

AGRICULTURAL CENSUS 2010

PAKISTAN REPORT



GOVERNMENT OF PAKISTAN
STATISTICS DIVISION
AGRICULTURAL CENSUS ORGANIZATION

STATISTICS DIVISION

Secretary
Sohail Ahmad

AGRICULTURAL CENSUS ORGANIZATION

Agricultural Census Commissioner
Muhammad Akram Khan

Joint Agricultural Census Commissioners
Noor Muhammad Dharejo
Khurshid Ahmad
Abdul Ghaffar

Deputy Agricultural Census Commissioners
Muhammad Nawaz Arshad
Mirza Zahid Mahmood
Naveed Iqbal
Khalil-ur-Rehman Rana (Admn.)

Senior Statistician
Tariq Bashir

Gurumangat Road, Gulberg-III, Lahore . Pakistan.
Tel: 042-99263180, 042-99263181 Fax: 042-99263172
Email: agcensus@yahoo.com
Website: statpak.gov.pk

COUNTRY MAP



AGRICULTURAL CENSUS 2010 AT A GLANCE

Important Census Item	Area in Acres
Number of Private Farms	8,264,480
Farm Area	52,910,408
Average Farm Size	6.4
Number of Farms by Tenure	
Owner	6,743,983
Owner-Cum-Tenant	604,354
Tenant	916,154
Farm Area by Tenure	
Owner	39,431,999
Owner-Cum-Tenant	7,584,079
Tenant	5,894,340
Number of Fragmented Farms	2,829,491
Average Number of Fragments per Fragmented Farm	3
Farms Reporting Purchase of Land	152,488
Farms Reporting Sale of Land	95,998
Operated Area	
Owner Operated Area	42,530,879
Tenant Operated Area	10,379,521
Cultivated Area	42,622,473
Uncultivated Area	10,287,935
Cropped Area	67,907,994
Kharif Crops Area	30,579,378
Rabi Crops Area	36,192,828
Orchard Area	1,135,757
Wheat Area	28,226,788
Rice Area	9,355,256
Cotton Area	9,226,387
Sugarcane Area	2,629,165
Maize Area	2,391,544
Fodder Area	6,036,935

Important Census Item	Area in Acres
Land Use Intensity (%)	83
Cropping Intensity (%)	159
Number of Farms Using	
Fertilizers	3,350,976
Manures	222,983
Pesticides	2,752,139
Herbicides	2,452,938
Farms Using Labour	
Permanent Labour	442,725
Casual Labour	2,750,977
Total Number of Households	24,094,908
Total Number of Household Members	170,897,500
Number of Family Workers	
Male	17,711,043
Female	10,023,324
Number of Permanent Workers	
Male	1,511,233
Female	167,171
Number of Casual Workers	
Male	17,971,708
Female	9,020,316
Agricultural Debt by Tenure	
Owner Households	829,691
Owner-Cum-Tenant Households	98,536
Tenant Households	153,693
Number of Farms Using	
Tractors	6,040,533
Draught Animals	298,308
Both Tractors and Draught Animals	1,546,138
Livestock Population	
Cattle	24,114,455
Buffaloes	23,468,154
Goats	45,738,255
Sheep	15,025,659

FOREWORD

Agricultural Census Organization (ACO) is serving the nation in general and the agricultural planners, researchers and academia in particular by providing detailed information decennially on the structure of agriculture. This organization has conducted six agricultural censuses since 1960 without any gap and provided very useful data on agriculture.

The in-hand census report provides lot of latest information by size of farm and also by tenure about the agriculture farms, farm fragmentation, land utilization, irrigated area with sources of irrigation, area under different crops, usage of manures, fertilizers and insecticides, farm labour and family workers, agricultural credit, use of agricultural machinery, work animals and livestock population, land ownership, sale and purchase of land etc. These data are very useful to boost up agriculture sector, minimize poverty, particularly the rural poverty, and achieve the concerned Millennium Development Goals (MDGs). In addition, the food security may be ensured and current account balance may be improved by increasing agricultural exports and minimizing agricultural imports. The researchers, academia and students can take benefit from these data in multi-dimensional directions of their interest.

My sincere appreciation goes to the Agricultural Census Organization for successful and within schedule completion of such a gigantic exercise throughout the country including Gilgit Baltistan and Azad Jammu & Kashmir in spite of meagre man-power, material and financial resources.

It is expected that the census results presented in this report, will be put to effective use by, both, agricultural policy makers as well as planners for the development of agriculture in our country.

SOHAIL AHMAD
Secretary
Statistics Division

PREFACE

Agricultural Census 2010 is the sixth in its series. This census was conducted in conjunction with World Census of Agriculture 2010 (WCA 2010) Program laid down by the United Nations Food & Agriculture Organization (FAO).

This report basically, comprises of two main sections. In the first section introductory details and definitions about various variables of the census have been elucidated. It provides information about the objectives and scope of the census, its methodology, field operations, sampling plan & estimation procedure, processing of data, and concepts and definitions of different variables. The second section contains 90 statistical tables for each of the administrative units based on the census data pertaining to number, area, tenure and fragmentation of farms, structural changes, land utilization, irrigation, land use and cropping intensities, acreage of crops, use of manures, fertilizers and insecticides, casual and permanent hired labour, indebtedness, use and ownership of agricultural machines, livestock population, household members with educational level, their contribution to agriculture and sources of income for the household. These tables are given at the country and provincial levels in this report while district level data are available in the Provincial Reports (Vol. II), one for each of the province.

This report portrays developments made in the agriculture sector since the last Agricultural Census in 2000 and provides basis of future planning. It is envisaged that the statistical information produced in this report will prove useful for planners, administrators, researchers, students and experts responsible for policy formulation aimed at the development of the agricultural community in the country.

In the pursuit of this exercise, the hard work and dedication put in by the staff of the Agricultural Census Organization, Data Processing Centres of Lahore and Islamabad, Regional / Field Offices of Federal Bureau of Statistics and Provincial Revenue Departments are duly acknowledged. The whole hearted and above par contributions made by Mr. Amjad Javaid Sandhu, Assistant Agricultural Census Commissioner at all stages of this census are compelling enough to be appreciated. The cooperation extended and meticulous labour put in by Mr. Muhammad Ikram-UI-Haq Rishi, Mr. Muhammad Iqbal Rana, Mr. Nafees Ahmad and Mr. Mujahid Islam of Data Processing Centre Lahore, for processing of the data of this report, is highly appreciated and worth mentioning.

MUHAMMAD AKRAM KHAN
Agricultural Census Commissioner

Lahore
April, 2012

CONTENTS

COUNTRY MAP	III
AGRICULTURAL CENSUS 2010 AT A GLANCE	V
FOREWORD	VII
PREFACE	IX
CONTENTS	XI
LIST OF TABLES	XIII
INTRODUCTION	XIX
Objectives	XIX
Legal Basis	XIX
Advisory Committee	XX
Type and Geographic Coverage	XX
Scope of the Census	XX
Reference Period	XXI
Sampling Plan	XXII
Census Questionnaires and other Forms	XXVII
Census Methodology	XXVIII
Publicity	XXXI
Data Processing and Tabulations	XXXI
Estimation of Census Results	XXXII
Publication of Census Data	XXXV
Quality of Census Data	XXXVI
DEFINITIONS	XXXIX
MAIN FINDINGS	XLVII
CAUTION FOR DATA USERS	LIX
TABLES	2-205
APPENDICES	
District-Wise Number of Total Units and Units Selected in First, Second and Third Stages of Sampling (Appendix-I)	207
Census Questionnaire (Appendix-II)	211
Co-efficient of Variation for Important Census Items (Appendix-III)	219

LIST OF TABLES

Table No.	Title	Page No.
CHAPTER - 1: NUMBER, AREA AND TENURE OF FARMS		
1.1	Number and Area of Farms by Size of Farm	2
1.2	Tenure Classification of Farms and Farm Area by Size of Farm	4
1.3	Number and Area of Owner Farms by Size of Farm	8
1.4	Number and Area of Owner-Cum-Tenant Farms by Size of Farm	10
1.5	Number and Area of Tenant Farms by Size of Farm	12
1.6	Farm Area by Tenure and by Size of Farm	14
1.7	Classification of Farms by Number of Associated Households and by Size of Farm	16
CHAPTER - 2: FRAGMENTATION AND MARKETING OF LAND		
2.1	Classification of Farms by Number of Fragments and by Size of Farm	18
2.2	Farm Area Classified by Number of Fragments and by Size of Farm	20
2.3	Fragmentation of Farms and Farm Area by Tenure and by Size of Farm	22
2.4	Farms Reporting Purchase and Sale of Land by Size of Farm	24
2.5	Farms Reporting Purchase and Sale of Land by Tenure	26
CHAPTER - 3: LAND UTILIZATION		
3.1	Land Utilization by Size of Farm	28
3.2	Completely Un-Cultivated Farms by Size of Farm	30
3.3	Cultivated Area by Type and by Size of Farm	32
3.4	Un-Cultivated Area by Type and by Size of Farm	34
CHAPTER - 4: IRRIGATION		
4.1	Irrigation Status of Farms and Farm Area by Size of Farm	36
4.2	Cultivated Area Classified by Mode of Irrigation and by Size of Farm	38

Table No.	Title	Page No.
4.3	Irrigation Status of Cropped Area by Crop Seasons and by Size of Farm	40
4.4	Area Irrigated by Perennial and Non-Perennial Canals by Administrative Units	42

CHAPTER - 5: LAND USE AND CROPPING INTENSITIES

5.1	Farms Classified by Land Use Intensity and by Size of Farm	44
5.2	Average Intensity of Land Use by Tenure and by Size of Farm	46
5.3	Farms Classified by Cropping Intensity and by Size of Farm	48
5.4	Average Cropping Intensity by Tenure and by Size of Farm	50
5.5	Comparison of Cropping Intensity of Irrigated and Un-Irrigated Farms by Size of Farm	52

CHAPTER - 6: CROPS

6.1	Classification of Cropped Area by Crop Season and by Size of Farm	54
6.2	Farms Reporting and Area Cropped by Crop Season and by Size of Farm	56
6.3	Farms Reporting Orchards and Orchard Area by Tenure and by Size of Farm	58
6.4	Farms Reporting Flower Fields / Nursery and their Area by Tenure and by Size of Farm	60
6.5	Number and Area of Orchards, Orchard Nursery and Flower Fields / Nursery by Size of Farm	62
6.6	Farms Reporting Fruit Trees and Number of Fruit Trees	64
6.7	Share of Different Crops Area in Total Cropped Area by Size of Farm	70
6.8	Share of Different Crops Area in Total Cropped Area by Tenure	72
6.9	Share of Different Kharif Crops Area in Total Kharif Crops by Size of Farm	74
6.10	Share of Different Rabi Crops Area in Total Rabi Crops by Size of Farm	76
6.11	Wheat Area Irrigated and Un-Irrigated and Farms Reporting Wheat by Size of Farm	78
6.12	Paddy Area by Varieties and Farms Reporting Paddy by Size of Farm	80

Table No.	Title	Page No.
6.13	Cotton Area and Farms Reporting Cotton by Size of Farm	82
6.14	Maize (for Grain) Area Irrigated and Un-Irrigated and Farms Reporting Maize by Size of Farm	84
6.15	Sugarcane Area Irrigated and Un-Irrigated and Farms Reporting Sugarcane by Size of Farm	86
6.16	Potato Area Irrigated and Un-Irrigated and Farms Reporting Potatoes by Size of Farm	88
6.17	Oil-Seeds Area Irrigated and Un-Irrigated and Farms Reporting Oil-Seeds by Size of Farm	90
6.18	Pulses Area Irrigated and Un-Irrigated and Farms Reporting Pulses by Size of Farm	92
6.19	Fodders Area Irrigated and Un-Irrigated and Farms Reporting Fodders by Size of Farm	94
6.20	Vegetables (Including Potatoes) Area Irrigated and Un-Irrigated and Farms Reporting Vegetables by Size of Farm	96
6.21	Number of Non-Fruit Trees by Size of Farm	98

CHAPTER - 7: FERTILIZERS, MANURES, PESTICIDES AND HERBICIDES

7.1	Use of Fertilizers, Manures, Pesticides and Herbicides by Size of Farm	100
7.2	Use of Fertilizers, Manures, Pesticides and Herbicides by Tenure	102
7.3	Proportion of Various Chemical Fertilizers Used on Important Crops	103
7.4	Use of Fertilizers by Extent of Cultivated Area Irrigated and by Size of Farm	104
7.5	Farms Reporting Use of Fertilizers and Manures on Wheat by Size of Farm	106
7.6	Farms Reporting Use of Fertilizers and Manures on Paddy by Size of Farm	108
7.7	Farms Reporting Use of Fertilizers and Manures on Sugarcane by Size of Farm	110
7.8	Farms Reporting Use of Fertilizers and Manures on Cotton by Size of Farm	112
7.9	Farms Reporting Use of Fertilizers and Manures on Maize (for Grain) by Size of Farm	114
7.10	Farms Reporting Use of Fertilizers and Manures on Tobacco, Potatoes, Onions, Sunflower, Orchards, Vegetables and Other Crops	116

Table No.	Title	Page No.
7.11	Use of Plant Protection Measures on Important Crops by Size of Farm	118
7.12	Use of Plant Protection Measures on Important Crops by Tenure	120
7.13	Use of Herbicides on Important Crops by Size of Farm	122
7.14	Use of Herbicides on Important Crops by Tenure	124

CHAPTER- 8: HIRED LABOUR AND FAMILY WORKERS

8.1	Number of Households and Household Members by Sex and Age and by Type of Household	126
8.2	Family Members 10 Years and above Usually Engaged in Agricultural Work on their Holdings by Type of Household	130
8.3	Family Members 10 Years and Above (in Hundreds) by Activity and by Type of Household	134
8.4	Farms Reporting Use of Permanent and Casual Labour by Tenure and by Size of Farm	138
8.5	Permanent and Casual Agricultural Labour Engaged in Agricultural Work by Type of Household	140

CHAPTER- 9: AGRICULTURAL CREDIT

9.1	Number of Households Under Debt by Tenure and by Type of Household	142
9.2	Agricultural Credit by Source and by Size of Farm	146
9.3	Agricultural Credit by Source and by Tenure	148

CHAPTER-10: AGRICULTURAL MACHINERY

10.1	All Farms Reporting Use of Tractors, Draught Animals or Both for Cultivation by Size of Farm	150
10.2	Owner Farms Reporting Use of Tractors, Draught Animals or Both for Cultivation by Size of Farm	152
10.3	Owner-Cum-Tenant Farms Reporting Use of Tractors, Draught Animals or Both for Cultivation by Size of Farm	154
10.4	Tenant Farms Reporting Use of Tractors, Draught Animals or Both for Cultivation by Size of Farm	156

Table No.	Title	Page No.
10.5	Farms Reporting Use of Important Owned Agricultural Machinery by Size of Farm	158
10.6	Farms Reporting Use of Important Rented Agricultural Machinery by Size of Farm	160
10.7	Farms Reporting Non-Use of Important Agricultural Machinery by Size of Farm	162

CHAPTER - 11: LIVESTOCK

11.1	Farms Reporting Work Animals by Tenure and by Size of Farm	164
11.2	Relationship of Work Animals to Size of Farm	166
11.3	Livestock Population by Age and Sex	168
11.4	Number of Cattle and Buffaloes by Size of Herd	171
11.5	Number of Sheep and Goats by Size of Herd	172
11.6	Number of Cattle and Buffaloes by Category and by Type of Household	174
11.7	Number of Sheep and Goats by Category and by Type of Household	178

CHAPTER - 12: EDUCATION AND SOURCE OF INCOME OF HOUSEHOLD MEMBERS AND TYPE OF HOUSES

12.1	Farms Reporting Highest Education Level Among Family Members	182
12.2	Number of Households Reporting Residential Houses by Type of Occupancy and Structure and by Tenure	183
12.3	Education Level of Family Members (In Thousands) by Type of Household	184
12.4	Households (In Hundreds) Reporting Sources of Income Other Than Farming and Basic Source of Income by Type of Household	194
12.5	Number of Farm Households Reporting Residential Houses by Type of Occupancy and Structure and by Size of Farm	198

CHAPTER-13: LAND OWNERSHIP

13.1	Number and Area of Owners by Size of Area Owned	200
13.2	Operational Status of Land Ownership by Size of Area Owned	202
13.3	Reasons for Renting Out Owned Area by Size of Area Owned	204

INTRODUCTION

Agriculture is an extremely important sector of Pakistan's economy. It plays a vital role and lays down the foundation for economic development and growth in this country. Agriculture contributes more than 21 per cent to the Gross Domestic Product (GDP) and provides employment to 45 per cent of the total labour force of the country. It provides raw material to the industrial sector on one side and is a market of industrial products on the other side. In the export earnings, direct as well as indirect share of agriculture is very high. Thus, it is prudent to construe that agriculture plays a multidimensional role in the economy of Pakistan.

Almost 64 % of the population of Pakistan resides in rural areas and earns its livelihood, directly or indirectly, from agricultural activities e.g. crop cultivation, livestock rearing, labour in agriculture, agriculture input supply, transportation of agricultural output to the market etc. Therefore, development of agriculture is synonymous to the development of the country. The availability of timely, accurate and reliable data is precondition for sound agricultural planning and development. The data from the Agricultural Census thus provide a concrete basis from which the agriculture sector can ultimately develop through evidence-based policy designing. The Agricultural Census Organization (ACO) has conducted five Agricultural Censuses in Pakistan: 1960, 1972, 1980, 1990 and 2000. The present report is the sixth one in the series. The Agricultural Census 2010 was undertaken to fulfil the following objectives:

OBJECTIVES

1. To generate basic information on the structure of agriculture.
2. To develop detailed basic information about the agricultural resources, state of their utilization and to find out the degree of acceptability of modern farming practices among the farming community for the purpose of regional, provincial and national development, planning and research in the field of agriculture.
3. To collect information about livestock population.
4. To fulfil data needs of the international agencies like FAO which require the country's information for a worldwide study of agricultural resources in order to formulate international policies in matters relating to the supply of food and raw materials on sustainable basis.

LEGAL BASIS

The defunct (now) Agricultural Census Act, 1958 (Act No.XLI of 1958) provided the legal basis for census operations throughout the country. The Act made it binding on the Government of Pakistan for the collection of agricultural data and also on the respondents to cooperate with the census enumerators and to furnish information on or with respect to items specified in the said Act. At the same time, the Act assured the secrecy of the information supplied by the respondents. It also bound the interviewer and interviewee not to declare or use this information for any legal proceedings.

ADVISORY COMMITTEE

The census taking exercise was guided by an Advisory Committee. This committee is comprised of about 50 official and non-official members drawn from the concerned Federal and Provincial Government Departments, Universities, Research Institutes, while non-official members come from the progressive farmers. The committee is also comprised of high-level government officials / technical experts from Gilgit Baltistan and Azad Jammu & Kashmir.

TYPE & GEOGRAPHIC COVERAGE

As per previous practice and approved procedures, the Agricultural Census 2010 was sample based. The sample design, however, varied for different regions of the country in accordance with the ground realities.

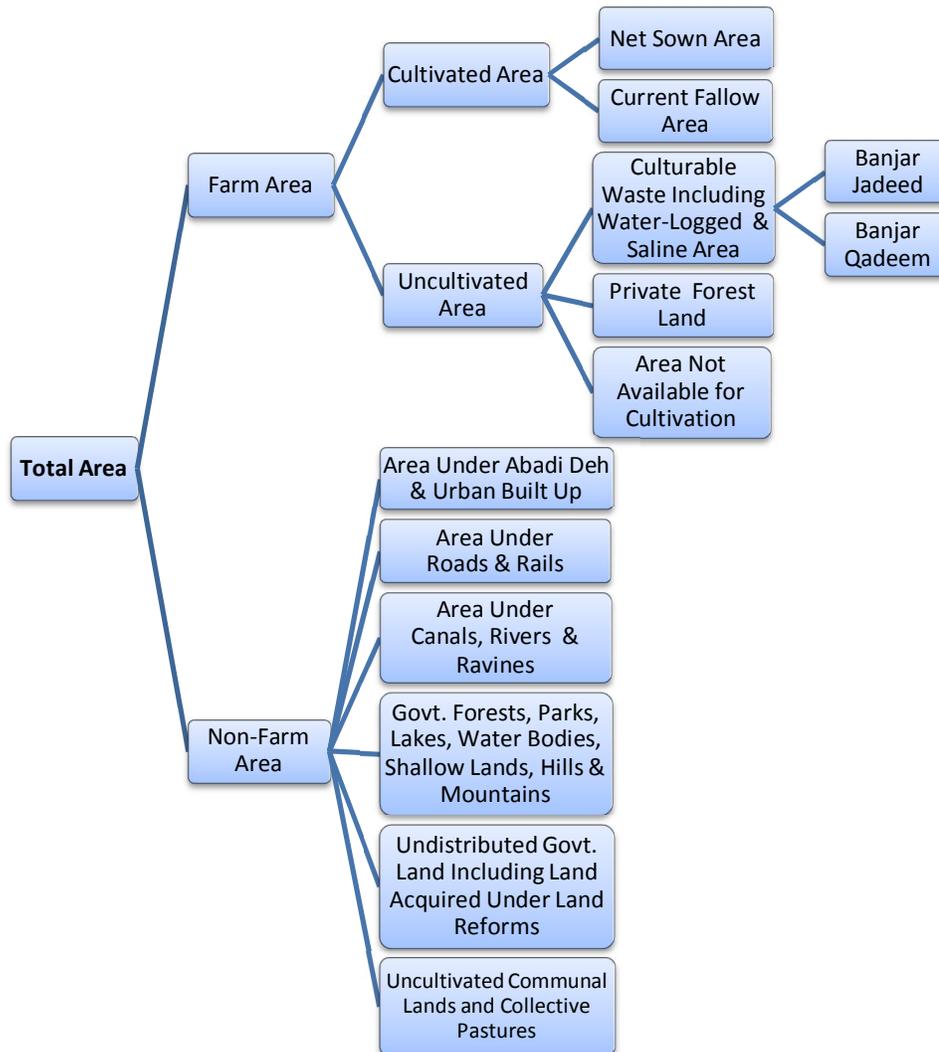
This census covered the entire country, i.e., Khyber Pakhtunkhwa (including Provincially and Federally Administered Tribal Areas, Frontier Regions and Agencies), Punjab (including Islamabad district), Sindh and Balochistan provinces. The geographic coverage was also extended to Gilgit Baltistan and Azad Jammu & Kashmir, each as a separate entity.

SCOPE OF THE CENSUS

The scope refers to the range / subjects / items covered by the census. For Agricultural Census 2010 the scope with reference to farm area was restricted to the agricultural farm(s) / holding(s) held and or operated by the Government or by private household(s), individually or collectively or under corporate arrangement at the time of census enumeration. Consequently, the undistributed government lands other than government farms, undistributed portion of the lands resumed by the Government under land reforms, built up areas, land under roads, rails, ravines, rivers, canals, government forests, parks, lakes, water bodies, shallow lands, hills and mountains, etc. falling under the category of non-farm area are outside the scope of the census.

The scope of the present census, as finally approved, included the collection of data on type, size, tenure and parcels of farms, land utilization, irrigation, area under crops and orchards, number of fruit and non-fruit trees, use of manures, fertilizers and plant protection measures, use of agricultural machinery, livestock population, loan and its sources, casual and permanent hired agricultural labour, household members by age, sex, qualification and their contribution towards agriculture, type of residential structures, economic activities of household members and their main source of income. To highlight the scope of census, details of total area, farm area, non-farm area and their further classifications are shown on the next page in a graph for the convenience of readers:

Pictorial for Scope of the Census



REFERENCE PERIOD

The reference period is defined as a time span and / or the census day on which information was collected. The data on land utilization, irrigation, cropping pattern, chemical usage for crops, use of agricultural machinery and agricultural labour pertain to the agricultural year 2009-2010 i.e. Kharif 2009 and Rabi 2009-2010. However, the information about land ownership, tenure system, orchard area, livestock population, payable loans, household members and their educational status, house structures and income sources of household was obtained as of the day of interview. Enumeration of this census was completed in three phases due to administrative issues and seasonal variations in different regions of the country. The detail of enumeration duration is mentioned at next page:

Areas Covered	Enumeration Period
<p>Hot Areas</p> <p>Phase-I: Whole of Punjab & Sindh provinces</p> <p>Phase-II: Peshawar, Mardan, Nowshera, Swabi, Charsadda, Kohat, Bannu, Hangu, Karak, Lakki Marwat, Tank and D. I. Khan districts; Agencies of Khyber and Mohmand and FRs of Peshawar, Kohat, Bannu, D.I. Khan, Laki Marwat and Tank in Khyber Pakhtunkhwa province. Districts of Naseerabad, Jaffarabad, Jhal Magsi, Bolan, Noshki, Chagai, Sibi, Harnai, Dera Bugti, Lasbella, Awaran, Panjgoor, Kharan, Washuk, Kech (Turbat) and Gawadar in Balochistan province.</p>	<p>14-12-2009 to 31-01-2010</p> <p>22-02-2010 to 10-04-2010</p>
<p>Cold Areas</p> <p>Phase-III: Abbottabad, Haripur, Mansehra, Toor Ghar, Battagram, Kohistan, Shangla, Buner, Swat, Lower Dir, Upper Dir and Chitral districts; Agencies of Malakand and Bajour in Khyber Pakhtunkhwa province while districts of Quetta, Kila Abdullah, Ziarat, Pishin, Kalat, Zhob, Sheerani, Khuzdar, Kohlu, Barkhan, Musa Khel, Loralai, Kila Saifullah and Mastung in Balochistan province and whole of Gilgit Baltistan and Azad Jammu & Kashmir.</p>	<p>17-05-2010 to 30-06-2010</p>

Note: Agricultural Census 2010 could not be conducted in the Agencies of Orakzai, Kurrum, North Waziristan & South Waziristan and FR Central Kurrum due to law & order situation in the areas.

SAMPLING PLAN

The sampling plan for Agricultural Census 2010 includes different sample designs for different regions of the country in view of the varied local conditions. It was not different from previous censuses, except for a few improvements. The entire country was divided into four distinct parts for the purpose of sampling, as described below:

- Part 1:** Rural settled areas of Khyber Pakhtunkhwa, Punjab and Sindh provinces: a three-stage weighted, stratified and systematic cluster sampling approach was used.
- Part 2:** Rural settled areas of Balochistan and all rural areas of Azad Jammu & Kashmir: a single-stage weighted and stratified sampling technique was used.
- Part 3:** Urban areas throughout the country: a two-stage sample design using stratified and systematic sampling was used.
- Part 4:** Rest of the country, comprising unsettled rural areas of Punjab, Balochistan and Khyber Pakhtunkhwa provinces and tribal areas (Agencies and FRs) including Gilgit Baltistan: a single-stage stratified and systematic sampling was used.

In all the areas, the sample size was determined at district / agency/ FR level. In urban areas, the sample size varied according to the size of populace in an urban unit. In areas of part 1, where three-stage sampling was used, Patwar Circles in the first stage and Mouzas in the second stage were selected with probability proportional to size (PPS), whereas a systematic selection of clusters of households (approximately 30 households in a cluster) was made for enumeration at the third stage. In the areas of part 2, Mouzas were selected with PPS and all the households in selected Mouzas were enumerated. For part 3, urban blocks were selected systematically and every fifth household was enumerated in each selected block. In part 4, the Mouzas were selected systematically and all the households in a selected Mouza were enumerated. For various stages of sampling, different up-to-date sampling frames were prepared to meet the requirements of sampling.

SAMPLING FRAMES:

Updated sampling frames are the prerequisites of sampling to avoid introducing a bias in the selection of sampling units. For the purpose, different sampling frames were prepared involving great deal of effort and expense and were used for the proper selection of representative samples for Agricultural Census 2010. The sampling frames were:

1. **Mouza Lists:** Mouza lists were updated at district level for each Tehsil through Mouza Census 2008. For sampling purpose, these lists contained only rural, partly urban and Bechiragh (unpopulated) Mouzas arranged by Patwar Circles and Kanungo Circles showing Mouza-wise total area, cultivated area as per 2006-07 revenue records and number of households according to the population census 1998 in that Mouza. These lists excluded purely forest, under dam and urban Mouzas. As the Mouza lists were based on Patwar Circles, they also provided the frame of Patwar Circles, although implicitly. Subsequently, the lists of Mouzas of the selected Patwar Circles served as the sample frame for the selection of Mouzas.
2. **List of Urban Blocks:** A complete district-wise list of urban blocks of approximate size of 200 to 250 households per block, prepared by Federal Bureau of Statistics (FBS).
3. **List of National Certainty Holdings (NCHs):** Lists of NCHs were prepared throughout the country at district level in all the Mouzas / Dehs / villages. NCH lists included all government agriculture & livestock farms as well as all private farms of 100 acres or more land owned / operated may be at one place or scattered in different Mouzas / districts / even provinces.
4. **Complete List of Households:** A list of households in each selected Mouza showing total area, area owned and rented-in constituting their farm / holding was prepared by the enumerators during the field operation.
5. **List of Mouza Certainty Holdings (MCHs):** During preparation of household list in a selected Mouza, a list of livestock holders having 25 or more cattle and / or buffaloes; 25 or more camels; 50 or more sheep and / or goats was prepared and such households were treated as MCHs. In addition, from a complete list of households in a Mouza / Deh / village, those households farming 20 acres or more land as area owned and / or area rented-in were also segregated as MCHs. In selected urban blocks, households having / operating agricultural land or having

any number of livestock were also treated as MCH. The nomads / gipsy / migratory people, if found in the boundary of selected Mouza / urban block during household listing or enumeration, were also treated as MCH.

SAMPLE SELECTION:

All the NCHs and MCHs were enumerated on 100 % basis and no further selection was made among such type of households. However, selection procedures adopted for Mouzas, urban blocks and common households at various sampling stages are given below:

First Stage: Selection of Patwar Circles

The number of Patwar Circles to be selected from each district was determined keeping in view the number of enumerators which could be made available, effectively trained and properly supervised, as well as the inherent variance of the population with respect to the main data items under study.

First of all, each Mouza was given a measure of size which was the geometric mean (G.M.) of its cultivated area and number of households as per Mouza lists mentioned above. This measure of size helped to arrive at the Mouza probability of selection which was separately calculated. This probability was equal to Mouza measure of size divided by total measure of size of the district multiplied by the number of Patwar Circles to be selected from the same district. Then, each Patwar Circle was assigned a probability by addition of the probability of selection of its Mouzas. The Patwar Circles falling in various Kanungo Circles were arranged by their cultivated area within the respective Kanungo Circles. The Patwar Circles with a probability higher than 0.890 were selected with certainty and sifted out from the list. The Patwar Circles having probability less than 0.020 were merged with the immediately above non-certainty, non-merged Patwar Circle(s) of the same Kanungo Circle such that after merger the collective probability of merged Patwar Circles was greater than 0.019. These merged Patwar Circles were retained in the list as a single unit with their collective probability for sampling purpose.

The non-certainty Patwar Circles were reassigned a probability by repeating the above mentioned process and more certainty Patwar Circles, if found, were again segregated, and the process continued till no certainty Patwar Circle was detected in the list. After segregating all certainty Patwar Circles, for non-certainty Patwar Circles a moving cumulative probability was worked out and shown against each Patwar Circle in a district. For carrying out the selection of Patwar Circles in a district, a random number over zero and up to 0.999 was selected. The first Patwar Circle with cumulative probability equal to or greater than the random number was considered selected. Similarly, the second Patwar Circle was selected by adding the number 1 to the random number; the third Patwar Circle was selected by adding 2 to the random number, and so on, until the predetermined number of Patwar Circles were selected from the district, in addition to the certainty Patwar Circles.

Second Stage: Selection of Mouzas

To equalize the enumeration workload in a Patwar Circle, it was decided to select two Mouzas per selected Patwar Circle. The Mouzas falling in certainty and selected Patwar Circles were arranged in serpentine fashion, i.e., within the odd-numbered Kanungos, in descending order of cultivated area of the Mouzas, and within even numbered Kanungos

in ascending order of cultivated area of the Mouzas. The method employed at the first stage was repeated at Patwar Circle level for segregating the certainty Mouzas and also for the selection of the non-certainty Mouzas. Like the Patwar Circles with small probability of selection, the Mouzas with small probabilities were merged together by applying the principle mentioned in the first stage and treated as one Mouza for sampling purposes. However, only two Mouzas from one Patwar Circle were selected whether the selected Mouza was certainty or non-certainty. In the case where only one Mouza was found in a Patwar Circle, the same Mouza was selected with probability 1. A list of selected Mouzas and systematically selected urban blocks (without any weight) was prepared carefully at the district level for further use.

Sub Stage: Sector Selection for Big Mouzas Only

According to the list of selected Mouzas, all Mouzas with 900 or more households were divided into sectors as described below:

During the field operation, listing and enumeration of so many households was expected to overburden the enumerators. Therefore, these selected Mouzas were termed as big Mouzas and a sub-stage of sector selection was introduced. Big Mouzas were divided into convenient number of sectors, each having approximately 300 . 500 households. The number of households in a sector was treated as the measure of size to work out the probability of selection of that sector which was subsequently incorporated in the probability of selection of that big Mouza and accordingly used for working out the census estimates. One sector from each big Mouza was selected with equal probability. The process of selecting a sector from big Mouzas could be treated as another stage in multistage sampling. For big Mouzas, a selected sector was treated as a full-fledged Mouza for settled areas and a full-fledged village / Killi / Basti for unsettled areas of the country.

Third Stage: Selection of Clusters of Households

A systematic selection of clusters of approximately 30 households, was made from list of households (Form-1) prepared by the enumerators during field operation. The number of clusters to be selected, with a minimum of two from each Mouza, was determined with regard to raising factor of the Mouza and the pre-fixed overall raising factor at cluster level for a particular Mouza. The limit of overall raising factor was fixed at 25 for all the rural settled areas. The ultimate sample of households selected for the census was as follows:

- i. The households in the selected clusters at final stage of selection.
- ii. In selected urban blocks, every fifth household.
- iii. All the households located in the selected villages / Basties / Killies of unsettled areas, including the whole of Gilgit Baltistan.
- iv. All households located in selected Mouzas of Azad Jammu & Kashmir and settled areas of Balochistan.
- v. The households located in the selected Mouzas / urban blocks designated as Mouza Certainty Holdings.
- vi. The households located anywhere in the country designated as National Certainty Holdings.

Total number of units and the units selected in the first, second and third stages for each of the province and at country level are given below in tabular form while their district-wise details in tabular form are given in Appendix-I.

**Number of Total Units and the Units Selected at the First,
Second and Third Stages of Sampling**

Admn. Units		Pakistan	Khyber Pakhtunkhwa	Punjab	Sindh	Balochistan	
Total Units	Households in Selected Mouzas / Villages	2787639	402150	1559743	710329	115417	
	Urban Blocks	27487	1908	17006	8019	554	
	Mouzas / Villages	53838	14700	26086	5717	7335	
	Patwar Circles	11298	1444	8006	1467	381	
Sampled Units	Third Stage Households	809808	139237	411743	163259	95569	
	Second Stage	Urban Blocks	1893	196	1108	442	147
		Mouzas / Villages	9080	2201	3933	1589	1357
	First Stage Patwar Circles	3959	890	1940	774	355	

CENSUS QUESTIONNAIRES AND OTHER FORMS

The main questionnaire from the previous census (Form-2) was sent to different data users / stakeholders / researchers / planners etc., for suggesting suitable improvements in view of their future data requirements. In the light of their suggestions, a comprehensive draft questionnaire was prepared and presented to the Advisory Committee for its consideration. The questionnaire was finalized on the basis of recommendations of the Advisory Committee and was used in the Agricultural Census 2010.

The questionnaire used in the census had two versions. The main questionnaire (Form-2) was spread over 8 pages and was meant for households reporting owned and / or rented-in land. For landless households, a short questionnaire (Form-3) which contained all the questions of Form-2, except those relating to land and crops, was used. A copy of Form-2 is given in Appendix-II. The questionnaires were printed in Urdu, except for Sindh province where the language used was Sindhi. The main questionnaire (Form-2) had fourteen parts.

There were 102 main data items in the questionnaire with about 600 data codes assigned to sub-questions concerning the main items. The format of the questionnaire was made to suit the data processing requirements. To further facilitate data processing, the questionnaire was fully pre-coded. The detail of forms used in the census is as under:

- Form-1:** To prepare the list / frame of all the households located in the selected Mouzas, villages and urban blocks.
- Form-2:** Main census questionnaire (8 pages) to be filled-in only for the selected households reporting owned and / or rented-in land for agricultural purposes.
- Form-3:** Brief census questionnaire (2 pages) to be filled-in for the selected households not reporting any land.
- Form-4:** Weekly progress report in the form of a prepaid postage card to be filled-in and posted by each enumerator to the Agricultural Census Organization, Lahore every week throughout the census enumeration period.
- Form-6:** National Certainty Holding (NCH) form was used for recording full address and other particulars of such household. If the same NCH could not be enumerated at its address, the new address was noted on the same form for further contact to collect the data.
- Form-7:** Identity Ticket to be filled-in by the enumerator for handing over to nomads / gipsy / migratory people to avoid re-enumeration.

CENSUS METHODOLOGY

In accordance with the previous practice and the recommendation of Advisory Committee, Provincial Revenue Departments were entrusted to carry out the enumeration task. In settled areas, the Patwaris / Tapedars of the Provincial Revenue Departments were designated as census enumerators, while the Kanungos / Supervising Tapedars were engaged as their immediate supervisors. The Kanungos / Supervising Tapedars were also made responsible for the enumeration of National Certainty Holdings (NCHs) located outside the sample Mouzas of their respective jurisdictions. In big urban areas like Peshawar, Islamabad, Rawalpindi, Gujranwala, Sialkot, Lahore, Faisalabad, Sargodha, Multan, Bahawalpur, Sukkur, Hyderabad, Karachi, Quetta and Muzaffarabad, the field staffs of the Federal Bureau of Statistics were employed for enumeration under their own supervisory staff designated for the purpose. In unsettled areas, however, the revenue staff being very scanty was substantially supported by the Field Assistants from Agriculture Extension Department, Stock Assistants / Veterinary Assistants from Livestock & Dairy Development Department and School Teachers from Education Department for the field operation. The enumerators and supervisors were normally deputed to work within their respective jurisdictions, unless otherwise compelled by the local circumstances.

At Tehsil / Taluka level, concerned Deputy District Officers (Revenue) [DDOs (R)] / Assistant Commissioners were designated as Tehsil Census Officers and made responsible for the census operations to be carried out within their respective jurisdictions. The Executive District Officer (Revenue) [EDO (R)] / District Officer (Revenue) [DO (R)] / Deputy Commissioners were designated as District Census Officers and overall in-charge of the census operations within their administrative district(s) to look after the progress and pace of census work. The District Coordination Officer (DCO) was the overall in-charge of the census field operation being senior most officer of the district to provide guidance and facilitate the District Census Officer(s) for any administrative issue like shortage of enumerators or supervisors, etc. The DCOs also assured the timely commencement and completion of the census work in the district concerned.

Before the start of the census field operation, a meeting was arranged at every district headquarter. This meeting was presided over by the concerned DCO / Deputy Commissioner. The EDO(R), DO(R), all the DDOs(R) / Assistant Commissioners and Tehsildars, Saddar Kanungo / Naib Tehsildar Office (NTO), Office Kanungos from all Tehsils were invited in the district meeting. One officer from ACO also attended the meeting to brief the participants about census methodology, schedule of census work in that particular district, to make the assignment of enumerators for all selected Mouzas / urban blocks in the district and to finalize the arrangements for training as well as census field operation in the district.

For Federally Administered Tribal Areas (FATA) / Agencies, the Political Agent was the overall in-charge of the census field operation in the areas under his jurisdiction. While for Provincially Administered Tribal Areas (PATA) / Frontier Regions (FRs), the District Coordination Officer (DCO) of the concerned district was the overall in-charge of the census field operation. However, in both type of areas, the Assistant Political Agent was designated as Agency / FR Census Officer. The Political Tehsildar, Political Naib Tehsildar and Political Moharrar assisted the Political Agent for successful completion of census in their jurisdictions.

TRAINING OF FIELD STAFF:

Detailed instruction manuals for Census Master Trainers (CMTs), for Enumerators and immediate Supervisors were prepared with detail of every data item to be collected in the census. As the first step, CMTs were trained at the ACO office regarding concepts, procedures, methodology, household sample selection techniques, field problems and their possible solutions to control the non-sampling errors. They were made fully conversant to cope with any type of field problem during census enumeration.

After district meetings, one CMT was placed at each district headquarter for the entire duration of field operations to train the enumerators, supervise the enumeration work, select the sample of households within the Mouza and to provide technical guidance to the enumerators as well as supervisors. The CMTs were also required to ensure in time commencement of census, its completeness, its quality, and to arrange the despatch of completed census documents to the Agricultural Census Organization, Lahore. They were also required to be in contact with the district administration time to time to discuss and resolve administrative issues.

An extensive training programme made the enumerators fully conversant with the basic idea of every item included in the census questionnaire and equipped them to frame and re-frame suitable questions for eliciting the requisite information. The enumerators and their immediate supervisors were intensively trained in batches of approximately 30 each in census methodology, census forms and the concepts involved at their respective Tehsil headquarters by CMTs specially trained and deputed for the purpose. The training session at District / Agency / FR headquarter was inaugurated by the concerned DCO / EDO(R) / DO(R) / Deputy Commissioner / Political Agent / Assistant Political Agent. However, at the Tehsil level the training sessions were chaired by the DDOs(R) / Assistant Commissioners / Tehsildars / Political Tehsildars. The three-day training programme for enumerators and supervisors included classroom lectures for the first two days of training, and a third day in the field for practical work followed by review, and finally the handing over of the blank forms to be used by the enumerators / supervisors. In addition to the theoretical and practical training, the enumerators were required to fill-in two main census questionnaires (Form-2) independently during the listing operation (filling of Form-1) and show these to the CMT for checking. The enumerators were given the go-ahead signal for enumeration by the CMT only after he was satisfied about the practical competency of the enumerators.

FIELD OPERATION AND SUPERVISION:

Immediately after training, the enumerators proceeded to their assigned Mouzas. In settled areas of Khyber Pakhtunkhwa & Punjab provinces and the whole of Sindh province, where a three-stage sample design was adopted, they first prepared sketch maps of the Mouzas showing the location of houses and important landmarks. Then, the enumerators prepared the sampling frame / list of households by numbering each and every residential structure within the boundaries of that Mouza and entered the names of the head of households along with area operated on the listing sheet (Form-1). Area owned and area rented-in on cash or share cropping basis by the household was also recorded. The numbers put on prominent residential structures were marked on the sketch map showing location of households in a street or within the boundaries of that Mouza with important landmarks. At the same time, they also identified those households which were within the limits of MCH. Afterwards the enumerators brought those lists to the CMT at Tehsil / district headquarters for selection of households for detailed interviews. After getting identification of selected households by the CMT, the enumerators again went to

the concerned areas to collect information through face-to-face interviews with the heads of households. This information was recorded on Form-2 (households operating agricultural land) or Form-3 (households not operating agricultural land).

In unsettled areas of Khyber Pakhtunkhwa & Punjab provinces, the whole of Balochistan province, Gilgit Baltistan and Azad Jammu & Kashmir, where a single-stage sample design was adopted, listing (filling of Form-1) and enumeration work (filling of Form-2 / Form-3) was done side-by-side, because all the households in selected Mouzas / villages / Killies / Basties were enumerated. However, in all the selected urban blocks located anywhere in the country, every fifth household was enumerated in addition to all the households having land or livestock.

The requisite information in the questionnaire for census purposes was collected through direct interview with the head of the selected household or, in case of his absence, with a very close associate of the head of the selected household.

During the course of listing and enumeration, each enumerator was required to fill-in and mail a pre-addressed weekly progress report card (Form-4) to the Agricultural Census Organization, stating the progress of work and problems, if any, faced by him. After completion of all the work in assigned Mouza(s), the enumerator was required to put all the documents back in the census kitbag(s) and deposit the same at Tehsil headquarters. The documents were then checked for completeness and were gathered at the district level from where these were despatched to the Agricultural Census Organization, Lahore by the CMT or district administration.

To maintain reasonable quality in the census results, a detailed supervisory program was also planned to supervise the countrywide census field operations to be completed within a short span of six to eight weeks. For this purpose, in addition to the supervision by CMTs and district management, Mobile Teams of ACO officers remained in the field both during training and census enumeration periods. Each team was assigned a few contiguous districts for overall supervision. Special emphasis was given to the supervision program for the districts where difficulties in the census operations were particularly anticipated for timely and satisfactory completion. In big cities where field staff of the FBS was used for enumeration, the supervision was done by their in-charge officers.

The number of provincial officers / supervisors and enumerators who participated in the Agricultural Census 2010 is given below:

PROVINCIAL OFFICERS AND STAFF ENGAGED IN FIELD OPERATION			
Administrative Unit	Officers / Supervisors	Staff / Enumerators	Total
Pakistan	1165	7106	8271
Khyber Pakhtunkhwa	249	1513	1762
Punjab	474	3584	4058
Sindh	275	1027	1302
Balochistan	167	982	1149

NATIONAL CERTAINTY HOLDINGS:

During the field operation, the NCHs lying within the boundaries of the selected Mouzas / villages / Killies / Basties were enumerated by the deputed enumerators. However, the responsibility to fill out the forms for the NCHs in the non-selected Mouzas / villages / Killies / Basties fell on the immediate supervisors / Kanungos / supervising Tapedars, in addition to the supervision of the enumerators work progress within their respective jurisdiction.

PUBLICITY

A well-planned media campaign is a prerequisite for any large statistical enterprise in order to raise a huge country level awareness and elicit the cooperation of the general public. However, due to a shortage of funds, the publicity campaign was of a limited level. It was launched in local as well as national newspapers to highlight the importance of the census and its objectives. Similarly, briefs on census and handouts were issued to the newspapers at appropriate junctures during the district meetings and census field operation for public awareness.

The census was sample-based and the enumeration work was confined to the selected Mouzas / villages / urban blocks and within a Mouza to selected households. Therefore, most of the District Council Nazims, members of the District and Tehsil Councils, Nazims of the Union Councils and Councillors of the selected Mouzas / villages were individually contacted and addressed on the issue. In addition, specially prepared pamphlets were pasted at important visible public places / sites (like mosques, street crossings, entry points of the Mouza / village / block etc.) right in the beginning of the census operation in the selected Mouzas / villages / urban blocks.

DATA PROCESSING AND TABULATIONS

Data entry was done by the Federal Bureau of Statistics, Data Processing Centres, Lahore and Islamabad. However, data processing was performed only at DP Centre, Lahore. The data processing and tabulations were carried out through a number of steps devised in a logical scheme of work as:

DOCUMENTS CONTROL:

A well-planned control room was established in ACO for maintenance of census documents. After retrieval of documents from the field, these were checked in the control room regarding required and completed number of questionnaires. One kitbag was assured for each selected Mouza / urban block. Differences found were brought into the notice of concerned officers for proper treatment from the field. Then kitbags were arranged district and Tehsil wise in an array so that any Mouza / bag could be traced out without any difficulty. A coding plan for this census was prepared with the help of computer programmers showing one code for each and every Tehsil of the country and documents were arranged according to the coding plan.

MANUAL CODING:

Coding refers to the assignment of a specific number / code to the information asked in a particular question during enumeration to facilitate the data processing on computers. The data items of main questionnaires were pre-coded with the help of computer programmers. However, identification of every questionnaire and their serial numbers

within Mouza / urban block were given manually by the staff of ACO. Any serial number, Tehsil code missing or illegible was made correct during coding. Then the questionnaires were tagged together for one Mouza / urban block to make them ready for manual editing and further data processing steps.

MANUAL EDITING:

Manual editing is a process to make the data recorded on a questionnaire consistent if inconsistencies are found among data items within the questionnaire. For this purpose manual editing instructions were prepared on the basis of theoretical mutual relationships among data items. In the light of those instructions manual editing was performed by the staff of ACO to make the data ready for keying. Ambiguous and illegible writings were also made correct during this step.

DATA ENTRY AND EDIT- CORRECTION:

After manual editing the data were entered in computers at Data Processing Centre (DPC) by Key punch Operators. Then the data were processed by the computer programmers through already developed computer programmes for the purpose. The programmers produced computer printouts as the first edits for each district. These edits were checked at ACO with source documents and errors were made correct, if found. The second edit was produced by the programmers after processing the errors found during the first edit and the process went on and on till the data of a particular district were declared error free. The correction of data through computer edits till the data are error free with the help of source documents is termed as edit-correction. After declaring data error free, tabulations were produced.

TABULATIONS:

Tabulations are the actual presentation of data for data users. A tabulation plan comprising of 90 tables was prepared at the time of census planning and preparation. In the light of instructions already conveyed to the programmers for each column and row of each table, they produced data tabulations for each district, province and at country level as requested by the ACO.

ESTIMATION OF CENSUS RESULTS

As the census was based on sample enumeration, the sample observations were to be extrapolated to the population level. Therefore, the raising factors determined at various sampling stages, representing the inverse of the probabilities of selection of the respective household, were fed to the computer along with the other data. In case of a joint farm, 1/2, 1/3, 1/4 of the farm (or as the case might be) was considered enumerated when one of the two, one of the three or one of the four partners of a farm, respectively, was enumerated.

The terminology used in the estimation of aggregates along with the mathematical formulae (as given below) for developing census estimates for three-stage sampling plan (part-1 of the country) has been elucidated being the most complicated as compared to the areas / regions of the country falling in part-2, part-3 and part-4. Anyhow, the probability of selection as well as the procedure for working out census estimates for part-2, part-3 and part-4 are implicit and may well be understood from the elucidated methodological formulae.

NOTATIONS:

As per practice, the standard notation has been adopted: small letters for sample observations, capital letters for population values and capped capital letters for estimates of population values. Whereas:

y_{hijkl} is the observation from the l^{th} sample household
of the k^{th} cluster
of the j^{th} Mouza
of the i^{th} Patwar Circle
of the h^{th} stratum and

x_{hijk} is the number of elementary units in the k^{th} cluster having such attributes.

With the number of :-

Total households in the k^{th} cluster, $l = 1 \text{ to } N_k$

National Certainty Households in the k^{th} cluster, $l' = 1 \text{ to } N'_k$

Mouza Certainty Households in the k^{th} cluster, $l'' = 1 \text{ to } N''_k$

Non-Certainty Households in the k^{th} cluster, $l''' = 1 \text{ to } (N_k - N'_k - N''_k)$

Total Clusters in the j^{th} Mouza, $k = 1 \text{ to } Q_j$

Sample Clusters in the j^{th} Mouza, $k = 1 \text{ to } q_j$

Total Mouzas in the i^{th} Patwar Circle, $j = 1 \text{ to } R_i$

Sample Mouzas in the i^{th} Patwar Circle, $j = 1 \text{ to } r_i$

Total Patwar Circles in the h^{th} stratum, $i = 1 \text{ to } S_h$

Sample Patwar Circles in the h^{th} stratum, $i = 1 \text{ to } s_h$

Total Strata in a district, $h = 1 \text{ to } L$

Total Strata in a district comprising

Non-Certainty Patwar Circles, $h' = 1 \text{ to } L'$

Total Strata in a district comprising

Certainty Patwar Circles, $h'' = 1 \text{ to } (L - L')$

For example: $Y_{h''ijkl''}$ represents the l'' th non-certainty household of the

k th cluster of the

j th Mouza of the

i th Patwar Circle of the

h'' th stratum comprising one certainty Patwar Circle.

PROBABILITIES OF SELECTION:

P_{hijkl} = Overall probability of selection of the l th household from k th cluster of j th Mouza of i th Patwar Circle of h th stratum.

For non-certainty holdings, $P_{hijkl''} = P_{hijk}$

For Mouza certainty holdings, $P_{hijkl''} = P_{hij}$

For national certainty holdings, $P_{hijkl'} = 1$

By each stage of sample selection, probabilities are:

- 1) ${}_h P_i$ = probability of selection of the i th Patwar Circle
- 2) ${}_{hi} P_j$ = probability of selection of the j th Mouza
- 3) ${}_{hij} P_k$ = probability of selection of the k th cluster

Cumulative overall probabilities of selection of each stage of selection are:

- 1) $P_{hi} = {}_h P_i$
- 2) $P_{hij} = {}_h P_i \times {}_{hi} P_j$
- 3) $P_{hijk} = {}_h P_i \times {}_{hi} P_j \times {}_{hij} P_k$

CENSUS ESTIMATES:

Step 1: Estimate for total of all non-certainty observations for the k th cluster

$$Y_{hijk}^{\prime\prime\prime} = \sum_{l''}^{(N_k - N'_k - N''_k)} y_{hijkl''}$$

Step 2: Estimate for the j^{th} Mouza for non-NCH

$$\hat{Y}_{hij}^{\prime\prime} = \sum_k \frac{q_j \hat{Y}_{hijk}^{\prime\prime\prime}}{P_{hij}^{\prime\prime}} + \sum_k \sum_{l''} \frac{Q_j N_k''}{l''} y_{hijkl''}$$

Step 3: Estimate for the i^{th} Patwar Circle for non-NCH

$$\hat{Y}_{hi}^{\prime\prime} = \sum_j \frac{r_i \hat{Y}_{hij}^{\prime\prime}}{P_j}$$

Step 4: Estimate for the h^{th} stratum for non-NCH

$$\hat{Y}_h^{\prime\prime} = \sum_i \frac{s_h \hat{Y}_{hi}^{\prime\prime}}{P_i}$$

Step 5: Estimate for the district for all holdings

$$\hat{Y}^{\prime\prime} = \sum_h \hat{Y}_h^{\prime\prime} + \sum_h \sum_i \sum_j \sum_k \sum_{l'} \frac{R_i Q_j N_k'}{l'} y_{hijkl'}$$

It can be seen that the last estimate could also be calculated directly by:

$$\hat{Y}^{\prime\prime} = \sum_h \left[\sum_i \sum_j \left(\sum_k \frac{(N_k - N_k' - N_k'')}{P_{hijk}} y_{hijkl''} + \sum_k \sum_{l''} \frac{Q_j N_k''}{P_{hij}^{\prime\prime}} y_{hijkl''} \right) + \sum_i \sum_j \sum_k \sum_{l'} \frac{R_i Q_j N_k'}{l'} Y_{hijkl'} \right]$$

The estimate of the number of primary units reporting a certain characteristic ($\hat{X}_w^{\prime\prime}$) will be obtained by the following formula:

$$\hat{X}_w^{\prime\prime} = \sum_R \left[\sum_i \sum_j \left(\sum_k \frac{(N_k - N_k' - N_k'')}{P_{hijk}} + \sum_k \frac{Q_j N_k''}{P_{hij}^{\prime\prime}} \right) + \sum_i \sum_j \sum_k \frac{R_i Q_j}{l'} N_k' \right]$$

This formula simply involves raising each observation by its combined raising factor, and summing up throughout the district. The ratios such as Average Farm Size can then be obtained by the following:

$$\frac{\hat{Y}^{\prime\prime}}{\hat{X}^{\prime\prime}}$$

PUBLICATION OF CENSUS DATA

The census data as mentioned above have been tabulated at district, province and country levels. The tabulations thus prepared are published in the following reports:

Volume 1: All Pakistan Report contains tabulations at country and province levels in acres and hectares for the local as well as foreign users.

Volume 2: Provincial Reports consist of four parts i.e. one for each province. Each contains tabulations at province and district levels in acres for the local users.

Volume 3: Special Reports comprise two reports i.e. one for Gilgit Baltistan and other for Azad Jammu & Kashmir. Each report contains tabulations at the district and overall levels in acres for the local users.

QUALITY OF CENSUS DATA

A sample-based census gives rise to sampling error as well as the non-sampling error. In spite of the best efforts made by the ACO during sample selection procedures, data collection and data processing methods, some margin of non-sampling errors is inevitable. Therefore, the most important consideration was to control the extent of non-sampling errors during the census. In addition, the quality of the census data was considered on the criterion of:

- i) Internal consistencies and
- ii) Comparison with other corresponding series

The quality of data had been assured by the following methods:

SAMPLING ERROR:

To estimate sampling error the relative variance (R.V.) and then the coefficient of variation (C.V.) were calculated for a number of important data items and presented in Appendix-III. The formula used for estimating relative variance and the coefficient of variation at district, province and country levels is described in the succeeding paragraphs.

At the district level, R. V. was estimated simply by first raising the sample observations of each Patwar Circle to stratum level using the overall raising factor for each holding but excluding all National Certainty Holdings (NCHs), and then summing up to obtain an estimate for each half stratum as described below:

$$\hat{Y}_{h'1}^{\ddot{}} = \sum_j^{r_1} \left[\sum_k^{q_i} \frac{(N_k - N'_k - N''_k)}{\sum_{l''} y_{h'1,jkl''}} + \sum_k^{Q_j} \sum_{l''}^{N''_k} \frac{y_{h'1,jkl''}}{P_{h'1j}} \right]$$

$$\hat{Y}_{h'2}^{\ddot{}} = \sum_j^{r_2} \left[\sum_k^{q_j} \frac{(N_k - N'_k - N''_k)}{\sum_{l''} y_{h'2,jkl''}} + \sum_k^{Q_j} \sum_{l''}^{N''_k} \frac{y_{h'2,jkl''}}{P_{h'2j}} \right]$$

Then, the *RV* for the district estimate of aggregates of the attribute is obtained by taking the square of differences between estimates for successive pairs of half strata divided by the district estimates as follows:

$$Var(\hat{Y}^{\ddot{}}) = [CV(\hat{Y}^{\ddot{}})]^2 = \sum_{h'}^{L'} \left[\frac{\hat{Y}_{h'1}^{\ddot{}} - \hat{Y}_{h'2}^{\ddot{}}}{\hat{Y}^{\ddot{}}} \right]^2$$

Similarly, the *RV* for the district estimate of units having the attribute is:

$$Var(\hat{X}^{\ddot{}}) = [CV(\hat{X}^{\ddot{}})]^2 = \sum_{h'}^{L'} \left[\frac{\hat{X}_{h'1}^{\ddot{}} - \hat{X}_{h'2}^{\ddot{}}}{\hat{X}^{\ddot{}}} \right]^2$$

Percent Sampling Error, i.e.

$$CV = \sqrt{RV} \times 100$$

If the RV for the aggregate of characteristic (W) for district (g) is denoted by $RVYW_g$ and Y_{wg} is the estimate for the aggregate (Y) of characteristic (W) for district (g), then the RV for the province with $g=1$ to u districts in the province.

$$RVYW = \frac{\sum_g^u (RVYW_g) Y_{wg}^2}{\left(\sum_g^u Y_{wg} \right)^2}$$

and

$$RVXW = \frac{\sum_g^u (RVXW_g) X_{wg}^2}{\left(\sum_g^u X_{wg} \right)^2}$$

RV estimates for country levels have also been worked out on the same pattern as at the province level.

NON-SAMPLING ERROR:

In Agricultural Census 2010, the non-sampling errors were minimized through careful planning, elaborate training, intensive care, close supervision and best techniques / efforts to help the respondents to provide the best data to be recorded on the questionnaires. The utmost efforts were made at different levels to minimize the non-response during field enumeration. Comprehensive editing of census questionnaires in the light of already developed checks / relationships was made before entering the data. During data processing, the edit checks were applied logically to clean the data and to make it error free before producing tabulations. After producing tabulations, quality control checks developed for the purpose were applied to verify the consistency among data tabulations.

CONSISTENCY OF DATA:

Consistency and plausibility of data were adjudged through a number of interrelationships between various census items. The users of census data would certainly find the required fineness in the quality of census estimates reflecting a reasonable degree of consistency.

COMPARISON WITH CORRESPONDING SERIES:

The census estimates were also checked / compared with the corresponding series as far as possible at the district, province and country levels. The discrepancies identified were sorted out diligently by digging into the source documents, raising factors, computational process etc., and corrected after careful considerations.

DEFINITIONS

The definitions of different data items / variables on which data were collected in Agricultural Census 2010 are presented here. These definitions will help the data users to understand conceptual issues related to the data and are given in lexicographic order as below:

1. **Agricultural Census** means collection of information about agriculture sector and is called the Agricultural Census 2010.
2. **Agricultural Households** include Farm Households and / or Livestock Holders.
3. **Agricultural Work** includes farm work or planning thereof. It includes work on the farm, e.g. ploughing, planting, hoeing, weeding, application of fertilizer(s) and plant protection material(s), harvesting, winnowing, feeding and caring of the livestock, supervision of agricultural workers, hauling farm produce to market and any other work related to the operation of the farm.
4. **All Households** include Farm Households and Non-Farm Households.
 - a. **Farm Households** include households operating any farm area for agriculture purpose irrespective of its ownership and whether operated individually or jointly with other households. Farm household may or may not have any livestock.
 - b. **Non-Farm Households** include households not operating any farm area for agriculture purposes. Households owning land but not operating for any agriculture purposes are also included in this category.
5. **Area Fertilized** means the area of a crop treated with chemical fertilizer(s), before and / or after sowing, irrespective of the number of times it was fertilized during the census year.
6. **Area not Available for Cultivation** is that uncultivated area of the farm which is under farm house, cattle shed, barn, storage, farm roads and channels, etc. and therefore not available for cultivation.
7. **Area Owned** includes the total area owned by all members of a household irrespective of its location. It also includes the area held in owner-like possession; such as land temporarily allotted, the mortgaged land under possession, government land taken on lease, etc.
8. **Area Self-operated** includes the whole or only that part of the area owned which is under the day-to-day operational control of a household on the census day.
9. **Area Share Cropped** means the rented-in area for which a pre-decided share of the produce is paid by the tenant to the owner of the area.

10. **Area Taken on Lease / Rent** means the rented-in area for which a pre-decided fixed rent in cash or kind is paid by the tenant to the owner of the area.
11. **Area under Fruit Trees Nursery** is the farm area on which fruit trees nurseries have been grown for any purpose.
12. **Banjar Jadeed** means that uncultivated area which was not sown / cultivated for the last two to four years.
13. **Banjar Qadeem** means that uncultivated area which was not sown / cultivated for beyond the last four years.
14. **Casual Labour** means the labour employed occasionally on daily wage basis for a specific agricultural work.
15. **Cattle** is the collective name given to bovine animals.
16. **Census Day** refers to the day of enumeration of a household.
17. **Census Year** was the actual calendar year 2010. However, data were collected for cropping seasons Kharif 2009 and Rabi 2009-10. In terms of the Agricultural year, it begins in April 2009 and ends on 31st March 2010.
18. **Complete Kacha House** means a residential place, walls of which are made up of mud or unbaked bricks bonded with mud.
19. **Complete Pakka House** means a residential place, walls of which are made up of baked bricks / stones / concrete bonded with mud or cement.
20. **Crop Area Covered with Plant Protection Measures** means the area of a crop on which plant protection chemicals insecticides / pesticides / fungicides / rodenticides etc. were applied / sprayed irrespective of the number of applications / sprays made during the census year. It does not include aerial spray and seed treatment.
21. **Crop Area Irrigated** means area of a crop actually irrigated at least once by artificial mean(s) during the census year. It also includes one or more irrigations given as part of land preparation before sowing of the crop.
22. **Crop Seasons** define the cropping pattern in Pakistan. The cropping pattern of the country is bifurcated as Kharif and Rabi and all types of crops are sown in these two seasons. Detail of both seasons is:
 - a. **Kharif** crops are sown in the summer from April to June and harvested in late summer or early winter during October to December. The important Kharif crops are cotton, rice, sugarcane, maize, jowar, Bajra and Kharif vegetables.
 - b. **Rabi** crops are sown in the winter from October to December and harvested in late winter or early summer from April to May. The important Rabi crops are wheat, gram, barley, rapeseed, mustard and Rabi vegetables.

- 23. Cropping Intensity** represents the total cropped area in terms of total cultivated area multiplied by 100, i.e.

$$\text{Cropping Intensity} = \frac{\text{Total Cropped Area}}{\text{Total Cultivated Area}} \times 100$$

It indicates the extent to which the cultivated area was used for intensive cropping.

- 24. Cultivated Area** is that farm area which was sown at least once during the census year i.e. 2009-2010 or a year before. It is the sum of area Net Sown and Current Fallow.

- 25. Culturable Waste** is that uncultivated farm area which is otherwise fit for cultivation but was not cropped during the census year or in the year before due to presence of any of the constraints like water logging, non-availability of irrigation water, salinity, un-levelling of land, manpower and / or funds shortage, etc.

- 26. Current Fallow** means that cultivated farm area which was not sown during the census year for the purpose of regaining fertility and / or any other specific objective / reason but was cropped at least once during the preceding year i.e. 2008-09.

- 27. Economic Activity:** The data on the type of economic activity are based on the concept of %usual+ activity using 12-months period as the reference period in contrast to labour force concept of %current+ activity in which a short time reference of one week or less is generally used. Usually, it involves the activity that generates income either in cash or kind.

- 28. Economically Active Persons** are those persons of either sex of 10 years or above in age who, during the reference period, participated in the production of economic goods or services.

- 29. Economically Inactive Persons** are those persons of the household who do not perform any work for profit or family gain in cash or in kind. Housewives and other members of the household who are mainly engaged in household duties in their own home, students attending any regular educational institution and other persons not economically active are generally included in this category.

- 30. Family Agricultural Workers** include household members of 10 years and above who do any kind of agricultural work on their farm / holding. Family workers have been classified into persons doing agricultural work on permanent basis or part time basis.

a. **Permanent Family Workers** include members of the household who only do agricultural work of the holding at their own farm. They also include senior household members who may not be doing any physical work at the farm but carry out and / or participate in the planning, supervision and operation of farm.

b. **Household Members Doing Part Time Work** are those members of the household who in addition to the agricultural work of the farm / holding also do some other work such as service, business, etc.

31. **Farm** is the aggregate area of land operated by member(s) of one household alone or with the assistance of member(s) of other household(s) without regard to location, size or title and normally used for crop production. Farms wholly uncultivated during the census year are also included in this category. The term **Farm** is synonymous to a holding.
32. **Flowers and Their Nursery Area** refers the farm area planted with flowers and / or their nurseries.
33. **Fodder Area** includes the area under Rabi fodders as well as Kharif fodders.
34. **Fragment or Parcel** refers to any piece of land of a farm entirely surrounded by land of other farm(s) and / or by land and / or water not forming part of that farm. One farm may have one or more fragments / parcels in it.
35. **House** means any type of structure / dwelling used for human inhabitation.
36. **Household** means a person or a group of persons living together whether or not having blood relationship to each other and eating from the same kitchen. Hospitals, hostels, jails and hotels are not considered as household.
37. **Household under Debt** includes households reported under any type of debt at the time of census enumeration.
38. **Individual Farm** means a farm operated by one or more persons of the same household.
39. **Irrigated Area** includes the cultivated area actually irrigated at least once during the census year by artificial sources of irrigation.
40. **Joint Farm** means a farm jointly operated by persons belonging to two or more different households.
41. **Land Purchased** means agricultural land purchased by the household anywhere in the country during the last 10 years.
42. **Land Sold** means agricultural land sold by the household anywhere in the country during the last 10 years.
43. **Land Tenure** refers to the rights / arrangements under which the land is operated. Land tenure may be of following types:
 - a. **Owner Farm:** A farm in which the entire land is owned by the operator himself.
 - b. **Tenant Farm:** A farm in which the entire land is taken from other household(s) against a fixed rent in cash or kind or a share in the produce or against any other terms and conditions.
 - c. **Owner- Cum-Tenant Farm:** A farm in which a part of the land area is owned by the operator household and the remaining is taken from other

household(s) against rent or share of the produce or any other terms and conditions.

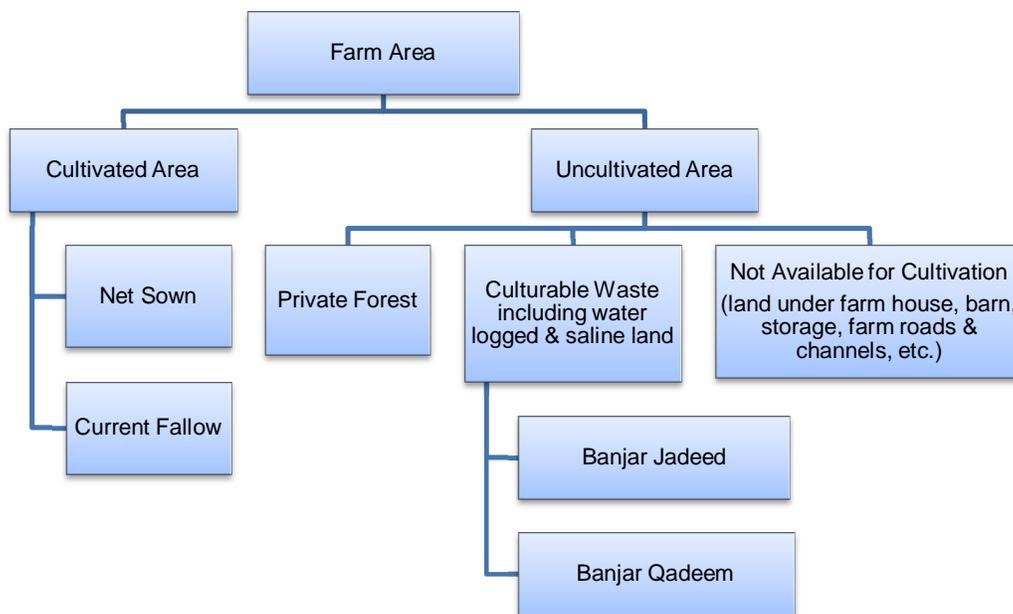
- 44. Land Use Intensity** represents the cultivated area measured in terms of total culturable area multiplied by 100, i.e.

$$\text{Land use Intensity} = \frac{\text{Total Cultivated Area}}{\text{Total Culturable Area}} \times 100$$

It indicates the extent to which the culturable land was used for cultivation of crops.

- 45. Land Utilization** means classification of the farm area in accordance with its use as under:

Pictorial Classification of Farm Area



- 46. Livestock Holder** is a household having at least one head of cattle and / or buffalo, 5 sheep and / or goats but not operating any farm area.

- 47. Mixed Crops / Inter-planted Crops** means sowing more than one crop in one field at the same time. In the same field, one crop planted between rows of another crop is referred to as inter-planted crops while more than one (often many) crops grown unsystematically are called mixed crops. The following procedure was adopted for recording area reported under such cases:

- a. **Crops Grown in Orchards:** If the orchard consisted fruit trees of non-bearing age, the entire area of a particular crop grown in the orchard was reported as crop area. If the orchard consisted of fruit trees of bearing age, only half of the area of a particular crop grown in the orchard was recorded as crop area. The area under orchard was included as such in either case.

- b. **Crops Grown Together:** If the two crops grown together were harvested at the same time, one half of the total area in the crops grown together was reported for each of the crops. If the two crops grown together were harvested at different times, the entire area of the crops grown together was reported for each of the crops.
 - c. **Seed Ratio:** In case of any other situation for mixed cropping, the ratio of seeds sown for each crop will be the basis of area reporting for each crop.
48. **Mouza or Deh** is a demarcated territorial unit for which separate revenue record including a cadastral map is maintained by the provincial revenue departments. One Mouza / Deh may contain one or more population settlements or may have no settlement (Bechiragh).
 49. **Net Sown Area** means the cultivated farm area which was actually sown at least once during the census year regardless of becoming %kharaba+ (crop failure) and / or the number of crops raised. It also includes area under orchards.
 50. **Non-Agricultural Households** include households which do not fall in the categories of Farm Households and / or Livestock Holders.
 51. **Non-Agricultural Work** refers to the work other than agricultural work, which may relate to trade, cottage industry, occupation of village functionaries, service with government or other agencies and non-agricultural labour, etc.
 52. **Non-Perennial Canal Irrigated Area** means the area irrigated by canal flowing not round the year but seasonally i.e. for a few months in a year.
 53. **Orchard Area** is the farm area compactly planted with fruit trees and their nurseries. The important fruit trees are mango, citrus, guava, date, grape, apple, pear, plum, apricot and peach.
 54. **Other Area** includes area operated by a household, other than the area owned, without paying any rent in the usual form, e.g. Kacha area along the river side, etc.
 55. **Owned House** means a household's residential place with ownership or equivalent rights.
 56. **Partially Kacha / Pakka House** means a residential place having both Kacha and Pakka walls.
 57. **Perennial Canal Irrigated Area** means the area irrigated by canal flowing round the year.

- 58. Permanent Hired Labour** means persons who work on the farm on whole time basis and are employed for longer periods. They get wages in cash and / or kind on a fixed period basis, i.e. monthly, quarterly and yearly etc.
- 59. Private Forest Area** is that uncultivated farm area which is under forest planted by the farmer himself or left for the purpose. It does not include area under government forests.
- 60. Pulses Area** includes the area under gram, Rabi pulses as well as Kharif pulses.
- 61. Sample Mouza / Deh / Village / Killi / Block** is a sampling unit selected through sampling method for census enumeration. In settled areas, Mouza / Deh has been used as a sampling unit while in unsettled areas village / Basti / Killi and in urban areas, blocks have been taken as the sampling units.
- 62. Total Cropped Area** means the aggregate area of crops raised at a farm during the census year including the area under orchards / gardens / nurseries.
- 63. Total Culturable Area** includes cultivated area and culturable waste.
- 64. Total Farm Area** includes total cultivated and uncultivated area of a farm but it does not include area outside the farm such as area under government forests, roads, railways, schools, playgrounds, canals, rivers, Abadi Deh, urban built-up area, undistributed government land, etc.
- 65. Uncultivated Area** means that farm area which was not sown even for a single crop during the last two years i.e. census year (2009-10) and a year before (2008-09).
- 66. Un-irrigated Area** includes the cultivated area not artificially irrigated. It depends for cultivation solely on rain fall (Barani or rain fed) or river floods and seepage water (Sailaba), etc.
- 67. Vegetable Area** includes the area under sugar beet, potato, tomato, onion, chilli, melon, other Rabi and Kharif vegetables.
- 68. Village / Basti / Killi** means a chunk of houses known by a certain name. There may be one or more villages / Basties / Killies in a Mouza.
- 69. Work Animals** include bullocks, male buffaloes and camels.

MAIN FINDINGS

FARMS AND FARM AREA

According to the estimates of Agricultural Census 2010, there were 8.26 million farms in the country. These farms were operating an area of 52.91 million acres. The distribution of farm area among small and large farms was highly skewed. Farms with less than 5 acres of land constituted 64 per cent (5.35 million) of the total private farms but they operated only 19 per cent (10.18 million acres) of the total farm area. Whereas, the farms that were of 25 acres and above in size, comprised only 4 per cent (0.30 million) of the total farms but they commanded 35 per cent (18.12 million acres) of the total farm area. The average size of farm in the country was 6.4 acres whereas the cultivated area per farm was 5.2 acres.

The distribution of all farms and farm area by province is given in TABLE –1 and in Fig: 1 – a to 1 – c below:

TABLE – 1 : NUMBER OF FARMS AND FARM AREA – BY PROVINCE

(Number in Million & Area in Million Acres)

Administrative Unit	Number of Farms		Farm Area		Average size (in acres) of	
	Number	Per cent	Total	Per cent	Farm Area	Cultivated Area
Pakistan	8.26	100	52.91	100	6.4	5.2
Khyber Pakhtunkhwa	1.54	19	5.57	11	3.6	2.9
Punjab	5.25	64	29.33	55	5.6	5.1
Sindh	1.11	13	9.87	19	8.8	6.9
Balochistan	0.36	4	8.14	15	22.7	9.7

Fig: 1 – a

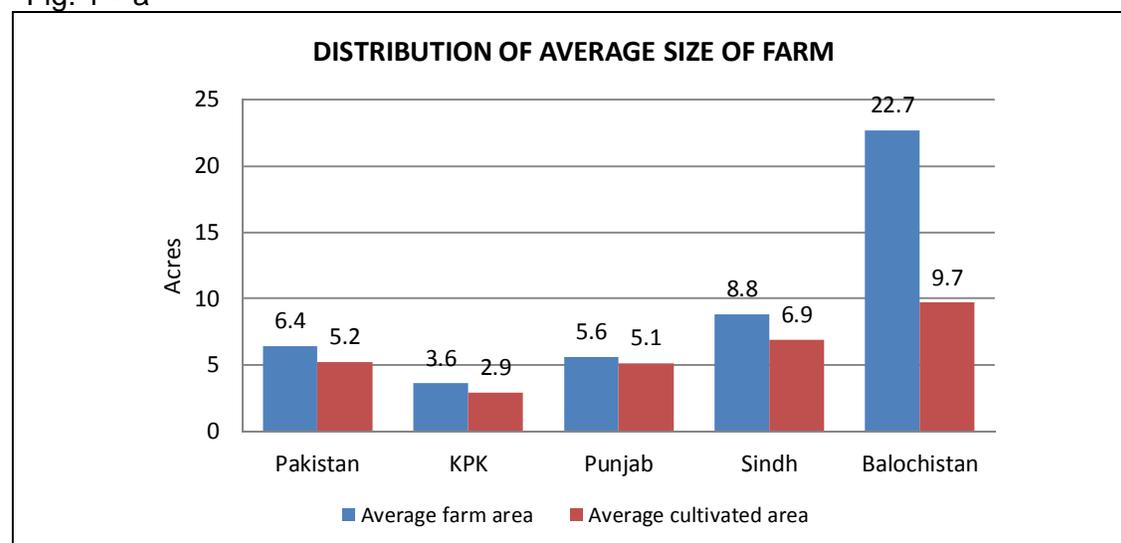


Fig: 1 – b

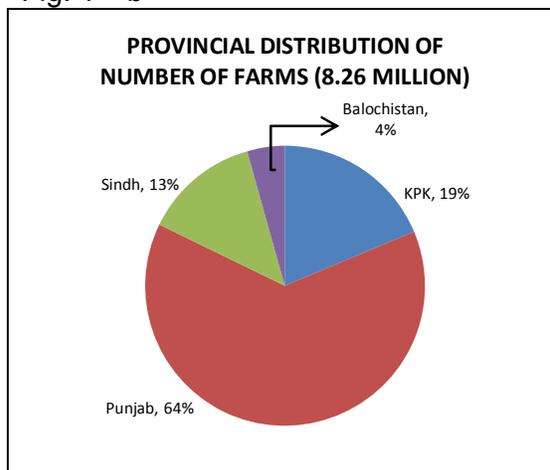
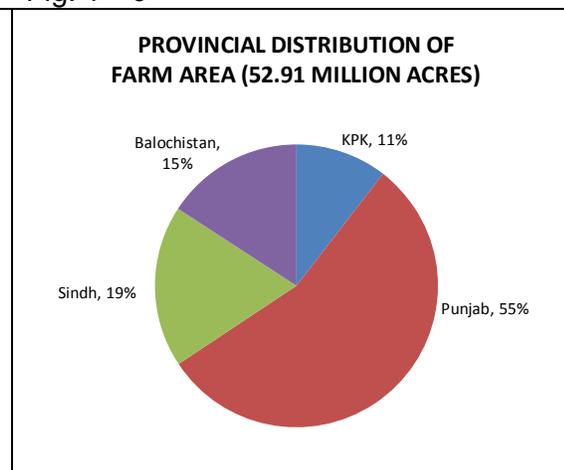


Fig: 1 – c



CULTIVATED AREA

The census estimates revealed that 90 per cent (42.62 million acres) of total farm area was cultivated area. There has been observed an inverse relationship in proportional cultivated area and size of the farm. Cultivated area to total farm area ratio was 0.93 among the farms with less than 5 acres, 0.91 in farms of 5 to under 25 acres and only 0.60 in large farm category i.e. farms of 25 acres and above.

The distribution of cultivated area, net sown area and current fallow amongst the provinces is given in TABLE – 2 and in Fig: 2 – a to 2 – b below:

TABLE – 2 : CULTIVATED AREA – BY PROVINCE

(Area in Million Acres)

Administrative Unit	Cultivated Area			Net Sown Area as per cent of Cultivated Area
	Total	Net Sown	Current Fallow	
Pakistan	42.62	41.06	1.56	96
Khyber Pakhtunkhwa	4.45	4.33	0.12	97
Punjab	27.04	26.45	0.58	98
Sindh	7.64	7.51	0.14	98
Balochistan	3.49	2.77	0.72	79

Note: Figures may not add up exactly to their respective totals due to rounding effect.

Fig: 2 – a

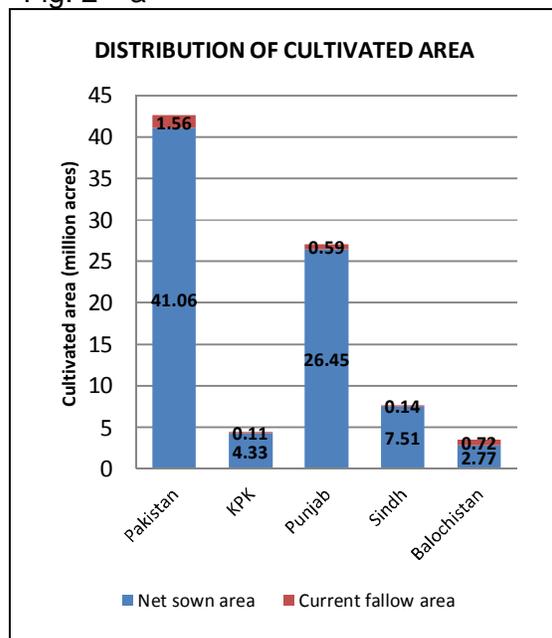
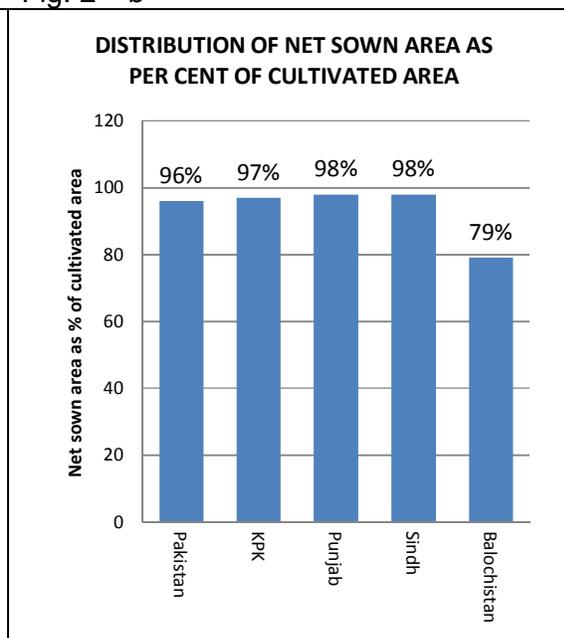


Fig: 2 – b



TENURE CLASSIFICATION OF FARMS AND FARM AREA

Privately managed farms were mostly cultivated by the owner cultivators (82 per cent) followed by tenants (11 per cent) and then by owner-cum-tenants (7 per cent). The area under possession of owners was 39.43 million acres (75 per cent) owner-cum-tenants 7.58 million acres (14 per cent) and tenants 5.89 million acres (11 per cent).

Tenure classification of farms and farm area by province is given below in TABLE – 3 and in Fig: 3 – a to 3 – d below:

TABLE – 3 : TENURE CLASSIFICATION OF FARMS AND FARM AREA – BY PROVINCE

(Number in Million & Area in Million Acres)

Administrative Unit	Number of Farms				Farm Area			
	Total	Owner	Owner-cum-Tenant	Tenant	Total	Owner	Owner-cum-Tenant	Tenant
Pakistan	8.26	6.74	0.60	0.92	52.91	39.43	7.58	5.89
Khyber Pakhtunkhwa	1.54	1.34	0.09	0.11	5.57	4.35	0.80	0.42
Punjab	5.25	4.32	0.45	0.47	29.33	20.60	5.37	3.36
Sindh	1.11	0.78	0.04	0.29	9.87	7.83	0.74	1.29
Balochistan	0.36	0.30	0.01	0.05	8.14	6.65	0.67	0.82

Note: Figures may not add up exactly to their respective totals due to rounding effect.

Fig: 3 - a

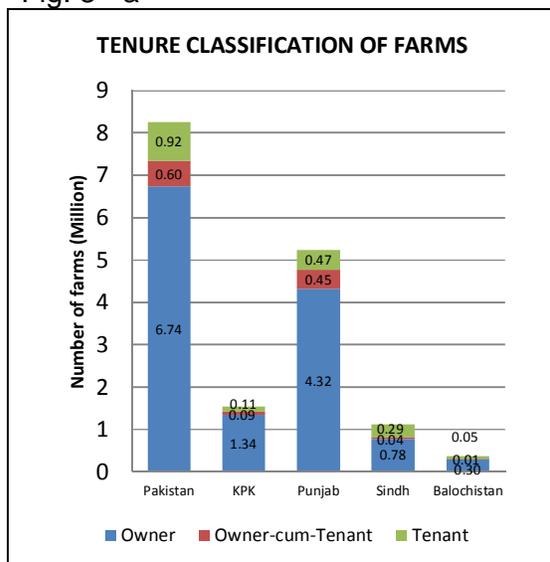


Fig: 3 . b

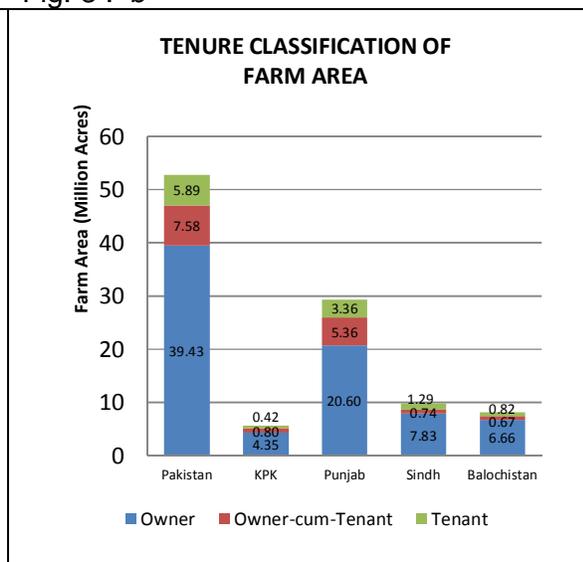


Fig: 3 - c

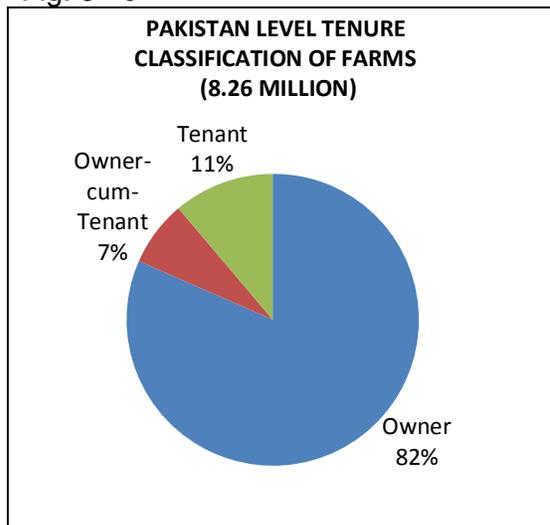
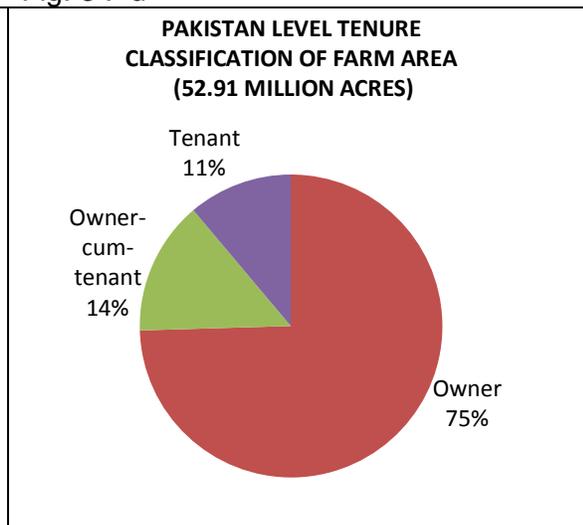


Fig: 3 . d



OWNER OPERATED AND TENANT OPERATED AREA

Census data indicate that owners and owner-cum-tenants operated an area of 39.43 million acres and 3.10 million acres respectively, accounting for 42.53 million acres in total. Whereas, the remaining 10.38 million acres were operated by tenants either on share cropping, lease or on undefined terms of tenancy. In this way, 80 per cent of the total farm area was operated by owners and 20 per cent by tenants. Majority of the tenant operated area (71 per cent) was cultivated on terms of share cropping (7.31 million acres) followed by 26 per cent on leasing basis (2.71million acres). Whereas, 0.36 million acres (3 per cent) of this area was reportedly being operated with undefined terms of tenancy.

The distribution of owner operated and tenant operated area amongst the provinces is given below in TABLE – 4 and in Fig: 4 – a to 4 – b below:

TABLE – 4 : OWNER OPERATED AND TENANT OPERATED AREA – BY PROVINCE

(In Million Acres)

Administrative Unit	Total Farm Area	Owner Operated Area	Tenant Operated Area			
			Total	Share Cropped	Leased	Others
Pakistan	52.91	42.53	10.38	7.31	2.71	0.36
Khyber Pakhtunkhwa	5.57	4.68	0.89	0.66	0.17	0.06
Punjab	29.33	22.70	6.63	4.45	2.00	0.18
Sindh	9.87	8.17	1.70	1.18	0.46	0.06
Balochistan	8.14	6.98	1.16	1.02	0.08	0.06

Note: Figures may not add up exactly to their respective totals due to rounding effect.

Fig: 4 – a

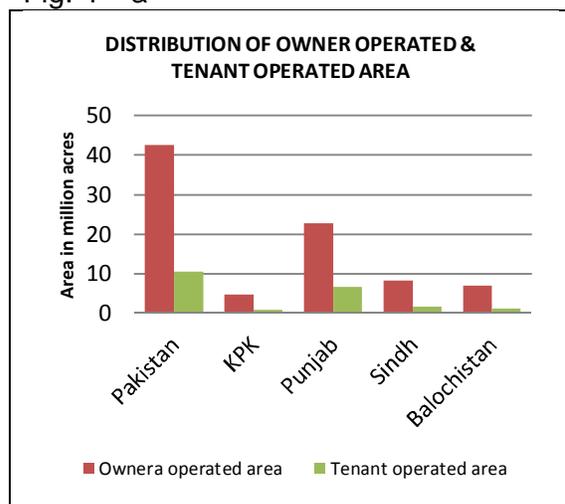
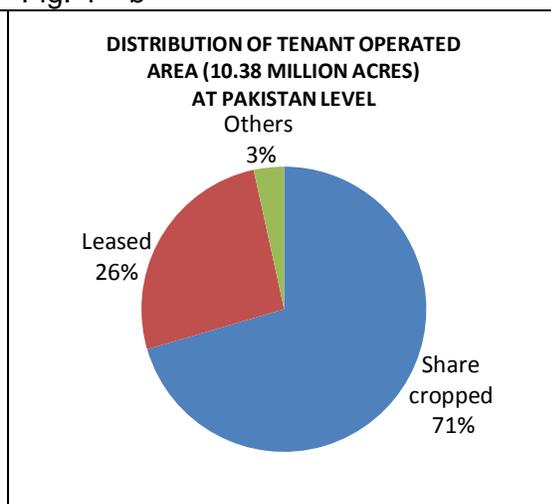


Fig: 4 – b



LAND USE INTENSITY

Land use intensity in the country was 83 per cent on the average. It was highest (93 per cent) in the Punjab and lowest (45 per cent) in Balochistan. It was 86 per cent in Khyber Pakhtunkhwa followed by Sindh being 79 per cent. The intensity of land use was higher for tenant operated farms being 85 per cent while it was 84 per cent for owner farms. Land use intensity was the lowest being 77 per cent for owner-cum-tenant farms.

The intensity of land use by tenure and by province is given in TABLE – 5 and by province in Fig: 5 below:

TABLE – 5 : LAND USE INTENSITY BY TENURE – BY PROVINCE

Administrative Unit	Average Intensity of Land Use (Per cent)			
	All Farms	Owner Farms	Owner - cum-Tenant Farms	Tenant Farms
Pakistan	83	84	77	85
Khyber Pakhtunkhwa	86	90	64	86
Punjab	93	97	84	86
Sindh	79	80	65	86
Balochistan	45	40	49	79

Fig: 5

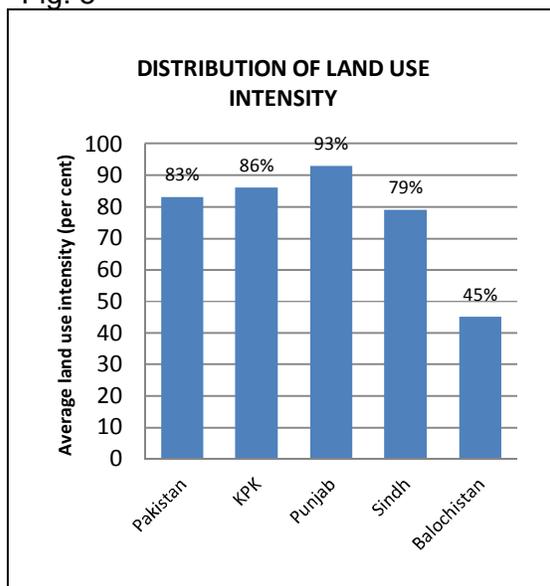
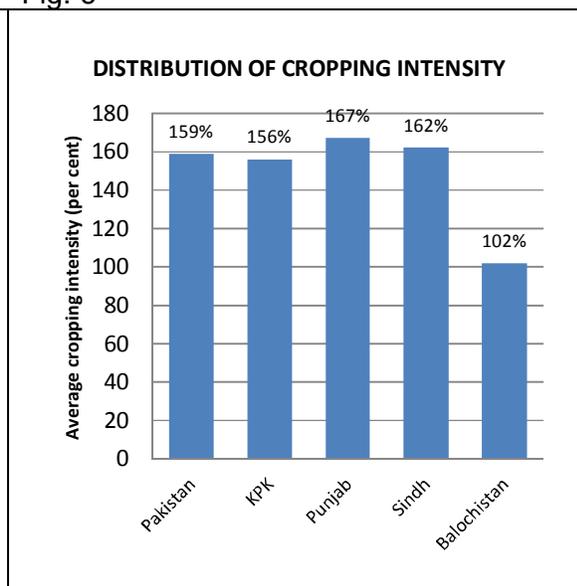


Fig: 6



CROPPING INTENSITY

The overall cropping intensity in the country was 159 per cent. It was the highest in the Punjab being 167 per cent and the lowest in Balochistan being only 102 per cent. Cropping intensity in Sindh was 162 per cent followed by KPK being 156 per cent. The intensity of cropping was 159 per cent for owner farms as well as for owner-cum-tenant farms and 160 per cent for tenant farms.

The intensity of cropping by tenure and by province is given below in TABLE . 6 and by province in Fig: 6 above.

TABLE – 6 : CROPPING INTENSITY BY TENURE – BY PROVINCE

Administrative Unit	Average Intensity of Cropping (Per cent)			
	All Farms	Owner Farms	Owner-cum-Tenant Farms	Tenant Farms
Pakistan	159	159	159	160
Khyber Pakhtunkhwa	156	155	153	165
Punjab	167	167	164	168
Sindh	162	162	156	164
Balochistan	102	98	106	116

CROPPING PATTERN

Of the total cropped area of 67.91 million acres in the country, wheat alone occupied 42 per cent, followed by cotton and rice 14 per cent each, fodder 9 per cent, pulses 5 per cent, maize and sugarcane 4per cent each, jawar / bajra, oilseeds and orchards 2 per cent each. The remaining 4 per cent of the area was reported under other crops.

The cropping pattern as observed in various provinces is given in TABLE . 7 and in fig: 7 below:

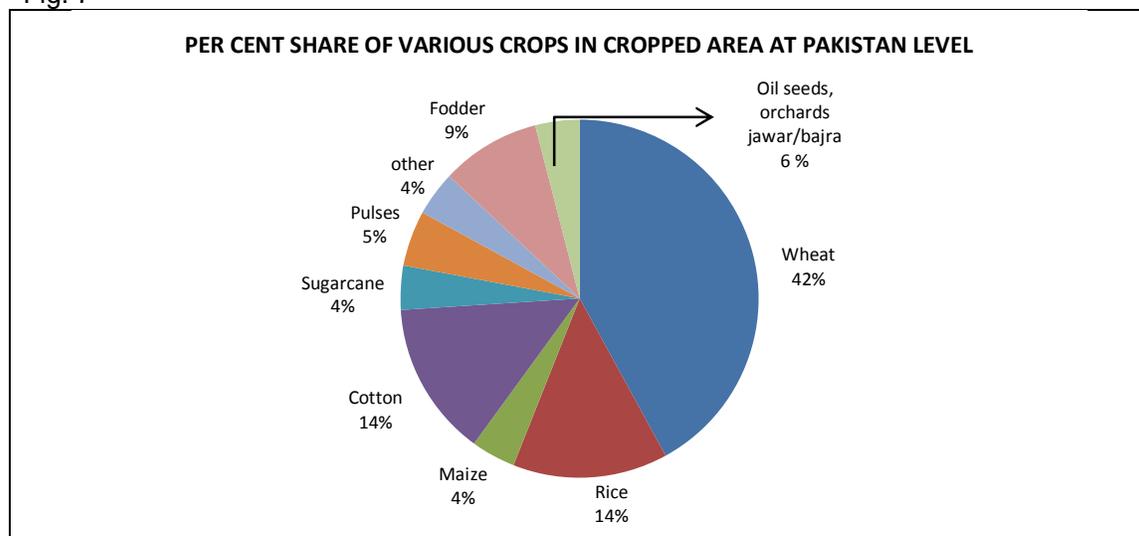
TABLE – 7 : CROPPING PATTERN – BY PROVINCE

Administrative Unit	Per cent Share of Various Crops in Total Cropped Area										
	Wheat	Rice	Maize	Jawar/ Bajra	Cotton	Sugarcane	Oil seeds	Pulses	Orchards	Fodders	Others
Pakistan	42	14	4	2	14	4	2	5	2	9	4
Khyber Pakhtunkhwa	47	3	24	3	*	6	1	5	1	6	6
Punjab	41	14	1	2	15	4	2	6	1	11	2
Sindh	38	20	*	2	20	5	3	1	2	4	5
Balochistan	45	13	2	6	1	*	4	4	10	3	11

Note: 1) Figures may not add up exactly to hundred due to rounding effect.

2) * Percentage less than 0.5.

Fig: 7



AREA UNDER MAJOR CROPS

The area reported under wheat in the country was 28.23 million acres, under rice 9.36 million acres, under cotton 9.23 million acres, under sugarcane 2.63 million acres and under maize 2.39 million acres. This was actual area sown under the crop, unlike harvested area including the area on which crop had failed.

Province-wise distribution of wheat, rice, cotton, sugarcane and maize area is given in TABLE – 8 and in Fig: 8 – a to 8 – e below.

TABLE – 8 : AREA UNDER WHEAT, RICE, COTTON, SUGARCANE AND MAIZE – BY PROVINCE

(Area in Million Acres)

Administrative Unit	Wheat		Rice		Cotton		Sugarcane		Maize	
	Area	Per cent	Area	Per cent	Area	Per cent	Area	Per cent	Area	Per Cent
Pakistan	28.23	100	9.36	100	9.23	100	2.63	100	2.39	100
Khyber Pakhtunkhwa	3.24	11	0.18	2	0.02	*	0.41	16	1.64	68
Punjab	18.68	66	6.26	67	6.63	72	1.59	60	0.64	27
Sindh	4.69	17	2.44	26	2.53	27	0.63	24	0.04	2
Balochistan	1.62	6	0.48	5	0.05	*	*	*	0.07	3

Note: 1) Figures may not add up exactly to their respective totals due to rounding effect.

2) * Represent less than 0.5per cent.

Fig: 8 – a

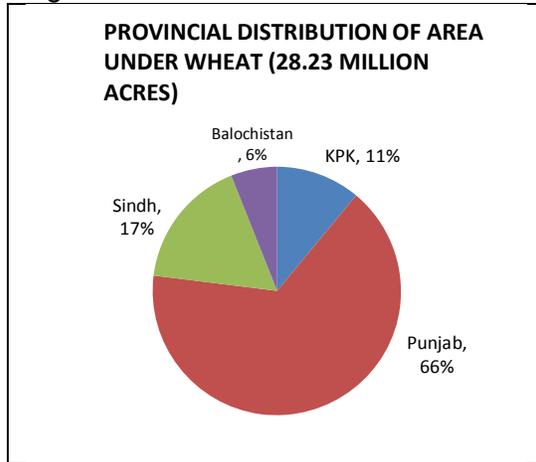


Fig: 8 – b

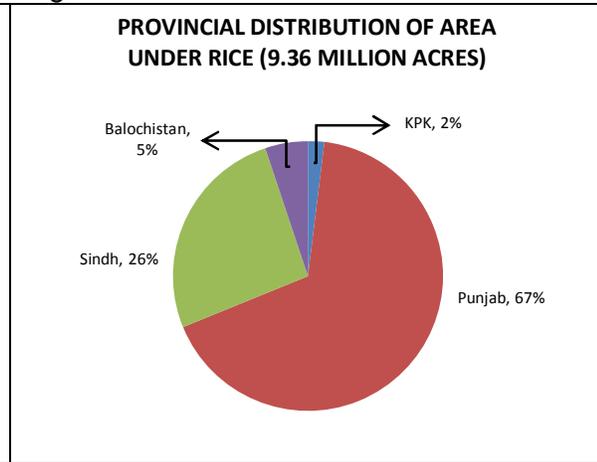


Fig: 8 – c

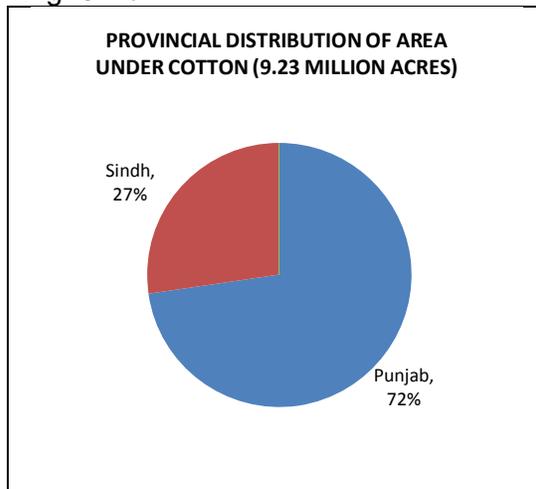


Fig: 8 – d

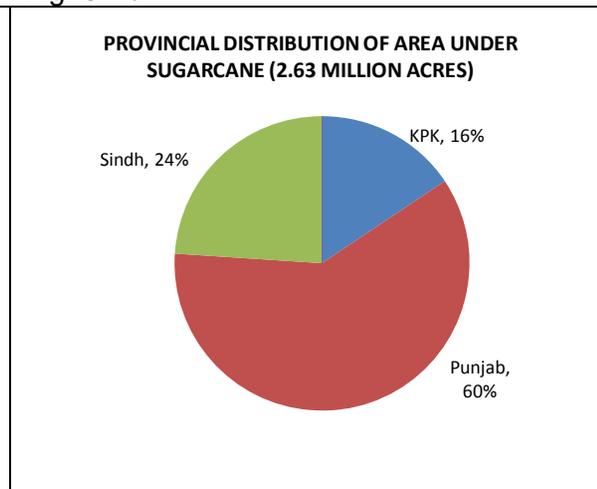
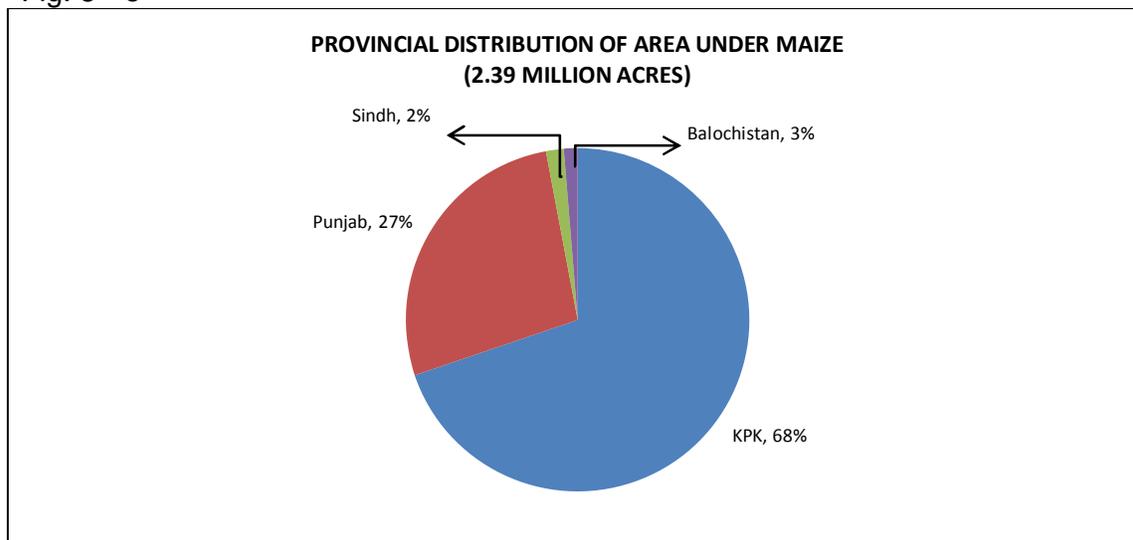


Fig: 8 – e



USE OF FERTILIZERS, MANURES AND INSECTICIDES

Out of a total of 8.26 million farms in the country, 3.35 million farms (41 per cent) reported use of fertilizers only, while another 2.45 million farms (30 per cent) reported use of both fertilizers and manures. The use of manures only had been reported by 0.22 million (3 per cent) farms. The remaining 26 per cent farms had not reported use of fertilizers and or manures.

The use of insecticides had been reported by 2.75 million farms, representing 33 per cent of the total farms in the country.

The use of fertilizers, manures and insecticides in various provinces is given in TABLE – 9 and in Fig: 9 below:

TABLE –9: USE OF FERTILIZERS, MANURES AND INSECTICIDES – BY PROVINCE

(Number in Million)

Administrative Unit	Farms Reporting Use of								
	All Farms	Fertilizers and Manures		Fertilizers Only		Manures Only		Insecticides	
		Number	Per cent of All Farms	Number	Per cent of All Farms	Number	Per cent of All Farms	Number	Per cent of All Farms
Pakistan	8.26	2.45	30	3.35	41	0.22	3	2.75	33
Khyber Pakhtunkhwa	1.54	0.64	42	0.23	15	0.11	7	0.14	9
Punjab	5.25	1.56	30	2.38	45	0.09	2	2.17	41
Sindh	1.11	0.19	17	0.67	60	0.01	1	0.41	37
Balochistan	0.36	0.06	16	0.07	20	0.01	4	0.04	10

Note: Figures may not add up exactly to their respective totals due to rounding effect.

Fig: 9

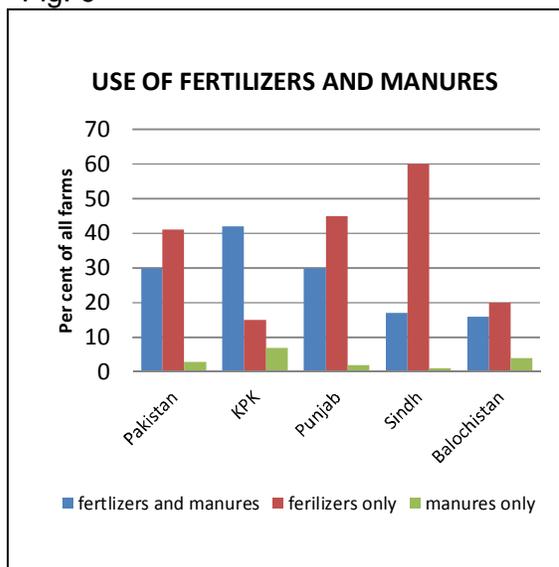
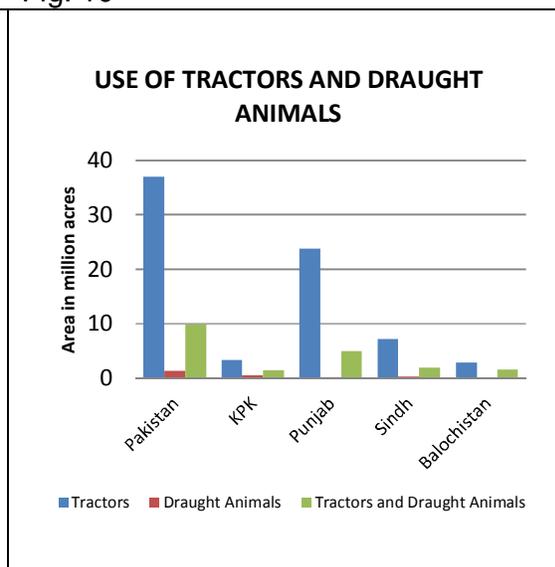


Fig: 10



USE OF TRACTORS AND DRAUGHT ANIMALS

Out of the total, 7.88 million farms (95 per cent) reported cultivated area at their farms at the country level, amongst them 6.04 million farms (77 per cent) had reported use of tractors only for cultivation of land, covering an area of 37 million acres i.e. 77 per cent of total farm area. There were another 1.55 million farms (20 per cent) reporting use of both tractor and animals for cultivation, covering an area of 9.93 million acres (20 per cent). The use of bullocks/other animals for cultivation of land had been reported only by 0.29 million farms (3 per cent), covering an area of 1.28 million acres, i.e. 3 per cent of the total farm area.

The use of tractors and draught animals for cultivation of land in various provinces is given in TABLE –10 below and in Fig: 10 above:

TABLE – 10 : USE OF TRACTORS AND DRAUGHT ANIMALS FOR CULTIVATION OF LAND

(Number in Million and Area in Million Acres)

Administrative Unit	Farms Reporting Cultivated Area		Farms Reporting Use of					
			Tractors		Draught Animals		Tractors and Draught Animals	
	Number	Farm Area	Number	Farm Area	Number	Farm Area	Number	Farm Area
Pakistan	7.88	48.21	6.04	37.00	0.29	1.28	1.55	9.93
Khyber Pakhtunkhwa	1.44	5.25	0.86	3.25	0.18	0.55	0.39	1.45
Punjab	5.10	28.88	4.18	23.67	0.06	0.22	0.86	4.99
Sindh	1.06	9.47	0.82	7.17	0.04	0.36	0.20	1.93
Balochistan	0.28	4.61	0.18	2.90	0.01	0.14	0.09	1.56

Note: Figures may not add up exactly to their respective totals due to rounding effect.

LIVESTOCK POPULATION

The number of cattle in the country had been estimated at 24.11 million, buffaloes at 23.47 million, goats at 45.74 million and sheep at 15.03 million.

Distribution of cattle, buffaloes, goats and sheep among various provinces is given below in TABLE – 11 and in Fig: 11 – a to 11 – e below:

TABLE - 11 CATTLE, BUFFALOES, GOATS AND SHEEP – BY PROVINCE

(Number in Million)

Administrative Unit	Cattle		Buffaloes		Goats		Sheep	
	Number	Per cent						
Pakistan	24.11	100	23.47	100	45.74	100	15.03	100
Khyber Pakhtunkhwa	3.84	16	1.32	6	6.48	14	1.18	8
Punjab	13.20	55	16.02	68	17.39	38	4.94	33
Sindh	5.64	23	5.93	25	12.89	28	2.91	19
Balochistan	1.43	6	0.20	1	8.98	20	5.99	40

Note: 1) Figures may not add up exactly to their respective totals due to rounding effect.

Fig: 11 – a

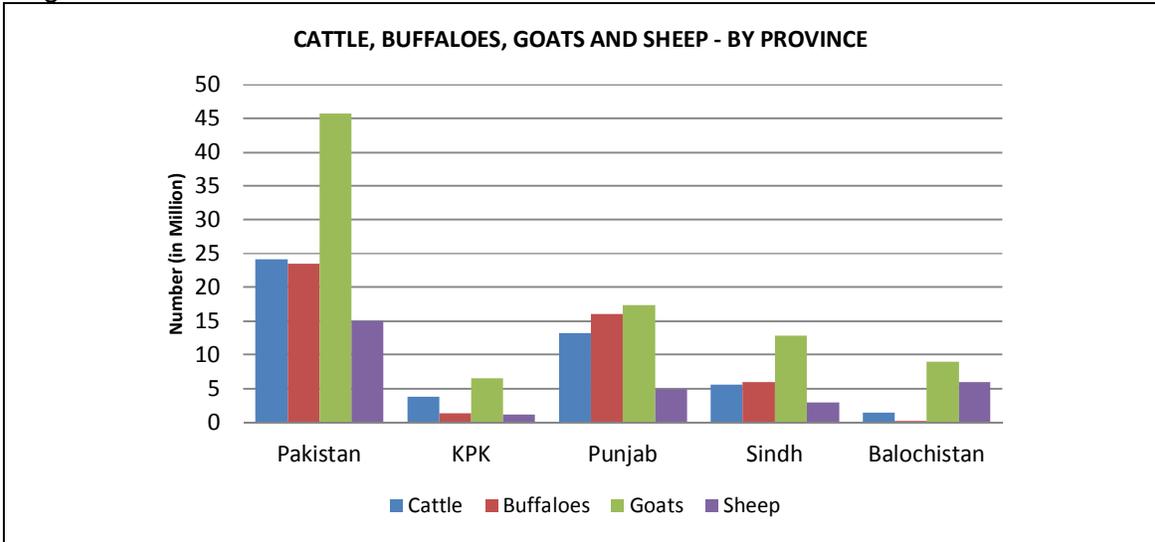


Fig: 11 – b

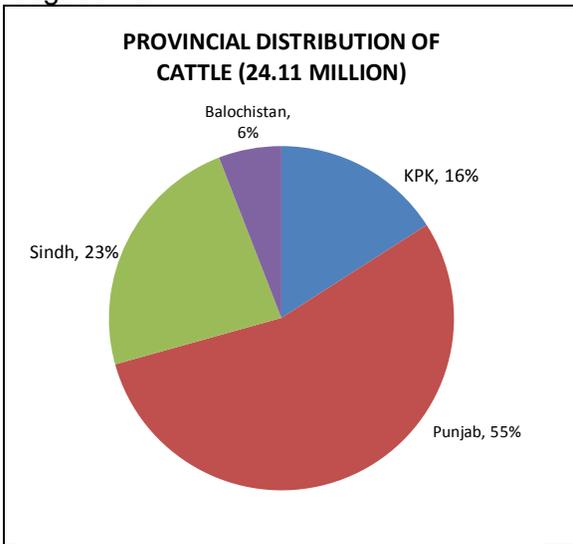


Fig: 11 – c

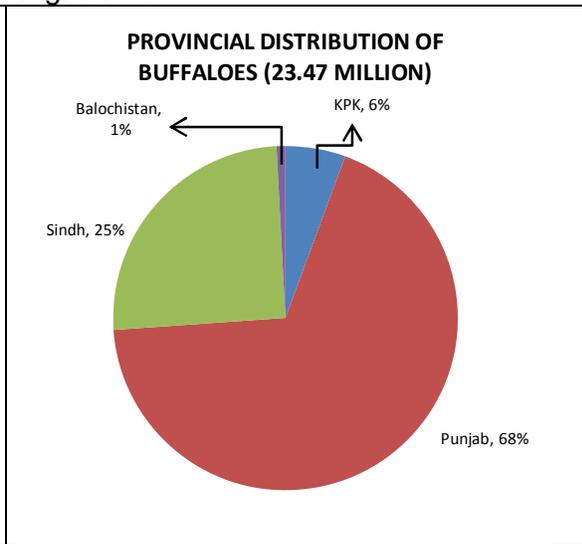


Fig: 11 – d

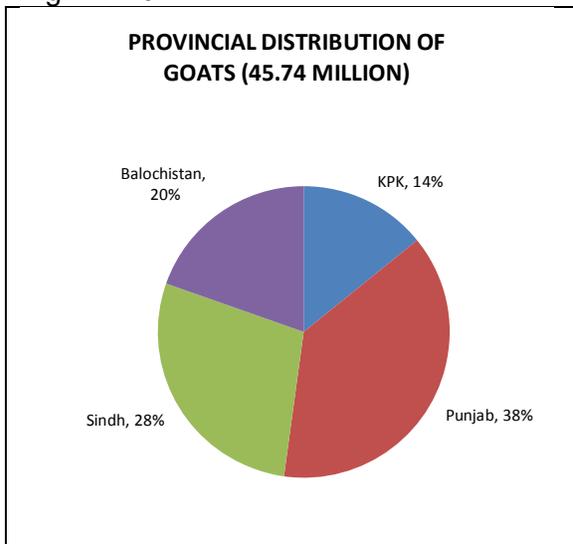
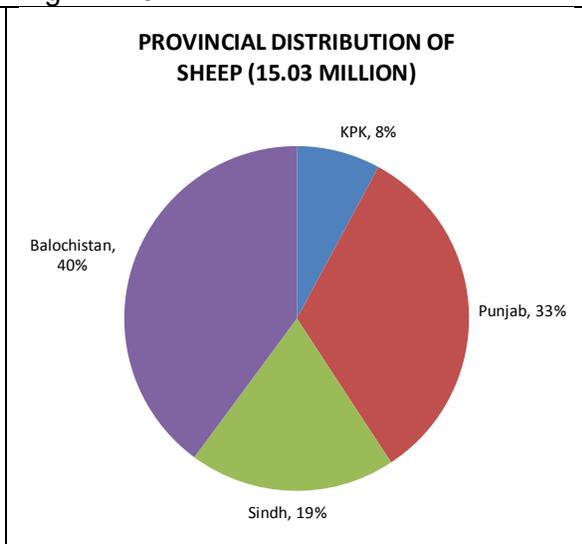


Fig: 11 – e



CAUTION FOR DATA USERS

The data users should be cautious while using the data from tabulations of this report and keep into consideration the below mentioned facts about the data tabulations:

1. The percentages in different columns and rows may not add up to 100, as the components of the same have been rounded separately to whole number.
2. The components of each and every total in a column or row when added up may not be exactly equal to the respective total due to rounding effect.
3. The Agricultural Census 2010 could not be conducted in the agencies of Orakzai, Kurrum, North Waziristan & South Waziristan and FR Central Kurrum due to law & order situation. Therefore, the relevant aggregated estimates have been arrived at and published without data from these agencies and FR.
4. The data on crops / orchards acreage given in this report should be cautiously compared with that of the acreage data given in any other official publication because of the methodological differences.
5. The data have been collected from the selected households as per sampling plan and presented in this report. Therefore, these data may be compared with any other relevant data with caution.
6. As per recommendation of the Advisory Committee of this census, an attempt was made to collect data about Fish Farms as part of the main census excluding fish catch from dams, head works, lakes and other water bodies etc. But the data have not been published in this report due to poor response from the field. However, the master tabulations have been retained by ACO for future reference and guidance.
7. The number of farms includes crop farms, fruit farms (including fruit nurseries) and flower farms (including flower nurseries). However, if fruit nurseries as well as flower nurseries are operated separately as individual farming units, they have been treated as separate farms.
8. The number of Government Farms and the acreage under Government Farms always happened to be very small proportion of the total farms and thus have not been shown in all the concerned tables.
9. In Table 2.4 and 2.5, the data on land sold and purchased during last ten years do not match, probably due to the exclusion of those households who have sold their entire land.
10. Completely uncultivated farms (Table 3.2) are those where any crop has not been sown during the last two years i.e. census year (2009-10) and a year before (2008-09) due to any constraint.
11. The symbol %† in any cell of the table stands for non-existence of data or for not applicable.