	Nahiya	Second stage sampling unit	population
				Genki	154
208.				'Aazhan	145
209.				Hermin	134
210.				Seenki	118
211.				Mama Khlan	113
212.			Mirga Bankard		
				Tenkerah	135
213.				Kameryan	112
214.				Iyanah	105
215.			Sulainaniyah		
				Qazan	115
216.				Hazar Nairđ	185
217.				Sourlah Khwar	117
218.				Kistau jown	174
219.				Qaratepah	119
220.			Altoon Kopri		
				Shirnaw	164
221.				Kubah Bash	198
222.				Dorun	169
223.				Koldrah Saghir	124
224.			Chemchemal		
				Tepah Sufla	128
225.				Madafar	183
226.				Zinan	183
227.				Kouran	126
228.			Aghjlar		
				Sheikh Waysi	127
229.				'Quqmishah	168
230.				Iskendriki	191
231.				Kani Hinjir Salhok	178
232.				Moutlihah	159
233.			Singawah		
234.				Dorahr	163

A Sample of 886 Out of 3738 Second Stage

Sampling Units (cont.)

Stratum:A

Sub-Stratum:A

Size Class 1-200

	Liwa	Qadha	Nahiya	Second stage sampling unit	population
208.				Genki	154
209.				'Aazhan	145
210.				Hermin	134
211.				Seenki	118
212.			Mirga Bankard	Mama Khlan	113
213.				Tenkerah	135
214.			Kameryan	Kameryan	112
215.				Lyanah	105
216.			Sulainaniyah	Qazan	115
217.				Hazar Maird	185
218.				Sourlah Khwar	117
219.				Kistau jown	174
220.				Qaratepah	119
221.			Altoon Kopri	Shirnaw	164
222.				Kubah Bash	198
223.				Dorun	169
224.				Koldrah Saghir	124
225.			Chemchemal	Tepah Sufla	128
226.				Madafar	183
227.				Zinan	183
228.				Kouran	126
229.			Aghjlar	Sheikh Waysi	127
230.				'Quqmishah	168
231.				Iskendriki	191
232.				Kani Hinjir Salhok	178
233.				Moutlihah	159
xxx			Singawah	Dorahr	163
234.					

A Sample of 886 Out of 3738 Second Stage

Sampling Units (cont.)

Stratum:A

Sub-Stratum:A

Size Class 1-200

	Liwa	Qadha	Nahiya	Second stage sampling unit	population
				Teelah Kar	176
235.				Hazarkani	139
236.			Tuz Khomats		
				Imam Mchammad	162
237.				Zindansh Saghir	147
238.				Yanikchah	130
239.				The'aleeb	109
240.					

Stratum A

Sub-Stratum:(1)

Size Class 200-400

1.			Barwari Bala		
				Hais	220
1.				Urman	261
2.				Warmil	273
3.			Silivani		
				Balquous	294
4.				Qusr Mulah Teib	223
5.			Silli		
				Nafikendalah	212
6.			D'hon		
				Shetri	338
7.				Koyyomau	219
8.				Tel Kheshf Sufla	343
9.			Ashayer Sab'a		
				'Aqar Doukendan Kebir	361
10.				Beer Jawish	243
11.			Bira Kabra		
				Shahi	295
12.					

A Sample of 886 Out of 3738 Second Stage

Sampling Units (cont.)

Stratum:A

Sub-Stratum:A

Size Class 1-200

	Liwa	Qadha	Nahiya	Second stage sampling unit	population
235.				Teelah Kar	176
236.			Tuz Khomats	Hazarkani	139
237.				Iman Mohammad	162
238.				Zindanah Saghir	147
239.				Yanikchah	130
240.				The'aleeb	109

Stratum A

Sub-Stratum:(1)

Size Class 200-400

			Barwari Bala	Hais	220
1.				Urman	261
2.				Warmil	273
3.			Silivani	Balquous	294
4.				Qusr Mulah Teib	223
5.			Silli	Nafikendalah	212
6.			D'hon	Shetri	338
7.				Koyyomau	219
8.				Tel Kheshf Sufla	343
9.			Ashayer sab'a	'Aqar Doukendan Kebir	361
10.				Beer Jawisha	243
11.			Bira Kabra	Shahi	295
12.				Doustkah	230
13.					

Stratum A

Sub-Stratum: (1)

Size Class 200-400 continued.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
			Shimal		
14.				Ketti	291
15.				Rashid	214
16.				Kolkan	265
17.				Yousfan	325
			Al-Quosh		
18.				Khozandar	216
			Iyadiyah		
19.				Immarat sufla	275
20.				Termi	260
21.				El-Mezari'a	340
			Shorah		
22.				Tlul Imbar	340
23.				El-Zawyah	344
24.				El-'Amriu	225
25.				El-Adhbah	236
26.				Mustantiq El-Gherlu	249
27.				Beèjwaneh El-sufla	225
28.				El-Haj 'Ali Fouqani	363
			Hamdaniyah		
29.				Bashbishah	293
30.				Qasfoldrah	338
31.				El-Jayef	224
32.				Zahra Khatoon	255
33.				Sikani Kabir	304
34.				Qarah Shoor	300
35.				'Abbas El-Rejabi	245
36.				Shtef	380
37.				Kizkan	247
38.				Kharabah Sultan	250
			Balak		
39.				Wardah	272
40.				Noupirdan	208
41.				Mirgah	309
			Mirga Sor		

Stratum A

Sub-Stratum: (1)

Size Class 200-400 continued.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
42.				Biran	367
			Rania		
43.				Drau	342
44.				Serdoul	224
			Chanaran		
45.				Freizah leh	228
			Knaisanjaq		
46.				Topzawah	207
47.				Pei Bazok	343
48.				Sartikah	208
49.				Koumah Tal	300
			Tanjru		
50.				Kani Hamzah	278
51.				Qarah Toghan	340
52.				Deilah Dah	361
			Kharmal		
53.				Girdah Nazi	351
54.				Shandri Khawad	233
55.				Serkat	374
			Warmawa		
56.				Selim Beirik	221
57.				Hasil	273
58.				Peirkah	292
			Shaharbazar		
59.				Sirah Meirk	256
60.				Bauri gaurah	268
61.				Sourah dizah	273
62.				Siri	236
63.				Kourah Dim	238
64.				Draz	313
65.				Shewah Gid	316
			Mirga (Bankard)		
66.				Seiwakan	236
67.				Wani	227
68.				Deilzah	208

Stratum A

Sub-Stratum:(1)

Size Class 200-400 continued.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
42.			Rania	Biran	367
43.				Drau	342
44.			Chanaran	Serdoul	224
45.			Knaisanjaq	Freizah leh	228
46.				Topzawah	207
47.				Pei Bazok	343
48.				Sartikah	208
49.			Tanjru	Koumah Tal	300
50.				Kani Hamzah	278
51.				Qarah Toghan	340
52.			Kharmal	Deilah Dah	361
53.				Girdah Nazi	351
54.				Shandri Khawad	233
55.			Warmawa	Serkat	374
56.				Selim Beirik	221
57.				Hasil	273
58.			Shaharbazar	Peirkah	292
59.				Sirah Meirk	256
60.				Bauri gaurah	268
61.				Sourah dizah	273
62.				Siri	236
63.				Kourah Dim	238
64.				Draz	313
65.			Mirga (Bankard)	Shewah Gid	316
66.				Seiwakan	236
67.				Wani	227
68.			Sulaimaniyah	Deilzah	208

Stratum A

Sub-Stratum: (1)

Size Class 200-400 continued.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
69.				Kani Berdiyah	237
70.				Soutkah	225
71.				Shotgarah El-jaf	334
			Altoon Kopri		
72.				Yarmjah	281
73.				Serbier	389
74.				Baba Hassan	311
75.				Mira Asfhan Kebir	338
			Chemchemal		
76.				Pryadi	231
77.				Nourah	224
78.				Sheirdrah	246
79.				Chragha Rouah	277
80.				Ariq	206
			Aghjlar		
81.				Tilyan	337
82.				Krad	226
			Singawa		
83.				Kchan	277
84.				Kani Baktesh	380
85.				Deirah Shah	253
			Tuz Khormato		
86.				Koks	271
87.				Beer Ahmad 'Ali El-Musa	281
88.				'Aboud	238
89.				Ghazah	249
90.				Aghchah Mash'had	228
91.				Kérmak	374
92.				Konnah Brou qodim	208

Stratum A

Sub-Stratum 1.

Size Class 400-800.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
			Balak		
1.				Derband	308
			Barwari Bala		
2.				Turwansh	500
3.				Hrour	719
			D'hak		
4.				Ziprah	444
			Ashayer saba		
5.				Koumah Zard	465
			Bira Kabra		
6.				Hoki	430
7.				Hrin	526
			Ab Shimal		
8.				Qomis	561
			Quosh		
9.				Sreechkah	505
			Iyadiyah		
10.				Qasr Sreij	382
11.				S'ehl El Bougha	738
			Shorah		
12.				Haj Ali Forkain	363
13.				Hadhar	322
14.				Albu Yousif	566
15.				Shorah	749
16.				Dobzat Fokain	402
17.				Hanadh Baloux	374
			Hamdaniyah		
18.				Abu jarbou{ah	660
19.				Slamiyah	669
20.				Khaznah Teqah	501
21.				Omar Kan	484
22.				Bazkirtan	444
23.				Qarqashah	215
			Mirgah sor		
24.				Shandou	440
25.				Zaiwah	499

Stratum A

Sub-Stratum 1.

Size Class 400-800 continued.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
			Kuaisanjaq		
26.				Sousah	408
27.				Smaqouli Sroujawah	569
			Tanjru		
28.				Qarkak	445
			Khormal		
29.				Kharbain	545
30.				Derk Shei Khan	443
31.				Bani Bnok	430
			Warmawa		
32.				Bani Khailan	421
			Mirgah(Bankard)		
33.				Gomkan	419
34.				Khurkhurah	406
35.				Merkara janfana	647
			Sulaimaniyah		
36.				Kani Spikal	494
			Altoon Kopri		
37.				Hisar Kebir	423
38.				Qoshqayah	452
			Chemchemal		
39.				Qarah Tamour	405
			Aghjlar		
40.				Korah Dei	405
			Tuz Khormato		
41.				Nouchol	487
42.				Luqoum	525
43.				Chori	413
44.				Khasha Darbi	460
			Silivani		
45.				Choli	366
			Silli		
46.				Bahnounah	304

Stratum A

Sub-Stratum:1

Size Class 800-1600

	Liwa	Qadha	Nahiya	second stage sampling unit	population
1.			Al-Shimal	Sanawi	904
2.			Iyadiyah	Ifkui	1057
3.			Hamdaniyah	Ali Rash	858
4.				Kokchi	1063
5.			Kuaisanjaq	Khoran	1002
6.			Khormal	Tawilah jalanah	1454
7.			Mirjah	Chinarni	877
8.			Tuz Khormato	Bastamli	997
9.				Amirli	1362

Stratum A

Sub-Stratum:1

Villages more than 1600.

1.			Hamdaniyah	Bahzani	2164
2.				Qarah Qosh	5048
3.				'Ashayer Babouli	2054
4.				Ba'ashiqah	2322
5.				Kramlis	1695

Stratum A

Sub-Stratum: 2

Size Class / less than 1000

	Liwa	Qadha	Nahiya	second stage sampling unit	population
1.			Gilli	Batufa (Center)	422
2.			Bira Kabrah	Bira Kabrah(Center)	376
3.			Al-Quosh	Odou	265
4.			Balak	Galalah(Center)	707
5.			Rania	El-Qolah	699
6.			Tanjru	Arbat	801
7.			Shaharbazar	Serjawah	159
8.				Shakhin	174
9.			Altoon Kopri	El-Souq	648
10.				Tesiu	617
11.			Singawa	The Center of the Nahiya	524
	size class 1001-3000		Al-Quosh		
12.				El-Tehtain	1458
13.			Al-Shorah	Hamam El-'Alil	1159
14.			Knaisanjaq	Bafer Qandi	2235
15.			Sulaimaniyah	Derkzin	2426
16.			Kufri	El-Sadeh	1965
17.				Ismail	2795
18.			Tuz Khormato	Mula Sufar	1333
19.				Mustafa Agha	1622

Stratum A

Sub-Stratum:2

Size Class 1001-3000

	Liwa	Qadha	Nahiya	second stage sampling unit	population
20.			Chemchemal	El-Khan	1610
21.			Handaniyah	Bartillah	2739
22.			Quosh	Sina	1465

Stratum A

Sub-Stratum:2

More than 5000

			Sulaimaniyah		
1.				Kani Askan	6165
2.				Malkandi	6906
3.				Chourbagh	3909
4.				Koljah	7012
5.				Ser Shekham	4877

Stratum:B

Sub-Stratum:1

Size Class 1-100

	Liwa	Qadha	Nahiya	second stage sampling unit	population
1.			Al-Dorah	Jame'at Khalil Ibrahim	82
2.			Al-Dujail	Nayef El-Faysel	53
3.			Tikrit	Mahtat Tikrit	23
4.			Balad	El-Rawashid	58
5.			Samarrah	Fdhailat	46
6.				Shakfah	44
7.				Aith El-Saleh	39
8.				El-Ramlah	57
9.				Hawi El-Sayed Marlai	72
10.				Dbalah	79
11.				Hawijat Hashash	30
12.			Ain El-Temir	Qaser El-Ulwah	77
13.			El-Namaniyah	El-Tal'ah	71
14.			El-Mahawil	Maqam El-Khiclhir	83
15.				Am Bazunah	52
16.			Beni Sa'ad	Am El-Twabir	67
17.				Bazoul El-Madadiyah	75
18.				Nahar Titni	91
19.			Qarah Tebah	Qula'h Tebah	95
20.			Kin'an	Abu Jawan	93
21.				Naher Tanuh	35
22.			Ba'aqoubah	Mohamed Bat	46
23.				Nahar Ashrat	32

Stratum:B

Sub-Stratum:1

Size Class 1-100

	Liwa	Qadha	Nahiya	second stage sampling unit	population
24.				Madhakhat Hanau Mahmud	98
25.				Jdiadah El-Thariniyah	48
26.				El-Tunimiyat & Mayadin	48
27.				Abu Kadrah	17
			El-Khalir		
28.				Abu Khurdah	76
			Abu Saidah		
29.				Kuam El-Muqdadiyah	52
30.				Abu 'Arabid	79
31.				Nahar El-jami'a	15
32.				Sensel El-Wostah	97
33.				Ghzlaniyat	82
34.				El-Sikah	81
35.				Bzayz El-Qaryah	93
36.				Baid'hanah	64
			El-Harthah		
37.				Jazirat El-Asafiyah	57
			El-Musharrah		
38.				Shat El-A'ama	80
			El-Kahel'a		
39.				El-'ajzah	56
40.				El-jasmiyah	46
			El-Majar El-Kebir		
41.				El-Dasmah	26
			Albu Saleh		
42.				Om Haidar Nasr Alah	59
43.				Al-Alail Il-Hsunah	86
44.				Al-'Abaiyat	62
			El-Duayah		
45.				Al-Hjool	59
			El-Khidhir		
46.				Aradi El-swad	96
			El-Rifa'i		
47.				Jama'at Jabir El-Shotarh	17

Stratum :B

Sub-Stratum:1

Size Class 1-100

	Liwa	Qadha	Nahiya	second stage sampling unit	population
48.			El-Chebayish	'Agail Dyabat	51
49.				Hammar El-Abd Al-'Aon	89
50.				Al-Abter	60
51.			El-Rumaith	Abu Sohat	78
52.			Hadithah	Orm Ghalwin	24
53.				Hawjat Mahzah	80

Size Class 101-200

1.			El-Dorah	Jama'at 'Ahass Hamid	113
2.			El-Dujail	Mohamad Jamil Al-Khojah	189
3.			Tikrit	'Abadi (El-shamrah)	179
4.			Balad	Jaisat	102
5.				Tel-El-Dhahab	171
6.			Samarrah	Hindriz	101
7.				Ta'asu El-Dayah	150
8.				El-Mahata	111
9.			'ain El-Tamir	Qaser Rmailah	191
10.			Zerbatiyah	El-Daijah	171
			Kut(Center)		

Size Class 101-200

	Liwa	Qadha	Nahiya	second stage sampling unit	population
11.			El-Namaniyah	Zerkan	125
12.			Aziziyah	El-Sualim	107
13.			Hillah(Center)	Hmud Harbi	194
14.			El-Mahawil	Jurf El-Krad	199
15.				Al-Uairah	164
16.				Hawar El-saghir and Rashaidah	168
17.				El-Msharkhah	168
18.				El-Merjaniyah	163
19.			El-Kifil	Om El-Khzar	147
20.				Mahawtah	170
21.				Waqf El-Mahdi	181
22.			Bein Sa'ad	Abu Ghzal & Sarrafiyah	176
23.				Khashim Kodri	129
24.				Nahr El'ali	119
25.				Om El-Runman	150
26.				'Abart El-Hashmiyah	126
27.			Qarah To	Khwaidan	157
28.				Markez Hodud	188
29.				Barikha	135
30.				Salhan	148
31.			Kin'an	Sayed Mustafa	131
32.				Kerbishah	158
33.				Om El-Semsem	135
34.			Ba'qoubah	El-Suayer	153
35.				El-Tahwilah	141
36.				Nahr El-Kharb	115
37.				Madhakhat Ustaj Ahmad	187
38.			El-Khalis	Madhakhat sayed Ahmad	155
39.				Al-Mahmudiyah	139
40.				Staif 'Ali El-Saleh	122

Size Class 101-200

	Liwa	Qadha	Nahiya	second stage sampling unit	population
41.			Abu Saidah	Albu Slaibi	160
42.				El-Raga'a	135
43.				Wahar Abu Hdaid	153
44.				Nahar El-Suwaidi	162
45.				Brash	140
46.				Sesel El-Qal'ah	167
47.				Chman	108
48.				Boudi	110
49.				Abu El-Ward	121
50.			'Ali El-Gharbi	'Aizat Nahar El-Badiyah	103
51.			El-Musharrah	El-Hasseiniyah	105
52.				El-Msoudnah	110
53.			El-Kahla'a	El-'Awdah	186
54.				Im'allayah	180
55.				El-Mutla'a	138
56.				El-Sulaimaniyah	166
57.			El-Major El-Kebir	Om 'Awani	128
58.				El-Dowayer	123
59.				El-Uaij	184
60.			Albu Saleh	Tapu Ahmad El-Mula Farhan	135
61.				El-Sai'at El-Hsumah	117
62.				Gais Ghlaij El-Hsumah	129
63.				El-Na'amah El-Glaiwi	104
64.			El-Khidhir	El-Hamad	106
65.			El-Rifai	Bestan El-Imami	121
66.				Kadkim El-jaber	129
67.			El-Chibayish	jama ar Handhel 'Aifan	123
68.				Hammar El-Dabat	113
69.				El-Farhan	133
70.				El-Ubussiyah	187
71.			El-Dagharah	El-Shari'a	165

Size Class 101-200.

	Liwa	Qadha	nNahiya	second stage sampling unit	population
72.				El-Zhaim	142
73.				El-Haramiyah	130
74.				Albu Hassen	113
75.			El-Abassiyah	Al-Hamdi	189
76.				Hatroujiyah	157
77.				Joban	157
78.			Hadithah	El-Gat'ah	146
79.				Hawjat El-Nassriyah	192

Size Class 201-600

	Baghdad	Baghdad	El-Dorah	'Agabiyah	423
1.				Jama'ab Abdul-Razzaq	
2.				T'aimah	336
				Om El-Asafir	347
3.				El-Siyafiyah	434
4.		Samarrah	El-Dujail	Jama'at Ja'afar Chalabi	282
5.		Tikrit	Tikrit	'Ain El-Faras	441
6.				El-Diyah	301
7.		Samarrah	Balad	'Agab Elbu-jb-aili	591
8.				Majma'a Jaiyarat	343
9.				Om Sh'aifah	265
10.				Qadriyah	337
11.				'Adhrifah	212
12.				Hiyalat Elbu Farraj	222
13.			Samarrah	El-Toot	283
14.				Sheikh Arba'a	370
15.				Jama'at Hassan	
16.				El-Ghaib	216
				M'aijl	355
17.				Zlayah	387
18.	Kerbalah	Kerbalah	'Aim El-Taima	Qasr El-Asali	398
19.					

Size Class 201-600

	Liwa	Qadha	Nahiya	second stage sampling unit	population
			El-Jarmah		
				Abu Sob	373
20.				Elbu Mahd	579
21.				Karghool	353
22.				Elbu Rgaibah	344
23.				Matrud El-Samawah	294
24.	Kut		Zerbatiyah	Warmzyar	465
25.		Kut	Kut(Center)		
				El-Shoaijah	250
26.				El-Shimraniyah	262
27.				Om El-Titi	253
28.				Shtait & Abu Shjair	282
29.				Aradhi El-Ahdab	277
30.				El-Draisat	277
31.			El-Namaniyah		
				El-Hamrayah	206
32.				Jama'at Isa El-Haj 'Ali Murad	458
33.				El-Zuwiyah	311
				El-Jos	317
34.				Om El-Rish	459
35.					
36.			Aziziyah		
				Danir	529
38.				Deir El-A'alah	368
39.				Dawari El-Sharqi	549
40.	Hillah		Sadat El-Hindiyah		
				El-Kamimiyah	230
41.			Hillah Center		
				'Aiqariyah	408
42.				Koairsh	574
43.				Elber Bahri	245
44.			El-Mahawil		
				'Amayat 'Asi	302
45.				El-Sourah	259
46.				El-Nil	462
47.				El-Khayaliyah	201
48.				El-Baridiyah	253
49.				Abu Kalnak	365
50.				'Amyat El-Topu	589
51.			El-Kifil		

Size Class 201-600

	Liwa	Qadha	Nahiya	second stage sampling unit	population
52.				El-Ni'aimiyah	287
53.				El-Bardawil	205
54.				Qaiter El-Kabir	345
55.				El-Matalik	356
56.				Waqf Ibrahim El-Khalil	203
57.				Hor El-Shok El-Gharbi	267
58.				El-Dolah	354
59.	Diala		Beir Sa'ad		
60.			Nissilliyah	Nissilliyah	253
61.				Dokhlah	494
62.				Abu Kadish	220
63.				Abu Sir	213
64.				Gatoon El-sadrani	371
			Qarah To		
65.				'Aidan & Siwalah	435
66.				Dar khormah	357
67.				Shirono	201
68.				Sr Qazl	314
69.				Kani Bijo	380
70.				Chia Sokh	384
			Kina'an		
71.				Abu Tfar	228
72.				Bad'at Latif El-Jasim & Gitan	351
73.				Bad'at El-Khshoom	359
		Baqoulah	Ba qoulah		
74.				El-Ihainnor	250
75.				Zahrah	522
76.				Dawriyat El-Wilayah	371
77.				El-Jizani	272
78.				Nah El-Kabir El-Sadrani	229
79.				Madhakhat Sayed Mustafa El-Ulah & El-Thaniyah	205
80.				Madhakat Mula 'Abid	220
			El-Khalis		
82.				Howairah	228
83.				Kashkin El-Kabir	460
84.				Koyat	439
85.				Zanbout	418
86.				Saghirah	536

Size Class 201-600

	Liwa	Qadha	Nahiya	second Stage sampling unit	population
87.				El-Hlaimat	214
88.				El-Badwaniyah	274
			Abu Saidah		
89.				Barwanah El-Saghirah	581
90.				El-'Aakar	452
91.				Khrairah	207
92.				Isaiwid	314
93.				Bzayez El-Shakhah	250
94.				Wadi El-Hisan	287
95.				Shok El-Rim	218
96.				Nahr El-Aswad	324
97.	Basrah		El-Harthah		
98.				Jazirat El-Hilaf	232
				El-Jrami	545
	Amarah		Ali El-Gharbi		
99.				El-Kabirah	301
100.				El-'Amyah El-Saghirah	348
101.				El-Horah	270
102.				Abu Sait	365
			El-Musharrah		
103.				El-Himaili	286
104.				El-Malfud	510
105.				El-Jowaidl	259
			El-Kahla		
106.				El-'Adil	487
107.				Tapu Nafish	458
108.				Hor El-Badhah	321
109.				El-Jariyah	281
110.				Itrif	238
111.				El-Sharmukh	245
112.				Jazrat Ghadhban	387
113.				El-'Adl Abu El-Toot	392
114.				El-Misfat	475
115.			El-Majar El Kabir	Dwarah	300
116.				El-D'aimi	352
117.				El-Wadi	323
118.				Irfai'ah	370
119.				El-Saftah El-Horah	258
120.				El-Khir El-Kabir	562

Size Class 201-600

	Liwa	Qadha	Nahiya	second stage sampling unit	population
121.				El-Wadiyah & Dawarah	250
122.				Abu Jalab	293
123.				El-Malha	569
124.				El-Kabab	334
			Albu Sabh		
125.				El-Gais El-Hsonah	321
126.				Om Mudhif El-Hsonah	262
127.				El-Shrish	331
128.				'Ashirat Om El-Shaf	254
129.				El-Sqaq'ah	427
130.				El-Wadi	537
			El-Dawayah		
131.				Al 'Amir	356
			El-Khidhir		
132.				Nash'ah	202
			El-Rifai		
133.				Nahr Ktan	382
134.				El-dyat	329
135.				'Abid Mri	278
136.				Aradhi El-Fayadiyah	548
137.				El-No'aumiyah	430
138.				Ashirat Al-Nassar	440
			Garmat Beni Said		
139.				El-Majar	345
140.				Jalkha	284
			El-Chibayish		
141.				El-Shkayer	437
142.				Jrbas	334
143.				El-Showai 'airiyah	266
144.				El-Mshailiyah	337
145.				Abu El-Skhair	223
			El-Dagharah		
146.				El-Hussainiyah	501
147.				El-Khamis	260
148.				Aradhi Abu Showarif	317
149.				El-Khalat	257
150.				El-Kwam	280
151.				Hlalan	308
152.				El-Asdal	207
153.				El-Dmawiniyah	284
154.				El-Rdhlah	225

Size Class 201-600

	Liwa	Qadha	Nahiya	second stage sampling unit	population
			El-Salahiyah		
155.				Hasah	209
156.				Shahailah	467
			El-Alassiyah		
157.				Khadyah	374
158.				Daryah	345
159.				Abu Shghoor Iktainah	268
160.				Aradhi El-Wahabi	231
161.				Shiyawa El-Nasir	313
162.				Abu Sheikh	439
	Dulaim		Hadithah		
163.				Jarnah & Shahmah	338
164.				Alus	466

Size Class 600-1000

	Baghdad	Baghdad	Al-Dorah		
1.				Karrodat Hussain El-Salman	680
			Tikrit		
2.				'Aowainat	602
			Balad		
3.				Khdhairah	817
4.				Elbu Jowari	616
			Samarrah		
5.				Truish	601
6.				Hrijah	734
	Kut		Kut		
7.				M'aikit	875
8.				El-Rmailah	857
9.				El-Howaiti	678
			Namaniyah		
10.				Isyala	640
11.				El-Had	661
			Aziziyah		
12.				Zowiyat El-Zar'a	832
13.				Irwalinyah	937
	Hillah		Sadat El-Hindiyah		
14.				Aradchi El-Barkah	743
			Hillah(Center)		
15.				Sinjar	605

Size Class 600-1000

	Liwa	Qadha	Nahiya	second stage sampling unit	population
16.			El-Mahawil	Skarji Abu Hamir	658
17.				Barnoon	926
18.				El-'Abbarah	967
19.				El-Haidariyah	603
20.			El-Kifil	El-Gatnah	920
21.				Omkashfah	605
22.	Diala		Qarah To	Mahmoud Qahr	809
23.			Kin'an	Wah Shaiban	625
24.			Baqoulah	Al-'Abbarah	700
25.				Zaghniyah El-Saghirah	904
26.			Abu Saidah	Abu Jasrah	768
27.				El-Wajihiyah	804
28.	Basrah		El-Harthah	El-Radhwiyah El-Jbailah	712
29.				El-Badran	969
30.				Om Qasmir	749
31.	Amarah		Ali El-Gharbi	El-Haswin & El-Sohol	881
32.			El-Musharrah	El-Wansah	734
33.				El-Jisah	806
34.			El-Kahla	El-Mahdar	896
35.				El-Mainshij	817
36.				El-Radah	858
37.			El-Majar El-Kebir	El-Cha'abiyah	644
38.				El-Sigar El-Hor	914
39.				Braidiyah	842
40.			Albu Saleh	El-Hamidi	690
41.			El-Dawayah	El-Fhookah	622

Size Class 600-1000

	Liwa	Qadha	Nahiya	second stage sampling unit	population
			El-Khidhir		
42.				El-Bdairi	604
			El-Rifai		
43.				'Anub	926
44.				Jama'at Hlamah El-Humadi	975
45.				Jama'at Sayed Yasir Yousef	632
			Garmat Bani Sa'ad		
46.				'Ashirat Beni Muslem	999
			El-Chbayish		
47.				Hammar Bein Khtait	988
48.				El-Sama'il	796
49.				Bahimah El-Khater	742
			El-Salahiyah		
50.				El-Bad'ah	902
			El-Ahassigah		
51.				El-KharabahEl-Tawilah	877
52.				Khachiyah	736
	Dulaim		Hadithah		
53.				Elbu Hayat	781

Size Class 1000-1400

	Baghdad	Baghdad	El-Dorah		
1.				Mo'askar El-Washah	1132
			El-Garmah		
2.				Hor Hamad	1339
	Kut		Kut(Center)		
3.				El-Yousfiyah	1317
			El-Namaniyah		
4.				Sadhi	1113
			Aziziyah		
5.				El-Qotniyah	1163
	Hillah		Sadat El-Hindiyah		
6.				Hor Hussaim	1147
			El-Mahawil		
7.				El-Khatooniyah	1138
			El-Kifil		
8.				Hmaisaniyah	1395

Size Class 1000-1400

	Liwa	Qadha	Nahiya	second stage sampling unit	population
9.	Diala		Baqoubah	Za'aniyah El-Kabirah	1036
10.			El-Khalis	Jdaidat El-Aghawat	1192
11.	Basrah		El-Harthah	El-Ghlaidhah	1200
12.	Amarah		Ali El-Gharbi	El-Graimah	1037
13.			El-Kahla	El-Zubair	1077
14.			El-Majar El-Kebir	Aradhir El-Batat & El-Gtah	1182
15.	Muntifaq		El-Rifai	El-Khir El-Saghir	1056
16.			Garmat Beni Sa'ad	Abu Hawan	1190
17.			El-Chibayish	'Ashirat al-Ziyad	1072
18.			El-Dagharah	'Amaijat El-Sheikh	1370
19.			El-Salahiyah	Othman El-Haj Shimran	1308
20.			Abassiyah	El-Baniyah	1131
21.				Radhi El-Waihi	1088

Size Class 1400-2000

1.	Baghdad	Tikrit	Tikrit	Chaiwan	1672
2.	Kut	Kut	Kut	Nisf El-Zawya	1791
3.			El-Namaniyah	El-Mazra'a El-Malakiyah	1737
4.	Hillah		Hillah(Center)	Hor 'Anatah	1696
5.			El-Mahawil	Tebah El-Miri	1488
6.	Daila		El-Khalis	Hibhib	1944

Size Class 1400-2000

	Liwa	Qadha	Nahiya	second stage sampling unit	population
7.			Abu-Saidah	El-Sa'adiyah	1584
8.			El-Harthah	El-Munjiah	1589
9.	Basrah		Ali El-Gharbi	El-Majdiyah	1892
10.	Amarah		El-Musharrah	El-Sa'adiyah	1676
11.				El-Jadil El-Kabir	1543
12.			El-Kahla		1464
13.			El-Majar El-Kabir		1490
14.			Albu Saleh		1683
15.			El-Rifai		1620
16.					1491
17.			El-Chibayish		1641
18.			El-Salahiyah		1444
19.			El-Abassiyah		1507
20.					1424

Size Class: More than 2000

1.	Baghdad	Tikrit	Tikrit	El-Kharjah	2466
2.		Samarrah	Samarrah	El-Dour	2749
3.	Kut	Kut	KutCenter	El-Sawadah	2190
4.	Hillah		Sadat El-Hindiyah	Aradhi El-Hussainiyah	6306
5.	Diala		Beni Sa'ad	Mhanawiyah	3977
6.		Baqoulah	Baqoulah	Jdaidat El-Shat	2551
7.				Khirmabat	2545
8.				Buhriz	4476

Size Class: More than 2000

	Liwa	Qadha	Nahiya	second stage sampling unit	population
9.	Basrah		El-Harthah	Jazirat El-Ali	2131
10.				Bani Malik	2219
11.	Amarah		El-Kahla	El-Akrah	4842
12.	Muntifaq		El-Rifai	El-Safanu	3444
13.			Garmat Beni Sa'ad	Jama'at Hamid El-Khojah	2585
14.				'Ashirat Elbu Khalifah	2043
15.			El-Daghorah	El-Qorbadhiyah	2920
16.			El-Runaith	El-Qa'im Hor El-Hjam	2295
17.				El-Dhowalim	9184
18.			El-Salahiyah	El-'Aajib	2726
19.				'Ankoush	3419
20.				'Akar	3456
21.				El-Gas'ah El-Sharkiyah	3650

Stratum:B

Sub-Stratum:2

Size Class 1-1000

1.	Baghdad	Samarrah	Samarrah	El-Qal'ah	983
2.	Kirbala		Ain El-temir	Qasir Elbu Howaidi	640
3.	Kut		Urbatiyah	El-Jauri'a	470
4.		Kut	Kut(Center)	Om Halatah	415
5.	Diala		Bim Sa'ad	Beni Sa'ad (Center)	822
6.			El-Khalis	El-Suq	232
7.				El-Saraya	794
8.	Basrah		El-Qournah	Shat El-'Arab	591

Size Class 1-1000

	Liwa	Qadha	Nahiya	second stage sampling unit	population
9.	Amarah		El-Musharrah	El-'Ajaid	987
10.			Albu Sabh	El-Sabiah	456
11.			Suq El-Shoyokh	Elbu Saleh(Center)	654
12.			El-Khidhir	El-Yaqadah	882
13.			El-Shamiyah	El-'ain	490
14.			El-Daghorah	Shiyanah	861
15.			Hadithah	El-Saraysh	553
16.				El-Sharqiyah	635
17.				Bein Dahr	476

Size Class 1000-2000

	Kerbalah		Ain Temir		
1.				Qasr El'Ain	1083
	Kut		Aziziyah		
2.				El-Sarayah	1420
	Hillah	El-Musayah	El-Musayah		
3.				El-Shoyoukh	1931
			El-Mahivil		
4.				Khana(Center)	1012
	Amarah		El-Kahla		
5.				El-'Aalwah	1046
	Muntifaq		Suq-El-Shoyokh		
6.				El-Howaizah	1560
			El-Dowayah		
7.				Nahiya Center	1193
			El-Rifai		
8.				El-Sarayah	1604
			El-Dagharah		
9.				El-Souq	1378
	Dulaim		Hadithah		
10.				Raban Dirwanah	1665

Size Class 1-1000

	Liwa	Qadha	Nahiya	second stage sampling unit	population
9.	Amarah		El-Musharrah	El-'Ajaid	987
10.			Albu Sabh	El-Sabiah	456
11.			Suq El-Shoyokh	Elbu Saleh(Center)	654
12.			El-Khidhir	El-Yaqadah	882
13.			El-Shamiyah	El-'ain	490
14.			El-Daghorah	Shiyanah	861
15.			Hadithah	El-Saraysh	553
16.				El-Sharqiyah	635
17.				Bein Dahr	476

Size Class 1000-2000

	Kerbalah		Ain Temir	Qasr El'Ain	1083
1.	Kut		Aziziyah	El-Sarayah	1420
2.	Hillah	El-Musayah	El-Musayah	El-Shoyoukh	1931
3.			El-Mahivil	Khana(Center)	1012
4.	Amarah		El-Kahla	El-'Aalwah	1046
5.	Muntifaq		Suq-El-Shoyokh	El-Howaizah	1560
6.			El-Dowayah	Nahiya Center	1193
7.			El-Rifai	El-Sarayah	1604
8.			El-Dagharah	El-Souq	1378
9.	Dulaim		Hadithah	Raban Dirwanah	1665
10.					

Size Class 2000-3000

	Liwa	Qidha	Nahiya	second stage sampling unit	population
1.	Baghdad	Tikrit	Tikrit	El-Harah	2794
2.	Baghdad	Samarrah	Samarrah	El-Gharbiyah	2999
3.	Hillah	Musayab	Musayab	Om El Sokhol	2249
4.	Hillah	Hillah (Center)		El-Wardiyah	2774
5.	Diala		Abu Saidah	Nahiya'Center	2319
6.	Amarah		El-Musharah	El-Saraya	2316
7.	Diwaniyah		Samawah	El-Qoshlah	2368
8.			El-Rifai	El-Sharq	2809
9.			Rumaithah	El-Gharbi	2455

Size Class 3000-5000

1.			Bald	El-Sharqiyah	3005
2.			Samarrah	El-Sharqiyah	4885
3.			Kut	El-Sayed Husain	3707
4.			Namaniyah	El-Sarayah	4304
5.			Musayab	El-Dohdwanah	3237
6.			Sadat El-Hindiyah	Sob El-Kabir	3653
7.			Hillah	El-Krad	3895
8.				El-Mahdiyah	4947
9.				El-Taq	3485
10.			Baqoubah	El-Saraya	4286

Size Class: More than 5000

	Liwa	Qadha	Nahiya	secons stage sampling unit	population
1.			Najaf	El-'Amarah	13586
2.				El-Howaish	9326
3.				El-Barraq	9880
4.				El-Mushraq	8202
5.				El-Amor Ghazi	15267
6.			Kut Center	El-Saraya	6315
7.			Baqoubah	El-Takyah	5521
8.			Samawah	El-Sharqi	6671
9.				El-Gharbi	6253
10.			Hillah Center	El-Jami'ain	5806

It is proposed that each second stage unit included in the sample should be completely surveyed for the following main reasons:-

i. The overall sampling fraction is sufficient as it is equal to less than ten per cent. Further sampling will increase the standard error of the estimates.

ii. These second stage units contain farms which greatly vary in size. Thus a sample of farms requires a frame which is not available in Iraq. This frame should contain the names and addresses of the farmers and some information related to their farms (preferably the size of the farms). Iraq lacks such a thing because land settlement processes are not yet completed.

iii. Charging the interviewers with the duty to select a sample of farms within the selected second stage units is not recommended for Iraq, because trained personnel are not available.

It is necessary to remind the readers that the second stage sample discussed above does not represent the centers of the Liwas of Mosul and Kirkuk from the Northern Region and the Centers of the Liwa of Baghdad,

Basrah and the Nahiya of Karradah from the Southern Region. These units are dealt with separately due to the reasons mentioned on page (46). Moreover these cities with the exception of Kirkuk and Karradah do not include any villages. Thus they are urban areas and need not be sampled for the purpose of collecting agricultural statistics.

As to the villages of Kirkuk and Karradah it has been found that the following villages are included.

Villages Attached to the Centers of Kirkuk Liwa

population	Villages	Sampling fraction	Units to be included in the sample
1-200	57	30%	17
201-400	16	30%	5
401-800	10	50%	5
more than 800	5	100%	5
	88		32

Villages Attached to the Nahiya of Karradah

population	Villages	Sampling fraction	Units to be included in the sample
1-200	23	30%	7
201-400	9	50%	5
401-800	5	100%	5
more than 800	5	100%	5
	42		22

The size of the samples from ~~the~~ these units are determined arbitrarily because their standard deviation are very big and the previous procedure followed in determining the sizes of the first stage sample and of the second stage sample can not be followed.

Selection of the required villages from each of the above mentioned size classes is made in accordance with the procedure described on pages (119).

The tables on the following pages show the village which are included in the sample.

A Sample of 32 of the 88 Villages Attached to the Center of Kirkuk Liwa.

	Liwa	Qadha	Nahiya	second stage sampling unit	population
x.	Kirkuk	Kirkuk	Kirkuk Center		
1.				Chragh	107
2.				Brima	109
3.				Talawa	22
4.				Sadah Saghira	20
5.				Jdaydah Hassan Bey	190
6.				Sayadah Kabir	71
7.				Hisar Mohamad Saleh	95
8.				Dujailah	76
9.				Hisar Hassan Agha	31
10.				Shamsah	63
11.				Qarah Yal	21
12.				Dmakah	47
13.				Maftulah	30
14.				Naletz	69
15.				Qaharah	31
16.				Qorkah Chal	180
17.				Hinjirah	62
18.				Qazliar	392
19.				'Alaw Mahmud	213
20.				Kochik Kabir	264
21.				Mulla 'Abdullah	231
22.				Hindiyah	242
	Size Class 400				
1.				Qarah Tebah	439
2.				Qotan Kabir	748
3.				El-Mahatah	667
4.				Chard Aghko	468
5.				Komptler	565
	Size Class				
1.				Tobzawa Hassan Bey	1280
2.				Sharikat El-Nafut	2080
3.				Tis'ain	2803
4.				Bashir	1699
5.				Tazah	1918

A Sample of 22 Out of 42 Villages Attached to the

Nahiya of Karradah

	Size Class				
	Liwa	Qadha	Nahiya	second stage sampling unit	population
	Baghdad	Baghdad	Karradah		
1.				Mahatat Kasil	106
2.				El-Sadir	181
3.				Jama'at Fakhri El'Abdullah	80
4.				El-Ghazaliyah	11
5.				El-Sowabi'a	57
6.				Jama'at Abdul-Wahab Gholam	74
7.				Grâgor El-Ulah	94
	Size Class				
1.				'Abud El-Garha	206
2.				'Arab Ajgham	362
3.				El-Tutujmaniyah	220
4.				Jama'at Qal'at Kharmah	205
5.				Jama'at Yousif Murad	204
6.				Jama'at 'Abdullah El-Mudhayifi	797
7.				El-Sham'ayah	442
8.				Jama'at Shafiq Nori El-Siaidi	420
9.				El-Doudahwiyah	413
10.				El-Rustamiyah	653
11.				'Arasat El-'Asimah	20910
12.				Tel Mohammad	5141
13.				Aradhi S'aido	1155
14.				El-Za'afraniyah	1493
15.				Ma'askar El-Rashid	1667

The Raising Factors:-

As the sampling fractions vary from one size to another it is advisable to determine a different raising factor for each size group in order to get reliable estimates. Furthermore as the exact totals number of villages or quarters in every sub-stratum is available, it is more accurate to use these totals in determining the raising factors than to use the totals which are estimated from the sample, because the latter estimates contain errors.

The following tables show the various raising factors for the size group in every sub-stratum:

Stratum:A

Sub-Stratum:1

Raising Factors For The Northern Villages in the Different Size Classes.

Population	Villages in the First Stage Sample	Villages included in the second stage sample(2)	Villages in all sampling units (3)	Raising factor (3÷2)
1-100	832	125	2160	17.28
101-200	576	115	1495	13
201-400	369	92	958	10.4
401-800	117	46	303	6.6
801-1600	18	10	46	4.6
more than 1600	5	5	15	3
	1917	393	4977	12.6

Stratum:A

Sub-Stratum:2

Raising Factors For the Northern Quarters Which Are Included In The Sample From The Various Size Classes.

Population	Quarters in the first stage sample	Quarters included in the second stage sample(2)	Quarters in all first stage sampling unit (3)	Raising factor (3 ÷ 2)
1-1000	33	13	96	7.4
1001-3000	16	11	45	4
above 3000	5	5	15	3
	54	29	156	5.35

Stratum:B

Sub-Stratum:1

Raising Factors for the Southern Villages Which are Included in the Sample from the Various Size Classes.

Population	Villages in first stage sample (1)	Villages in second stage sample (2)	Expected villages in all first stage units (3)	Raising factor (3 ÷ 2)
1-100	264	53	658	12.42
101-200	393	79	982	12.43
201-600	652	163	1625	9.97
601-1000	178	53	443	8.36
1001-1400	71	21	177	8.43
1401-2000	45	18	112	6.22
above 2000	53	21	131	6.24
	1656	408	4128	10.12

Stratum:B

Sub-Stratum:2

Raising Factors for the Southern Quarters Which are Inlcuded in the Sample from the Various Size Classes.

Population	Quarters in first stage sample	Quarters in second stage sample(2)	Expected Quarters in all 1st stage sampling units	Raising factors (3 ÷ 2)
1-1000	42	17	104	6.11
1001-2000	24	10	59	5.9
2001-3000	18	9	45	5
3001-5000	17	10	42	4.2
above 5000	10	10	25	2.5
	111	56	275	4.91

Raising Factors for Villages Attached to the Center of Kirkuk Liwa.

Population	Villages	Villages in the sample	Raising factors
1-200	57	17	3.35
201-400	16	5	3.2
401-800	10	5	2
above 800	5	5	1
	88	32	2.75

Raising Factors for Villages Attached
to the Nahiya of Karradah.

Population	Villages	Villages in the sample	Raising factor
1-200	23	7	3.28
201-400	9	5	1.8
401-800	5	5	1
above 800	5	5	1
	42	22	1.90

The informants:

All the items of agricultural information mentioned in section 2.3 should be collected from those whoe pursue the work of farming on mulk land, waqf sahih lands, Waqf Ghair sahih lands, miri tapu land, miri land granted in lazma, miri sirf land and lands held in any other type of tenure, provided that these lands are included in the villages and quarters, which constitute the second stage sample mentioned above.[1] In brief, farmers and

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1. supra P.P. 125-161 and 165-166.

landholders whose farms are included in the selected villages and quarters (second stage sample) should be interviewed. But as some of the landholders are living away from their lands and do not actually manage their lands, the sirkals should be interviewed.

Mathematical Appendix of the Thesis

N Qadhas' centers and Nahiyas

N_1 Northern Qadhas' centers and Nahiyas

N_2 Southern Qadhas' centers and Nahiyas

$N_1 + N_2 = N$

$N_I \longrightarrow K_I + K_2 + K_3$ $\quad K_I$ or $l_I \lessgtr 20000$

$N_2 \longrightarrow l_I + l_2 + l_3$ $\quad K_2$ or $l_2 \geqslant 20000 \leqslant 80000$

K_3 or $l_3 > 80000$

On condition that combination does not cross sub-divisions

K_I, K_2, K_3 or l_I, l_2, l_3

$N_I \longrightarrow N_{In}$ new units

$N_2 \longrightarrow N_{2n}$ new units

$N_{In} \longrightarrow K_{Ia} + K_{2a} + K_{3a}$

$N_{2n} \longrightarrow l_{Ia} + l_{2a} + l_{3a}$

A division between K_{Ia}, K_{2a}, + K_{3a} and 1_{Ia}, 1_{2a}, 1_{3a} is based on the minimum standard deviation for each substratum.

$$\sigma_{K_{Ia}}, \sigma_{K_{2a}}, \sigma_{1_{Ia}}, \sigma_{1_{2a}}$$

$$p = N_{In} + N_{2n} + K_{3a} - 1_{3a}$$

$$p = K_{Ia} + K_{2a}, \; 1_{1a} + 1_{2a}$$

$$\sigma_{\bar{p}} = \frac{\sigma_{\bar{p}}}{\sqrt{p}}$$

$\bar{P}$ is the mean population $K_{1a} + K_{2a} + 1_{1a} 1_{2a}$

$$\frac{\bar{p}}{20} = \sigma_{\bar{p}} = \frac{\sigma_{\bar{p}}}{\sqrt{\bar{p}}}$$

$$\sqrt{p} = \frac{\sigma_{\bar{p}}}{\sigma_{\bar{p}}} = \frac{20 \times \sigma_{\bar{p}}}{\bar{p}}$$

P was thus divided proportionately to

$K_{Ia} : K_{2a} : 1_{Ia} : 1_{2a}$

S_I, S_2, r_I, r_2

$S_I + S_2 = V$ (villages and quarters)

$r_I + r_2 = U$ (villages and quarters)

$V \longrightarrow V_I + V_2$ (V_I villages, V_2 quarters)

$U \longrightarrow U_I + U_2$ (U_I villages, U_2 quarters)

V_I, V_2, U_I, U_2 made into frequency Distribution

$$\sigma_{\overline{p'}} = \frac{\sigma_{p'}}{\sqrt{p'}}$$

$\overline{p'}$ is the mean populations of $V_1 + V_2 + U_1 + U_2$

$$\frac{\overline{p'}}{20} = \frac{\sigma_{p'}}{\sqrt{p'}}$$

$$\sqrt{p'} = \frac{20 \times \sigma_p}{\overline{p'}}$$

p' was thus divided proportionately to the class intervals of each frequency Distribution.

As regard K_{3a}, l_{3a}

It includes b villages and Quarters

$b \longrightarrow b_I + b_2$ (b_I northern villages, b_2 southern villages made into frequency Distribution)

$b_1 \longrightarrow b_{1a} + b_{2a}$ (~~b_1 Northern Villages, Northern Quarters~~ Sampling fractions determined arbitrarily).

$b_2 \longrightarrow b_{1c} + b_{2c}$ (~~b_2 Southern villages, b_{2a} Southern quarters~~)

Appendex (B)

Questionnaire Form

I. Size of land holding donums

A. Cultivated land

i. Annually cultivated

ii. Pastureland

iii. Orchard

iv. House

v. Left fallow for the Coming year

vi. Other use

B. Cultivable but not actually cultivated

i Due to the lack of water

ii Due to the lack of credit facilities

iii Other reasons

C. Land not Cultivable

D. Type of Tenure:

( ) Mulk ( ) Waqf Sahih ( ) Waqf Ghair sahih

( ) Miri tapu ( ) Miri lazma ( ) Miri Sirf

( ) Others

Type of tenure	area (in donum)

II. Types of Water Supply donums

i. Land dependent on rainfall

ii. Land irrigated by river flow

iii. Land irrigated by Water pumps

iv. Land irrigated by other means

III. Water pumps:

i. Horse power of each one 1. 2. 3. 4.

ii. Present Price of a new one 1. 2. 3. 4.

iii. Date of purchase of the machines 1. 2. 3. 4.

iv. The present value in Dinars 1. 2. 3. 4.

IV. Agricultural Machines and implements

A. Owned by the farmer

i. Harvestors

a. Horse power for each (dinar) 1. 2. 3. 4.

b. Present price of a new one 1. 2. 3. 4.

c. Date of purchase of ~~the machines~~ each (year) 1. 2. 3. 4.

d. ~~Combines~~ Present value of each 1. 2. 3. 4.

ii. ~~Present value of each~~ Combines

a. horse power for each 1. 2. 3. 4.

b. Present price of a new one 1. 2. 3. 4.

c. Age of the machines 1. 2. 3. 4.

d. Present value of each 1. 2. 3. 4.

iii. Threshers

a. horse power 1. 2. 3. 4.

b. Present price of a new one(Dinars) 1. 2. 3. 4.

c. Date of purchase (year) 1. 2. 3. 4.

d. Present value of each(Dinars) 1. 2. 3. 4.

iv. Other types of agricultural machines

	Type	No.	horse power
1.			
2.			
3.			
4.			

B. Agricultural Machines Hired by the farmer

(excluding those let by the Government)

Type	No.	total horse power	Period month	monthly money paid
1. Harvestors				
Combines				
Threshers				
Other types				

V. Farm Laborers paid money wage

	Farm laborers		Mechanics	
	No.	weekly wage (Dinar)	No.	weekly wage (Dinar)
Male				
below 15				
above 15				
Female				
below 15				
above 15				

Table I.

Seed sown, Area harvested, production, shares received by the different classes, wholesale price and Amount sold.

Type of Crops	Seed sown (Kilos)	Area Harvested (donums)	Production (Ton)	Shares of the Produce (Ton)				Wholesale Prices (in dinars per ton)	Total Amounts Sold
				Land-holder	pump owner	Sirkal	Farm-laborers		
Winter Crops									
Wheat									
Barley									
linseed									
lintiles									
chikling vetch									
Others									
Summer crops									
Pirice									
Cotton									
Sesame									
Maize									
Green Gram									
Millet									
Others									
Vegetables									
Total									

Table II

Fruits

Kinds	No.of trees Fruitful	No.of trees Non-bearing	Annual production or unit	Whole sale price per ton or 1000	Remarks
Orange					
Apple					
Pear					
Pomegranate					
Appricot					
Other kinds					
Pistachio					
Walnut					
AAlmond					
Other Kinds					

Table III.

Dates

Kind	Palm Trees: Fruitful	Palm Trees: non-bearing	shrubs	Production in ton	Prices per ton in Dinar	Remarks
Sayer						
Hillawi						
Khadrawi						
Khistawi						
Zahdi						
Other kinds						

VII. Credit and indebtedness of the farmers

a. Money borrowed to the beginning of this year (dinars)

b. Money borrowed by the farmers from private persons, This year only D.

c. Interest # Rate %.

d. Money lent by the farmers to the farm laborers D.

e. Value of the Constituents of the loans made to farm laborers D.

Table VIII.

Crops	Quantity bought at discounted prices	Discount Price: Discounted prices per ton (in dinars) the loan in kind	Discount Price: Discounted prices per ton (in dinars) for loan made in money	Remarks
Wheat				
Barley				
Linseed				
Lintiles				
checkling Vetch				
Rice				
Cotton				
Sesame				
Maize				
Green gram				
Millet				
Others				

Table IX.

Livestock[1]

Kinds	one year ago	Born	Bought	Sold	Eaten	Died	Now	Sales prices
1. Sheep								
a.Karradi								
b.Awasi								
c.Arabi								
others								
2. Goats								
a.Southern								
b.Northern								
c.European								
d.Other Kinds								
3. Mules								
4. Buffalo								
5. Bull								
a.Southern								
b.Northern								
c.European								
d.others								
6. Ass								
7. Horses								
8. Poultry								
a.Hens								
b.Geese								
others								

Livestock Products[2]

Unit	Sold	Consumed	Sales Prices	Quantity to Owner
Milk				
Butter				
Meat				
Cheese				
Semmah				
Wool				
Eggs				
Hides				
Mohair				
Others				

1. This information on the livestock is copied from the questionnaire form used for Lebanon.
2. This table is also taken from the Questionnaire form used by the T.C.A. in Lebanon.

Appendix(C)

Instructions for enumerators

I. How many donums of land do you have under your control ?

A. How many donums of land do you cultivate (including orchard and pastureland)

i. How many donums of land have you cultivated this year ?

ii. How many donums of land have you used as pastureland ?

iii. How many donums of land have you used an orchardland ?

iv. How many donums of land have you used buildings ?

v. How many donums of land have been left fallow ? (only because of the salinity of land)

vi. How many donums of land have you left for other uses ?

The interviewer should note that results of questions No. 1, 2, 3, 5 and 6 should add up to the total in question A.

B. How many donums of land are cultivable but not actually cultivated ? (This question does not include area left fallow because of the salinity of land).

How many donums are uncultivated because of the

i. Lack of water

ii. The lack of credit facilities

iii. Inability to exploitate and other reason.

Results of questions Nos. 1, 2, and 3 should add up to the total of question B.

C. How many donums of land are not cultivable ?

Results of questions A, B and C should add up roughly to that of question I.

D. Type of tenure

Is your land mulk, waqf, Naqf Ghair Sahih, tapu, lazma or miri sirf or held in other types of tenure.

If a holding is held in many types of tenure, then ask about the area of each type. In this case the interviewer should note that these areas should add up to the area of land holdings given question I.

II. Types of water supply

How many donums of land are

i. Dependent on rainfall ?

ii. Irrigated by river flow ?

iii. Irrigated by water pumps ?

iv. Irrigated by other means ?

III. Water pumps

How many water pumps are installed on your land ?

i. What is the horse power of each ?

ii. What is the present price of a new one in Dinars of the same make and the same horse power in this area ?

iii. When did you buy each water pump ?

iv. What is the present value of each one ? (in Dinars)

If there are many water pumps questions 2, 3 and 4 should be repeated for each water pump.

IV. Agricultural Machines & implements:-

A. Owned by the Farmer

i. How many harvestors do you have ?

a. What is the horse power of each one ?

b. What is the present price of a new one (in Dinars) of the same make and horse power ?

c. When did you buy each harvester ?

d. What is the present value of each harvester ?

For combines, substitute this word instead of harvestors in question i ; then repeat questions 2, 3, 4 and 5. The same procedure is followed when you ask about tractors, threshors and other machines.

B. Agricultural machines and implements hired by the farmers.

i. How many harvestors did you hire this year ?

ii. What is their total horse power ?

iii. For how many months did you hire them ?

iv. How many Dinars are the amount of rent paid per month ?

Substitutes,combines, threshors, ~~xxxxxxxxxx~~ in questions No. 1 instead of ~~threshors~~ harvestors when you ask about each of them. Then questions No. 2, 3 and 4 should be repeated when asking about every type of these machines.

V. Farm laborers

A. How many male laborers whose ages are below 15 are employed on your farm ?

Do you pay them money wages ? If yes then ask what is the total weekly wage in dinars ?

Repeat these question when you ask about farm laborers above 15, female below 15 and female above 15 years of age.

B. How many mechanics do you employ ? (This question should include laborers who run water pumps and agricultural machines). How many Dinars do you pay them per week ?

VI. Crop statistics

a. How many donums of land did you till for sowing this year ?

b. How many donums of land did you sow this year ?

c. Estimate the area under crops three months after the time of sowing.

d. How many donums of land were harvested ? (If the area harvested is much less than the area sown, then ask for the reasons).

Table I.

How many kilos of wheat were sown ?

How many donums of land under wheat were harvested ?

Estimate the amount of wheat produced in tons .

How many tons of wheat were sold wholesale ?

What is the whole sale price of wheat per ton when sold in Dinars ?

Substitute each of the crops mentioned in table No.1 instead of wheat in the above mentioned questions when you fill in the table.

As to the shares received by the farm laborers, Sirkal, landholders and water pump owners (the interviewer should ask the following questions):

What is the percentage of the produce received by

a. Farm laborers

b. Pump owners

c. Sirkals

d. Land holders

Table II. Fruits:

How many orange trees do you have ?

What was the number of Oranges produced this year ?

What was the amount sold ?

What was the wholesale price per 1000 oranges in Dinars ?

Substitute each kind of fruit mentioned in table No.2 instead of orange in the questions above when you fill in the table. Interviewers should note that they should use the units mentioned in this table when they ask about the amount of production (tons).

Table III. Dates:

How many fruitful sayer palm trees do you have ?

How many non bearing sayer palm trees do you have ?

How many sayer shruks do you have ?

How many tons of sayer were produced this year ?

Substitute each kind of the dates mentioned in table No.3 in the questions above when you fill in the table.

VII. Credit and Indebtedness of farmers:

a. How many dinars did you borrow to the beginning of this year ?

b. How many dinars did you borrow this year (amounts borrowed from the Agricultural Bank should not be included)?

c. What is the interest rate.

d. How many dinars did you lend to farm laborers this year ?

e. Estimate the value of draft animals, seed or other items you advanced to farm laborers this year ?

Table VIII. Discount prices:

a. How many tons of wheat have you bought at discounted price ? (this includes only the amount bought from his farm laborers ?)

b. What is the discounted price per ton of wheat (if the loan is made in money)

c. What is the discounted price per ton of wheat (if the loan is made in kind ?)

Substitute each kind of the crops mentioned in table VIII in the questions above when you fill in the table.

Table IX: Livestock.

Estimate the Number of sheeps

a. you had one year ago

b. born this year

c. bought this year

d. Sold this year

e. Eaten

f. died

g. Now

h. Sales price

Substitute other kinds and species of livestock and poultry instead of sheep when you fill in table (VIII).

Table X Livestock Product:

i. Ask about the unit in which milk is sold.

ii. What is the quantity sold in this week.

iii. What is the quantity consumed

iv. What is the sale price of a unit of milk.

Then substitute each of the product mentioned in table 10 instead of milk when you fill in this table.

Appendix D

Frequency Distribution of Qadhas population in the Northern Region

	frequency (f)	mid-point m	fm	deviation from the mean(d^1)	fd^2	Σfd^2
0-40000	11	20000	220000	- 37800	1428840000	15717240000
40001-100000	9	70000	630000	12200	148840000	1339560000
more than 10000	2	210500 (1)	421000	163200	26635240000	53268480000
	22		1271000			70325280000

$\bar{X}_N = 57800$

Frequency Distribution of Qadhas' Population in the Southern Region

	frequency (f)	mid-point (m)	fm	deviation from the mean d'	d'^2	fd'^2
0-40000	4	20000	80000	- 68800	4733440000	18933760000
40001-100000	28	70000	1968000	- 18400	338560000	9479680000
more than 100000	6	218400 (2)	1310000	129900	16777010000	100044000000
	38		3358000			128458440000

$\bar{X}_S = 88400$

Mean of Qadha population in Iraq = 77000

Standard deviation of Qadha's population = $\sqrt{\frac{\Sigma fd^2}{N}} = \sqrt{3313062000} = 57700$

Appendix E

Stratum A_1 : Nahiys Qadhs' Centers in the Northern Region

Population is More Than 300 But Less Than 20000

Code No.	Liwa	Qadha	Nahiya or Qadhas's Center	population X	X^2
1	Mosul	Mosul	Himiadat	18022	324700000
2	"	Amadia	Amadia (Center)	10474	109700000
			Torirkan		
3.	"	"	Barwari Bala	11638	135300000
4.	"	Zakhu	Zakhu(Center)	14294	202800000
5.	"	"	El-Silivani	8917	79520000
6.	"	"	El-Sindi	7635	58270000
7.	"	"	El-Gilli	5358	28710000
8.	"	Dhouk	Dhouk(Center)	5621	31590000
9.	"	"	Dhouk	14229	202200000
10.	"	"	El-Doski	9534	90900000
11.	"	"	El-Mizouri	9864	97300000
12.	"	Aqra	Aqra(Center)	5579	30120000
13.	"	"	El-Sorchia	7413	54950000
14.	"	"	El-Ashayer-El Sabaa	10271	105500000
	"	"	Bira Kabra	8832	78010000
15.	"	Sinjar	Sinjar(Center)	5407	29240000
16.	"	"	Sinjar	15382	236600000
17.	"	"	El-Shimal	10920	119200000
18.	"	Shikhan	Shikhan(Center)	13300	176900000
19.	"	"	Quosh	11772	138500000
20.	"	Talla'far	Tallafar(Cent.)	19951	397900000
21.	"	"	El-Iyadiya	9534	90900000
22.	"	"	El-Zummar	13343	178000000
23.	Arbil	Arbil	Shaklawa	16644	276900000
24.	"	Makhmur	Makhmur(Center)	13284	175000000
25.	"	"	El-Guwair	13692	187000000
26.	"	"	Kindinawa	17852	318500000
27	"	Kmaisanjaq	Taq Taq	10092	101900000
28.					

Code No.	Liwa	Qadha	Nahiya or Qadhas'Center	population(X)	X^2
29.	Arbil	Rawanduz	Rawanduz(Center)	18196	330900000
30.	"	"	Dira Harir	9041	81740000
31.	"	"	Balak	9751	95080000
32.	"	"	Bradost	3920	15080000
33.	"	"	Mirka Sur	4158	17290000
34.	"	Rania	Rania(Center)	13431	180400000
35.	"	"	Chanaran	4736	22430000
36.	"	"	Nowdasht	8985	80730000
37.	"	Zechar	Zechar(Center)		
			Barazan & Mzawra Bala	6604	43610000
38.	Sulaimaniya	Sulaimaniya	Tanjru	10490	110100000
39.	"	"	Qara Dagh	10117	102200000
40.	"	"	Sordash	11957	142060000
41	"	"	Bazyan	4250	18020000
42.	"	Halabcha	Khormal	19577	383000000
43.	"	"	Warmawa	6857	47400000
44.	"	Shaharbazar	Shaharbazar(Center)	17341	300000000
45.	"	"	Mawt	11594	134000000
46.	"	"	Srujuk	10056	101000000
47.	"	Bishdar	Mirka(Bankard)	13471	181500000
48.	Kirkuk	Kirkuk	Qara Hassan	13878	192300000
49.	"	"	Altoon Kopri	14955	223400000
50.	"	"	El-Mlaiha	15329	234700000
51.	"	"	Shuwan	11200	125400000
52.	"	Kufri	Kufri(Center)	4760	22660000
53.	"	"	Bibaz	5959	35510000
54.	"	"	Shirwana	17566	304400000
55.	"	Chamchamal	Chemchemal(Center)	11943	143500000
56.	"	"	Aghjlar	9567	91520000
57.	"	"	Singawa	8301	68910000
58.	"	Daquq	Daquq (Center)	14647	214400000
59.	"	"	Qder Karan	14689	215600000
		$\bar{X}$ =11100		656133	8315140000

Stratum A_2 : Nahyas, Qadhas' Centers and Liwas' Centers in the Northern Region whose population are more than 20000 but less than 90000 each.

Code No.	Liwa	Qadha	Nahiya, Qadha Center or Liwa's Center	population X	X^2
60.	Mosul	Mosul	El-Shorah	26109	681200000
61.	"	"	El-Hamdaniya	42715	1824000000
62.	"	"	El-Shirqat	25085	629100000
63.	"	"	Tel-Kaif	27833	774400000
64.	"	Amadia	Amadia	21206	449400000
65.	Arbil	Arbil	Arbil(Center)	27036	730600000
66.	"	"	Quosh Tebah	42244	1784000000
67.	Arbil	Kuaisanjaq	Kuaisanjaq (Center)	20106	404000000
68.	Sulaimaniya	Sulaimaniya	Sulaimaniya (Center)	43049	1852000000
69.	"	Halabcha	Halabcha(Center)	22741	517100000
70.	"	"	Benjuwin	22318	479700000
71.	"	Bishdar	Bishdar(Center and Qala Diz	22632	512100000
72.	Kirkuk	Kirfri	Qara Teba	21074	444000000
73.	"	Daquq	Tuz Khormato	29693	877400000
				393841	11959000000

Stratum A_3 : Nahiya, Qadha's Center or Liwa's Center in the Northern Region Whose population is more than 90000

Code No.	Liwa	Qadha	Liwa's Center	population X	X^2
	Mosul	Mosul	Mosul(Center)	133625	17850000000
	Kirkuk	Kirkuk	Kirkuk(Center)	92444	8545000000
				225069	26395000000

Stratum B_1: Nahiyas, Qadha's Center or Liwa's Center in the Southern Region

Whose population is between 3000 and 20000

Code No.	Liwa	Qadha	Nahiya, Qadha or Liwa Center	population X	X^2
74.	Baghdad	Baghdad	El-Dorah	16090	259000000
75.	"	"	Salman Pak	18860	355600000
76.	"	Kadimain	Tarmiyah	15102	228000000
77.	"	Mahmudiyah	Yousifiya	16052	257000000
78.	Baghdad	Samarrah	Dujail	7373	45360000
79.	"	Tekrit	Tekrit(Center)	15377	236300000
80.	"	"	Baiji	8661	75020000
81.	Kerbelah	Kerbelah	Ain Temur	5336	28470000
82.	Dulaim	Ramadi	Hit	18478	338600000
83.	"	Fallujа	El-Karmah	12407	153800000
84.	"	Anah	Anah(Center)	11396	129100000
85.	"	"	Haditha	14077	198000000
86.	"	"	El-Qaim	7841	61490000
87.	Kut	Badrah	Badrah(Center)	12934	167400000
88.	"	"	Zerbatiyah	3255	10590000
89.	"	Suwairah	Zubaidiyah	10287	105700000
90.	Hillah	Hindiyah	Hindiyah(Center)	11077	122600000
91.	"	"	Abu Gharq	19928	396800000
92.	"	Musayab	Musayab(Center)	9797	95980000
93.	"	"	Jurf El-Sakhur	5161	26640000
94.	"	"	Sadat Hindiyah	16463	271000000
95.	"	"	Iskenderiyah	14145	200000000
96.	Diala	Khalis	Beni Sa'ad	16711	279200000
97.	"	Khanaqin	Khanaqin(Center)	10090	101900000
98.	"	"	Khanaqin	15922	253400000
99.	"	"	Horin Shekhan	5936	35340000
100.	"	"	Quorah To	12810	164000000
101.	"	"	El-Sa'adiyah	13401	170100000
102.	"	Mandili	Balad Ruz	17184	295200000
103.	"	Muqdahiyah	Muqdahiyah(Center)	4203	01767000
104.	"	"	Kina'an	10761	115800000
105.	Basrah	Quornah	Qournah(Center)	3156	9961000
106.	"	Abu Al-Khasib	El-Seebah	16768	280900000
107.	Amarah	Amarah	Kumayt	19234	369800000
108.	"	Ali Al-Gharbi	Ali Al-Gharbi(Cent)	18824	354100000
109.	"	"	Sheikh Sa'ad	17158	294100000
110.	Muntifaq	Nasiriyah	Ur	9163	83910000
111.	"	SuqAl-Shiyokh	Suq Al-Shoyokh(C.)	8795	77350000

Code No.	Liwa	Qadha	Nahiya, Qadha or Liwa Center	population X	X^2
112.	Muntifaq	Shatrah	Dowayah	6024	36290000
113.	Diwaniyah	Diwaniyah	Al-Mlaiha	11996	143700000
114.	"	"	Al-Shafi'ia	8090	65450000
115.	"	Afaq	Afaq(Center)	13970	195100000
116.	"	"	Al-Bdair	7299	53270000
117.	"	Samawah	Samawah(Center)	15292	233800000
118.	"	"	Al-Khidir	9395	88260000
119.	"	Shamiyah	Shamiyah(Center)	6520	42510000
120.	"	"	Shinafia	9628	92690000
				558067	7616251000

Stratum B_2: Nahiya, Qadha's Center or Liwa Center in the Southern Region Whose population is Between 20000 and 90000

121.	Baghdad	Baghdad	Adamiyah	77524	6009000000
122.	"	Kdimain	Kadimain (Center)	62162	3864000000
123.	"	"	AbiGhraib	38496	1482000000
124.	"	Mahmudiyah	Mahmudiyah(Center)	37631	1416000000
125.	"	Samarrah	Samarrah(Center)	30014	900000000
126.	"	"	Balad	27517	756800000
127.	Kerbelah	Kerbelah	Kerbelah(Center)	44150	1950000000
128.	"	"	Hussayniyah	21677	469600000
129.	"	Najaf	Najaf(Center)	57947	3757000000
130.	"	"	Kufa	20154	406000000
131.	Dulaim	Ramadi	Ramadi(Center)	67395	4531000000
132.	"	Fallujа	Fallujа(Center)	36394	1325000000
133.	Kut	Kut	Kut(Center)	56105	3147000000
134.	"	"	Namaniyah	25283	619300000
135.	"	Hay	Hay(Center)	44949	2020000000
136.	"	"	Muwafaqiyah	232588	556100000
137.	"	Suwairah	Suwairah(Center)	26323	692800000
138.	"	"	Aziziyah	22214	493200000
139.	Hillah	Hillah	Hillah(Center)	51314	2633000000
140.	"	"	Muhawil	28703	823700000
141.	"	Hashimiyah	Hashimiyah(Center) & Qasim	25523	651300000
142.	"	"	Madhatiyah	27660	761500000
143.	"	Hindiyah	Kifil	22056	484000000
144.	"	"	Jadwal al+gharbi	29400	804400000

Code No.	Liwa	Qadha	Nahiya, Qadha or Liwa Center	population X	X^2
145.	Diala	Baqoba	Baqoba(Center)	42515	1810000000
146.	"	Khalis	Khalis(Center)	31141	969700000
147.	"	"	Mansuriyah	21359	455800000
148.	"	Mandili	Mandili(Center)	36334	1320000000
149.	"	Muqdadiyah	Abu Sa'adah	35406	1253000000
150.	Basrah	Basrah	Shat Arab	37836	1431000000
151.	"	"	Hartha	55648	3095000000
152.	"	"	Zubair	24148	582000000
153.	"	Quornah	Suwaib	42073	1770000000
154.	"	"	Mdainah	21612	467000000
155.	"	Abu Khasib	Abu Khasib(Center)	43734	1913000000
156.	"	"	Faw	22289	496400000
157.	Amarah	Amarah	Amarah(Center)	48110	2315000000
158.	"	"	Musharah	21769	473900000
159.	"	"	Kahla'a	48992	2400000000
160.	"	"	Majar Saghir	54872	3011000000
161.	"	Qalat Saleh	Qal'at Saleh(Center)	33546	1125000000
162.	"	"	Majar Kabir	44508	1980000000
163.	Muntifaq	Nasiriyah	Nasiriyah(Center)	24527	601300000
164.	"	"	Albu Saleh	23208	538200000
165.	"	"	Sindinawa	23860	569200000
166.	"	Rifai	Rifai(Center)	41736	1742000000
167.	"	"	Qal'at Sikar	37997	1443000000
168.	"	SuqAl-Shiyokh	Garmat Beni Sa'ad	33538	1124000000
169.	"	"	Agaigah	39503	1560000000
170.	"	"	Chibayish	29100	846800000
171.	"	Shatra	Shatra(Center)	62207	3869000000
172.	Diwaniya	Diwaniyah	Diwaniyah(Center)	20015	400400000
173.	"	"	Hamzah	22948	526200000
174.	"	Afaq	Dagharah	25026	628100000
175.	"	Samawah	Rumaitha	30049	900000000
176.	"	"	Khannaq	23978	574400000
177.	"	AbuShkair	Abu Shkhair (Center) & Hirah	22031	495300000
178.	"	"	Qadissiyah	24834	616500000
179.	"	"	Faisaliyah	30837	950400000
180.	"	Shaniyah	Salahiyah	41777	1745000000
181.	"	"	Abassiyah	27038	730600000
182.	"	"	Ghammas	33228	1103000000
				2187508	88373100000

Stratum B_3 : Nahiya, Qadh's Center or Liwa's Center in the Southern Region Whose Population is more than 90000

Code No.	Liwa	Qadha	Nahiya, Qadha or Liwa Center	populationX	X^2 6
	Baghdad	Baghdad	Baghdad(Center)	352137	124000000000
	"	"	Karradah	94209	8874000000
	Basrah	Basrah	Basrah(Center)	101535	10300000000

Stratum A_1

$\bar{X} = 11100$ 8315140000

$\bar{X}^2 = 123210000$ $N\bar{X}^2 = 7269390000$

$\Sigma X^2 = 1045750000$

Stratum A_2

$\bar{X} = 28100$ $N\bar{X}^2 = 11054540000$

$\bar{X}^2 = 789610000$ $\Sigma X^2 = 904460000$

Stratum B_1

$\bar{X} = 11900$ $N\bar{X}^2 = 6655670000$

$\bar{X}^2 = 141610000$ $\Sigma X^2 = 960580000$

Stratum B_2

$\bar{X} = 35300$ $N\bar{X}^2 = 77257580000$

$\bar{X}^2 = 1246090000$ $\Sigma X^2 = 11034320000$

$$\bar{\sigma}^2 = \frac{\Sigma x_1^2 + \Sigma x_2^2 + \Sigma x_3^2 + \Sigma x_4^2}{(N_1 - 1) + (N_2 - 1) + (N_3 - 1) + (N_4 - 1)}$$

$$\sigma^2 = \frac{13945110000}{178}$$

$$\sigma^2 = 78400000$$

$$\bar{\sigma} = 8800$$

$$\bar{X} = 20900$$

$$\sqrt{N} = \frac{8800}{1045} = 8.4.$$

$$N = 71.$$

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