Draft

National Food Security Policy

Government of Pakistan
Ministry of National Food Security and Research
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Foreword

Achieving food and nutritional security for its population has remained one of the core underlying objectives of all the policies, programs and strategies of Pakistan since its independence. Under 18th constitutional amendment, the Ministry of Food and Agriculture (MINFA) functions were devolved to provinces on 30th June 2011. However, in view of the importance of attaining and maintaining national food security and better execution of un-devolved functions (24) of MINFA, Ministry of National Food Security and Research (MNFSR) was established by the Government of Pakistan on 26th October, 2011.From the very first day, the need for a comprehensive National Food Security Policy has been strongly felt at MNFSR.

It is a matter of immense pleasure that the Ministry of National Food Security and Research is releasing this first comprehensive food security policy document. Achieving food security and nutrition for its population is a high priority for the Government of Pakistan. A number of important policy initiatives have been taken in this direction, which include concept development of National Zero Hunger Program, food security assessment survey, the recent commitment of the Government for Sustainable Development Goals, particularly to the SDG-1 and 2 about poverty and Zero Hunger Challenges. To document all these initiatives and future strategies in light of SDGs MNSFSR prepared a comprehensive National Food Security Policy.

I strongly believe that any policy or program towards food security can only be successful if it is based on relevant policy measures planned for achieving food security and nutrition goals through sustainable development of agriculture sector. Policy document focuses on enhancing food availability, improving food access, enabling food utilization and ensuring food stability at all levels. This policy is based on series of discussion with stakeholder, policy briefs prepared by MNFSR, projects and proposals developed, new acts and laws, special programmes for addressing food security, food security assessment, and framework developed for expanding agricultural production base.

I would like to congratulate the Secretary MNFSR and his team involved in the preparation of this comprehensive document. I also appreciate the valuable contribution from Mr. Seerat Asghar (Former Secretary MNFS&R) for laying a strong foundation for this food security policy document. I would also express my sincere thanks to various federal government institutions like Ministry of Planning, Development and Reforms, Pakistan Agricultural Research Council, National Agricultural Research Centre, Agricultural Policy Institute; international organizations like FAO, ICIMOD,WFP;and provincial governments for providing valuable inputs in finalizing this document.

I hope that this policy shall contribute in addressing the challenges of achieving food and nutritional security in Pakistan.

Sikandar Hayat Khan Bosan
Federal Minister
Ministry of National Food Security and Research

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This policy document has been the outcome of the continuous efforts of more than3 years. This policy could not attain this shape without the support received from Mr. Sikandar Hayat Khan Bosan, Federal Minister for National Food Security and Research. Different national and international organizations contributed in form of valuable suggestions in the formulation of national food security policy. These organizations included FAO, ICIMOD and WFP. Dr. Daud Ahmad Khan from FAO and Dr. Abid from ICIMOD contributed a lot in conceptualizing policy framework. Ex. Chairman PARC Dr. Iftikhar Ahmad (Late) persistently was a great motivational force behind policy formulation.

Dr. Nadeem Amjad, Ex-Chairman, PARC; Dr. Muhammad Hashim Popalzai, Additional Secretary, Ministry of National Food Security and Research; Dr. Muhammad Aslam Gill, Dr. Shakeel Ahmad Khan and Dr. Waseem-ul-Hassan, Food Security Commissioners MNFSR; and Dr. Qurban Ali, Livestock Commissioner provided their valuable comments to improve the policy draft during its review process at MNFSR. Dr. Muhammad Azeem Khan, Director General, NARC headed a team of social scientists namely Mr. Hassnain Shah, Dr. Muhammad Qasim and Dr. Abid Hussain from SSRI, NARC for the preparation of this policy document. The secretarial support rendered by Mr. Qamar Bin Yameen from MNFSR is also acknowledged.

It is expected that the policy implementation will help in the promotion of value added food production while creating a new class of agricultural entrepreneurs. As a result the availability of diversified food products will increase that will help to improve the economic access of food to the socially deprived communities living in marginal and remote areas.

Finally, I am confident that the food security situation will improve by the implementation of these policy reforms. This policy document will be used to provide guidelines for formulating future strategies regarding the research and development activities for improving the food security and safety standards in Pakistan.

Muhammad Abid Javed
Federal Secretary
Ministry of National Food Security and Research

Preamble

Pakistan has made significant progress in food production over the last several decades. However, food security has remained a key challenge due to high population growth, rapid urbanization, low purchasing power, high price fluctuations, erratic food production, and inefficient food distribution systems. According to Food Security Assessment Survey (FSA), 2016, 18% of the population in Pakistan is undernourished. To address the challenge of food insecurity, the Government of Pakistan has taken the initiative to formulate a national agriculture and food security policy. Food insecurity in Pakistan is primarily attributable to the limited economic access of the poorest and most vulnerable to food. A key factor limiting access to food, particularly since 2007, is the increase in the prices of essential food items. With the poorest families spending substantial part of their income on food, the price rise has exacerbated under nutrition and vulnerability.

Agricultural growth has not benefited the rural poor in Pakistan to the extent it was expected. Wheat, rice and sugarcane being major food crops are given more attention during previous policies. Despite the consistent increases in the production of these crops, approximately one fourth of the population is undernourished with child wasting and stunting being a major concern. For balanced food intake, there is a need to focus on the production of diverse food, i.e., vegetables, fruits, nuts, oilseed, pulses, and livestock products: which not only contribute around 50% of dietary energy, but also significantly contributes in nutritional food security.

Pakistan is an agrarian country and, hence, agricultural development is a prerequisite for achieving food security. According to Pakistan Economic Survey 2016-17, agriculture contributes 19.5% to Pakistan's GDP, employs 42% of the labour force, constitutes 65% of export earnings, and provides livelihoods to 62% population of the country. The harmonization of non-agricultural activities, such as those related to nutrition, trade, natural resource management, non-farm income opportunities, targeted income support, and other innovative options, with the agriculture sector are also recognized as important steps in achieving food security.

The agriculture sector in Pakistan has been facing a number of major challenges over the last decade. As a result, the performance of this sector has been less than its potential in recent times with low growth of around 3.3% over the last decade. The major factors underlying this underperformance include a slow rate of technological innovation; problems with the quality, quantity, and timeliness of inputs supply; inadequate extension services and technology transfer; limited investment in construction, road maintenance, and market infrastructure; marketing and trade restrictions; pest and livestock disease problems; feed & fodder shortages; limited amounts of credit for agricultural production and processing; and lack of agriculture-specific loan products.

Pakistan also needs to continue to build the resilience of the agriculture sector to climate change risks. Climate change projections indicate that there will be greater variability in the weather with more frequent extreme events such as floods and droughts. Much of the impact of these changes will be on the agriculture sector, which needs mechanisms to cope and adapt. It is further projected that there will be immense pressure on limited surface as well as ground water resources. These challenges could be managed through adopting soil and water conservation technologies, enhanced use of high efficiency irrigation systems, developing drought resistant varieties, and introducing climate smart agriculture.

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Food Security Policy

1. Vision

A Food Secure Pakistan

2. Mission

To ensure modern and efficient food production and distribution system that can best contribute towards food security[1] and nutrition, in terms of availability, access, utilization and stability

3. Goals

More specifically food security policy aims to:

i. Achieve agriculture growth at the rate of 4% per annum to improve food security and economic development
ii. Develop innovations for improving food systems for producing nutritious and healthy food
iii. Initiate special programs for reducing poverty and hunger (zero hunger, kitchen gardening, rural poultry and other enterprises) as per government's commitment towards SDGs.
iv. Bridge the yields gaps and ensure farm profitability for sustainability of agriculture sector
v. Augment existing water resource base by promoting efficient use through applying alternate sources of energy
vi. Develop climate smart agriculture while focusing on the use of bio-technology, resources conservation and harmonious production packages
vii. Develop hybrid seeds of vegetables, oil seeds, food grain and fodder crops
viii. Harvest untapped potential of high value agriculture in Rod-Kohi, FATA, Gilgit-Baltistan/ Chitral, Balochistan, AJK, Potohar, Thar, Nara and Kohistan through rain-water harvesting technologies
ix. Provide incentives for food processing/value addition at farm level through cluster approach under public private partnership arrangements
x. Disseminate bio-remediation technology for safe food production in peri-urban areas
xi. Enhance institutional infrastructure for developing a cadre of agriculture service providers
xii. Control and eradicate the livestock diseases of trade (trans-boundary) and economic importance, and fully exploit the production potential of indigenous breeds
xiii. Develop efficient farm mechanization and processing technologies to reduce cost of production, enhance timeliness of operations and add value to crops at farm level.
xiv. Facilitate to enhance food and horticulture exports by up to 10-20 percent
xv. Exploit the potential of aquaculture and enhance overall fish exports
xvi. Legislate agricultural and food safety regulatory laws, and establish credible regulatory trade regime for food products

[1] Food security is a situation that exists "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (as defined in the World Food Summit Declaration 1996). Food security has four main determinants, i.e., food availability, food accessibility, food utilization, and food stability, which are simultaneously improved to ensure adequate nourishment and nutrition for all segments of the population.

xvii. Restructure NARS for improving coordination and linkages in shortest possible time
xviii. Facilitate provinces in agricultural policy formulation
xix. Facilitate to enhance food storage capacity at federal and provincial level
xx. To develop land use policy planning to control the conversion of productive agriculture land into towns and cities

4. Major Challenges to Food Security and Agriculture

i. Less focus on dietary diversity, nutrition and healthy food
ii. Low level of affordability for nutritious food by the poor segments of the society
iii. Problems with the quality, quantity, and timing of supply of agricultural inputs
iv. Lack of infrastructure and technologies for post-harvest management and value addition
v. Slow rate of diffusion of technological innovations
vi. Low farm gate prices, high price fluctuations and declining international prices
vii. Inadequate market infrastructure and trade restrictions
viii. Degradation of natural resources (land, water, rangelands, pastures, and forests)
ix. Un-capitalized potential of mountain agro-ecological zones
x. Climate change effects on agriculture and livestock
xi. Low priority to mainstreaming women contribution in value added agriculture and family nutrition
xii. Inadequate non-farm income opportunities, particularly in the marginalized and remote areas (i.e., mountains and deserts)
xiii. Lack of innovative livelihood practices, i.e., medicinal plants, fisheries, bee-keeping, local food products, seed production, rural poultry, and fruit orchard nurseries etc.
xiv. Low per unit animal productivity and endemic livestock diseases
xv. Inefficient utilization of land and water resources
xvi. Lack of qualified human resources for food security and food systems analysis
xvii. Placement of non-qualified persons in food departments
xviii. Pakistan's status as low riparian state in the semi-arid region.

4.1 Investment Challenges

i. Abysmally low public sector investment in Pakistan's agricultural R&D compared to other countries of the region[2]
ii. Low investments on agriculture R&D in comparison to other countries
iii. Lack of enabling environment for foreign and private sector investments in agriculture R&D
iv. Lack of modern infrastructure for the development of nutritious food products and qualified human resources in food sciences.

4.2 Research Challenges

i. National Agricultural Research Systems (NARS) limitations to address and achieve the complex research goals of modern agriculture
ii. Weak coordination in research and technology dissemination

[2]Pakistan spends 0.18% of agricultural GDP compared to Nepal as 0.28%, Sri Lanka as 0.34%, Bangladesh as 0.37%, India as 0.30% and China as 0.62%.

iii. Lack of qualified and trained human resource for research
iv. Inadequate demand driven research
v. Inadequate research infrastructure

5. Strategic Framework

Feeding the ever growing population in the country means harnessing the food and agriculture system more effectively towards sustainable agriculture development imperatives. Agricultural development cannot be called sustainable unless it improves Food Security and Nutrition (FSN). Agriculture and agricultural systems of Pakistan are continuously evolving and adjusting to meet the increasing demand for food and changes in nutrition and diet habits. Pakistan's agriculture has a potential to grow at the rate of 7%, provided that a comprehensive programme for the development of all the sub-sectors is implemented. Following will be the guiding principles of strategic framework of the food security policy:

i. Developing close partnership with the Provincial Governments, entrepreneurs, research scientists, investors, exporters, importers, academia, progressive farmers and civil society for achieving FSN.
ii. Periodical deliberations of National Food Security Council (NFSC) on the issues of agricultural development and food security. The NFSC will provide the requisite patronage to agriculture sector at the highest level to achieve the synonymous goals of food and the national security of the country.
iii. Shifting the current emphasis of the public sector policies from a few strategically important crops such as wheat, rice, sugarcane and cotton towards other aspects of agriculture and rural development such as: a) raising incomes and employment through developing business clusters in potential production zones including CPEC; b) the efficient use of natural resources such as water, land, rangelands, pasture and forests; c) safe food production for better environment and climate change compatibility; and d) equity including how to empower women and vulnerable groups such as share croppers, tenants, the landless, trans-humants, and marginalized communities from highly fragile areas such as mountains and deserts.
iv. Reducing the cost of production of agriculture through enhancing the farm level supply of certified seed, quality fertilizers and pesticides, access to institutional credit, and appropriate farm machinery.
v. Diversifying the food systems for better diets and nutrition through developing innovations targeting household food diversity specially focusing on implementing zero hunger program.
vi. Improving market support for achieving the goals of fair prices to both consumers and producers, and value chain development for better food availability and access.
vii. Putting Pakistan on a high trajectory of development while exploiting unutilized trade potential lying in all sub-sectors of agriculture viz: horticulture (fruits, vegetables and floriculture), livestock, dairy development, poultry and fisheries

The principles of strategic framework can only be implemented effectively if the needed investments in agricultural R&D are made on sustainable basis.

6. Policy Imperatives

Pakistan is a highly diversified country, having 12 agro-ecological zones, where more than 35 types of crop and livestock mixed farming systems are practiced. Policies of the successive governments to achieve self-sufficiency in food grains (wheat and rice) and sugar have been implemented

successfully. As a result, surpluses in wheat, rice and sugar are produced in the country since last six years. The high cost of production, large international stock build-up and reduced international prices make it almost impossible for the Pakistani farmers to compete in the international markets. FAO "Food Outlook" report further indicates that prices in the international markets will remain depressed during coming years. Foregoing in view, Pakistan would need to take measures to introduce changes in its production systems. For instance, area under rice and sugarcane crops will have to be reduced for the cultivation of other high value crops, such as oilseed, pulses, soybean, horticulture crops and fodder. It is imperative to address the exploitative market practices as well as lack of storage and value-addition facilities, which are mainly responsible for the poverty in the rural areas. It is a fact that every inch of Pakistan's land can be productively used to contribute to the prosperity of the rural population of Pakistan. The lands in Thar, Cholistan and Nurpur Thal, coastal belt, FATA, can be cultivated and used for innovative agriculture purposes. The following sections focus on achieving four pillars of food security including; availability, accessibility, utilization and stability while highlighting key issues and suggesting policy interventions.

6.1 Food Availability

Food availability is an amount of food that is present in a country or area through all forms of domestic production, imports, food stocks and food aid. Agriculture sector is mainstay to food availability in the country. The following section emphasize to enhance production of diversified food to improve nutrition level of the people, and suggest policy measures to increase productivity of crops by ameliorating supply of essential inputs; seed, fertilizers, pesticides and credit. Moreover, means to enhance irrigation water availability and use, as well as prospects of agricultural mechanization are also elaborated. At the end of this section, policies essentials to increase production of livestock, fisheries and poultry are highlighted.

6.1.1 Diversification for Income and Nutrition

The demand for diversified food has been continuously increasing due to urbanization, rising incomes and purchasing powers. The consumers are increasingly demanding diversified food of high quality including fruits, vegetable and livestock products. However, per capita consumption of high value products like beef, chicken, fish, milk, vegetables and fruits is almost 6-10 times lower than developed countries. Diets of the people are also deficient in essential micronutrients (40-80%) like iron, calcium, vitamin-A etc. Large quantities of imported edible oil, dry milk, pulses, and other processed food products are consumed. The food import bill of Pakistan is around US$ 4 billion. Import of edible oil is of US$ 2.7 billion which is 67 percent of the total import bill of food items. Hence, there is an opportunity to shift agricultural production focus from conventional crops to pulses & oilseeds, fruits & vegetables, rural poultry, livestock, fish, and value added products. Moreover, the replacement of illegal crops cultivation like poppy in FATA, Balochistan and other areas required to be targeted through promoting relevant policies and programmes. Diversification in agriculture is needed as a necessity to revive rural economy as well as to reduce dependence of growers on few commodities.

Policy measures:

i. Increasing productivity of major crops for diverting saved natural resources for the production of other high value crops.
ii. Promotion of cultivation and utilization of pulses and oilseeds as alternate crops for import substitution
iii. Provision of indicative prices for sustainable production

iv. Contractual production linkages of alternative crops with private sector food chains and public sector food departments including utility stores and CSDs
v. Introduction of new species of high value fruit crops like olive, pistachio, almond, kiwi, grapes and dates
vi. Development of new fortified cultivars of crops rich in micronutrients
vii. Patronization and certification of potential private livestock breeding farms for high milk and meat productivity gains
viii. Introduction of improved rural poultry, kitchen gardening, fish farming and medicinal herbs cultivation for food diversity and livelihood improvement
ix. Development of processing clusters of high value crops, livestock and fisheries for producing diverse high value products to reduce post-harvest losses, increase availability during off-seasons and to promote rural businesses
x. Supporting Ministry of Interior and Narcotics Control in the promotion of alternate agriculture along with market incentive to sustainably eradicate cultivation of illegal crops like poppy.

6.1.2 Agricultural Inputs

The development and progress of a sustainable agriculture sector greatly depends on supply of timely and quality key farm inputs like seed, fertilizers, credit, pesticides on affordable prices. These inputs play a vital role in ensuring enhanced farm productivity and profitability. In Pakistan smallholders are the largest investors in agriculture. Their system of production is both complex and dynamic. The high level of risks and the modest means available imply that unpredictable expenditures can trigger an impoverishment spiral. Second, when products are sold, there is pressure to first feed the family and repay loans or debts. Thus the marketable surplus is reduced, cash incomes remain low and, consequently, investments through cash expenditures become difficult. Therefore, a framework and strategy will be developed to ensure supply of quality farm inputs under a transparent and effective regulatory arrangement in collaboration with relevant federal departments and provincial governments.

a) Seed

Seed is a vital input for crop production upon which, the efficiency of other agricultural inputs greatly depends. The supply of certified seed in the country is limited to only few major crops like wheat, rice and cotton; whereas, the availability of certified seed is almost non-existing for minor crops like fodder, pulses, and vegetables. The supply of certified and true to type nursery plants is also lacking for all fruits produced all over the country. Hybrid seed of maize, vegetables, oilseeds and fodders remained on the import list. As a policy, a modern seed sector is aimed at not only to meet domestic needs of seed but also harness opportunities for export to regional and international markets.

The Seed Act, 1976 and the Seed Act, 2015 has provided the requisite legislative support to establish a modern seed industry in the country. Rules have also been notified. The plant breeder rights bill is also in the final approval stages. The next focus will be to implement the seed act and Plant Breeder Rights (PBR) bill in true letter and spirit for achieving modern seed system development goals in collaboration with provincial partners.

Policy measures:

i. Strengthening and Restructuring of Federal Seed Certification and Registration Department
ii. Facilitation in creation of Seed Corporation in Khyber Pakhtunkhwa and Balochistan provinces

iii. Strengthening of Punjab and Sindh Seed Corporations
iv. Establishing Foundation Seed Cells (FSCs) at major research institutes
v. Strengthening of research facilities for the development of hybrids of potential crops
vi. Up-scaling of Fruit Plant Certification Programme
vii. Establishing Seed Technology Research and Training Institute
viii. Implementation of PBR with the requisite institutional arrangements in collaboration with provinces
ix. Development of requisite legislative and regulatory support system for development of modern seed industry

b) Fertilizers

Soils of Pakistan are low in organic matter and extremely deficit in macro and micro soil nutrients. The pH level of our soils is also very high. Hence the reliance on the use of synthetic fertilizers has tremendously increased. However, during the last five years, the fertilizer use has decreased due to higher prices. This has significantly contributed in increasing cost of production of crops. The farming community is continuously demanding for bringing fertilizer prices down to enhance its affordability. Key challenges to the fertilizer sector are: a) a high tax regime on fertilizers; b) absence of a transparent and effective mechanism for ensuring transfer of subsidy to the farmers; c) lack of proper flow of information regarding application of fertilizers; d) un-even distribution of fertilizers in various regions (marginal/remote areas); e) inadequate/limited designated fertilizer testing laboratories in the provinces; and f) ineffective implementation of Provincial Fertilizer Control Acts.

Policy measures:

i. Coordination towards ensuring the availability of fertilizers at affordable prices
ii. Establishing and strengthening soil fertility laboratories by provinces
iii. Establishing accredited fertilizers testing laboratories by provinces
iv. Promoting the production of compost as organic fertilizer
v. Introduction of innovative technologies for efficient use of fertilizers
vi. Up scaling production and use of bio-fertilizers

c) Pesticide

Initially, pesticides import was carried out by the Federal government and distributed among farmers through the provincial agricultural departments. In 1980s, the pesticide business was transferred to private sector which led to increase in crop productivity and exponential growth in the use of pesticides. The indiscriminate use of pesticides resulted into serious problem of pest resistance and chemical residues in various agricultural commodities, and contamination of ground water and environmental pollution. The quality of pesticide also compromised that affected productivity as well as polluted environment. Efforts will be made for improvement of regulatory support system for pesticide import and distribution at federal and provincial level. Key challenges to the pesticide sector are: a) severe shortage of human resource in DPP for various types of registrations to ensure import as per prescribed standards/quality; b) non-existence of independent accredited lab for handling pesticide import; c) removal of GST on pesticide import; d) limited technical capacity and infrastructure (ICT , building, equipment etc); e) Inadequate legal support system within DPP; f) lack of disposal mechanism for obsolete pesticides; g) abolishing existing pre-shipment inspection (PSI) rules; h) lack of well-equipped laboratories for monitoring pesticide quality, residual activity; i) lack of pest warning and quality control department in KP, Balochistan and Sindh provinces; j) high amounts of pesticide residues beyond maximum residual limits in food

supply chain especially in fruits and vegetables and k) less focus on biological control of pests and diseases.

Policy measures:

i. Strengthening and restructuring of pesticide import and registration sections in Department of Plant Protection (DPP)
ii. Develop legal support system within DPP
iii. Establishment of pesticide analytical labs at Divisional level by provinces
iv. Facilitation in development of incineration facility for disposal of hazardous wastes and obsolete pesticides
v. Facilitation to institutionalize Farmer Field School (FFS) led Integrated Pest Management (IPM) approach in the research and extension system of Pakistan
vi. Local manufacturing of certified bio pesticides for conserving biodiversity and environments
vii. Mass scale rearing of predators through establishing lab infrastructure in public and private sector
viii. Awareness raising for safe use of pesticide
ix. Curtailing the indiscriminate use of pesticides in order to ensure that food complies with safety standards of Codex Alimentarious Commission of FAO/WHO

d) Improving Credit Market

Growth in the demand for agricultural credit in Pakistan has always been higher than the institutional credit actually disbursed. As a result majority of the farmers are compelled to avail credit from informal sources at a very high cost. The target set for institutional credit disbursement was enhanced upto Rs. 700 billion during 2016-17 against the total credit needs of Rs 1016 billion. Role of public sector Zarai Traqiati Bank Limited (ZTBL) in credit disbursement has been reduced from 56% in 2001-02 to 19% in 2015 due to the increased participation of commercial banks. Growth in the number of borrowers is increasing at far less rate than the amount of credit being disbursed annually. Disbursement of right amount of credit at the right time has also been a challenge. Access to soft credit is also a pre-requisite for the successful implementation of supply chain oriented rural businesses development policies. The key issues in credit market are: a) high transaction costs of lending to small farmers, b) high interest rate, c) small loan size, d) cumbersome lending procedures, e) lack of collateral, f) unsuitable lending products particularly for small farmers.

Policy Measures:

Ministry of Food Security and Research will facilitate credit institutions in the:

i. Assessment of regions pecific innovative financial products for strengthening rural businesses
ii. Establishment of requisite linkages for the pilot testing of smallholder specific products
iii. Extending outreach of credit among the participating communities on the recommendation of NARS establishments all over the country
iv. Development of a model of value chain financing on major crop-livestock products
v. Promotion of low cost microfinance among rural populations through one window operation

6.1.3 Land and Water Resources Management

Management of natural resources is a challenge in terms of resources degradation, including soil health, grasslands degradation, ground water depletion and rapid withdrawal of water resources. Due to rapid urbanization, the land use is changing from fertile lands to urbanized areas for

residential and industrial purposes. Rural to urban migration is a main driver of this rural transformation. Water resources are also under stress due to high demand of food by ever growing population. Per capita availability of water has drastically reduced from 5000 m^3 in 1950s to less than 1000 m^3 presently. From a total of 142 million acre feet (MAF) river flows, about 104 MAF is diverted to canals, out of which about 57 MAF reaches the farm head. The canal water is supplemented with groundwater abstraction (50.3 MAF) through more than 1.0 million tube-wells installed in the country making water availability at farm head of about 108 MAF. Another 27 MAF is lost in field application leaving only 81 MAF for crop consumptive use against requirement of 102 MAF. Overuse of tube-well water has resulted into depletion as well as intrusion of saline water in the ground water aquifer. The untapped potential of about 19 MAF generated from hill-torrents (Rod Kohi), if harvested, can bring about 7 million hectare area under cultivation in Balochistan (67%), KP (13%), Punjab (8%), Sindh (8%) and Federally administered areas (4%).

The major challenges of irrigation water availability and use are: a) absence of approved National Water Policy; b)increasing population pressure; c) shrinking water resources (fresh water is finite); d) dwindling land for agriculture; e) inadequate storage and sedimentation of reservoirs; f) high water losses in irrigation system (conveyance and field application); g) low water and land productivity; h) untapped rainwater potential especially from hill torrents system; i) limiting/diminishing energy resources (shortage of electricity and high cost of diesel); j)lack of institutional arrangements and regulatory framework for Groundwater management resulting into mining of aquifers k) deterioration of GW quality due to saline water intrusion and l) construction of water reservoirs by India on the rivers allocated to Pakistan under the Indus Water Treaty of 1960.

Policy measures:

i. Assist in formulization of long-term term National Plan aimed at ensuring availability as well as efficient utilization of this scarce resource
ii. Promote solar based pumping systems in shallow water areas like riverine areas, mini dams, ponds, rivers and dug-wells
iii. Persuade to invest in the construction of small and mini dams, water ponds, on farm storage in Rod-Kohi and water harvesting in rain-fed areas
iv. Support replication of successful water conservation technologies/models by the provinces
v. Develop and enforce required legislative and regulatory framework to protect groundwater resources through provincial governments
vi. Protect groundwater through management and technical measures like artificial recharge for threatened aquifers through provincial governments
vii. Promote efficient utilization of land and water resources by adopting appropriate techniques and measures like high efficiency irrigation systems, laser land leveling and watercourse improvement
viii. Develop a knowledge sharing network with regions and other countries to improve water availability
ix. Facilitating the provinces for strengthening the extension services in water management
x. Promoting efficient water distribution according to needs through using remote sensing technology
xi. Promoting cropping pattern with maximum water productivity
xii. Facilitating provinces for land reforms to improve the per capita land availability and improving land distribution.

xiii. Coordination with provisional governments to develop policy and regulatory imperatives for addressing urbanization and rural transformation with specific focus on changes in the use of fertile land
xiv. Sustainable intensification of crop and livestock systems, while conserving water resources and averting degradation of natural resources including arable lands, forest, pastures and rangelands

6.1.4 Agricultural Mechanization

Agricultural mechanization is mainly limited to crop production. The available farm power in Pakistan is estimated as 1.1 kW/ha as opposed to 2.0 kW/ha, 5.7 kW/ha of India and China, respectively. Tractors that are being used in Pakistan are based on the 1960's technology and need improvement in their manufacturing technology through strict regulatory regime. Wheat production in the country stands substantially mechanized. However, production of rice, maize, cotton, sugarcane, vegetables and fruit remain partially mechanized. Wheat and rice harvesting is achieved using imported old combine harvesters. The inefficiency of old combine harvesters result in around 10% grain losses. Farmers have no access to modern machinery such as rice trans-planters, vegetable planters, fruit pickers, potatoes diggers/shakers, orchard pruning equipment etc. There is partial adoption of Green Houses and other advanced techniques of vegetable production. The use of solar energy for high efficiency irrigation system under water stressed environment has a great potential for adoption. The equipment used for farm level value addition is almost non-existent (which result in high post-harvest losses and low level of value addition at community level).

The key constraints in the farm level mechanization are: a) inefficient utilization of tractor horse power; b) slow adoption rate of high efficiency irrigation system; c) low manufacturing focus on small scale value-added machinery and implements to reduce post-harvest losses; d) use of less efficient second-hand combine harvesters; e) lack of machinery for small scale dairy farming; f) lack of standardization for quality of farm implements; and g) non-availability of complete package of machinery at community level.

Policy measures:

i. Reduction in duties and taxes on import of farm machinery
ii. Reduction in GST on sale of farm machinery to enhance farm mechanization
iii. Promotion of Precision Agriculture for profitable production
iv. Incentives for processing and value-addition machinery for reducing post-harvest losses in fruits and vegetables
v. Incentives for import of machinery for hay/silage making, milking, dairy and meat products
vi. Aquaculture mechanization for intensive production, processing and maintaining cold chain
vii. Persuasion for establishment of a "National Center for Testing of Agricultural Machinery (NCTAM)" with regional/provincial satellite institutions under Ministry of Industry and supported by Engineering Development Board
viii. Development of National Network of Agricultural Mechanization to coordinate agricultural mechanization R&D
ix. Promotion of the use of alternate and renewable energy sources at farm level
x. Establishment of machinery pools as farm-services centers by provinces in private sector

6.1.5 Livestock

Livestock is rapidly growing in Pakistan and central to the livelihood of its rural people. The sub-sector plays an important role in national food security & rural economic uplift. Livestock sub-

sector particularly generates daily cash income for the 8.5 million small farmers and landless families. It also provides safety net for poor and self-employment opportunity for women. Pakistan is one of the leading producers of milk with an estimated production of 52.6 million tons annually. The country produces about 3.9 million ton of meat, including 2.01 million ton of beef; 0.69 million ton of mutton and 1.2 million ton poultry meat. The organized large and small dairy and fattening units are few; however, commercial dairy and feedlot fattening operations are emerging in the country.

Despite huge population of 72 million cattle i.e. cows and buffalos, Pakistan imports dry milk and other dairy products. Low productivity per animal and seasonality of milk production are the main root causes behind imports. Ninety percent of the total milk produced enters the marketing channels from subsistence farmers and five percent is processed as dairy pack products. There is a need for decreasing yield gap in milk production through genetic interventions and improved breeding and feeding programmes utilizing local and exotic dairy breeds' potential and maximizing fodder and forage production

Growth in population, urbanization, increase in per capita income and export opportunities are increasing the demand for livestock products. However, development of this subsector is constrained with lesser profits due to low productivity, poor husbandry practices, nutrition and health issues. Key challenges to the livestock sector are: a) Expansion of federal and provincial capacity for livestock sector development; b) Promotion of meat as profitable business for local consumption and exports; c) low capacity of national control programs on highly infectious and economically important animal diseases; d) Inadequate compliance to national and international standards for quality and hygiene; e) Prevalence of zoonotic diseases due to close proximity of human and animals; f) lack of incentives for generation of quality export surpluses; and g) inadequate legal framework for export standards and consumers' trust.

Policy measures:

i. Programmes for improvement of local animal breeds for enhanced milk and meat productivity
ii. Special incentives for the private sector to invest in the dairy production
iii. Promotion of dairy and feedlot fattening through commercial and corporate livestock farming segments
iv. Encourage value added industry for livestock and livestock products with the aim to enter into global Halal food market
v. National Programs for risk based progressive control of trans-boundary animal diseases of trade and economic importance including Foot and Mouth Disease (FMD), and PPR
vi. Improved legal framework addressing legislative gaps, standards, grades, monitoring & enforcement to enhance national and international quality compliance
vii. Encourage provinces for improvement of veterinary health services, disease free zoning and livestock markets
viii. Enhance training opportunities for milk and meat technology to develop a cadre of skilled human resource for modernization of the sector
ix. Up-gradation and capacity building of National Veterinary Laboratory (NVL),National Reference Laboratory for Poultry Diseases (NRLPD), Animal Quarantine Department (AQD), and Livestock and Dairy Development Board (LDDB)
x. Coordination for the implementation of One Health programmes to manage zoonotic diseases for containment and eradication as well as controlling deaths and illnesses.
xi. Strategies to increase fodder area and yield

xii. Animals and animal products export facilitation by developing infrastructure on cold chain and traceability aspects
xiii. Enhancement of duties on import of cheaper dry milk powder in order to protect the local dairy industry
xiv. The price of fresh milk may be fixed to provide incentive to dairy producers

6.1.6 Fisheries

Fishery sub-sector is also one of the most important economic activity supporting livelihoods of a large number of fish farmers and workers. It plays a significant role in the national economy and food security of the country. About 740 thousand metric tons of fish is produced in the country, of which worth of US$ 349 million is exported. The challenges for inland aquaculture are: a)sustainability of the inland fishery resources; b) lack of brackish water aquaculture; c) lack of diversification in species and systems; d) limited number of finfish species in cultivation; e) low productive fish farming system; f) lack of specific feed to popularize intensive farming; g) lack of financial resources for fish farming activities; h) lack of technical knowledge and extension services to fish farmers; i) high input cost; j) and non-existence of fish hatcheries of high value fish/shrimp.

Policy measures:

i. Value chain development for high value fish farming in warm-water areas
ii. Coordination for Trout Farming development in GB and mountainous areas of KP
iii. Promotion of private sector led establishment of service centers for production of inputs, cold chain and auction etc.
iv. Promotion of Shrimp Farming in saline inland and barren coastal areas of Sindh and Balochistan
v. Development of high value intensive aquaculture for different ecologies
vi. Establishment of cold chain across supply line for meeting international trade requirements
vii. Establishment of fish feed production units and fish hatcheries and
viii. Availability of low markup loans for aquaculture sector
ix. Regulatory framework to support exports from aquaculture production

6.1.7 Poultry

Poultry is a dynamic sub-sector contributing 1.3 percent to national GDP, 6.3 percent to agriculture and 11.2 percent to livestock. Pakistan has become the 11th largest poultry producer in the world producing more than 1.02billion poultry birds and around 16 billion eggs annually. The sector is well developed in Pakistan along with efficient regulatory system. The challenges to the poultry sub-sector are: a) high cost of commercial poultry production and fluctuation in market prices of poultry products i.e. live birds, poultry meat and eggs; b) low competitiveness in international market; c) High tax and duties on poultry inputs and products; d) reduced availability of cheap rural poultry products; e) limited research on developing rural poultry breeds; f) poor vaccination coverage for rural poultry; g) poultry diseases and h)negative consumer perception about poultry meat.

Policy measures:

i. Appropriate structure of tax and duties for poultry industry to ensure level playing field vis-à-vis foreign competitors

ii. Promotion of enabling environment for commercial poultry production, lesser duties on imported poultry inputs and processing machinery used in value added industry
iii. Encourage and continue to support measures for small poultry farming segment
iv. Support value addition for poultry products though appropriate incentives
v. Promotion of rural poultry for sustainable food security and livelihood improvement

6.1. 8 Food Losses and Wastage

Food quality loss or waste which refers to the decrease of a quality attributes of food (nutrition, aspect, etc.), linked to the degradation of the product, at all stages of the food chain from harvest to consumption. Food Losses are estimated at about one-third of food produced for human consumption in mass or one quarter as measured in calories. Per capita food losses in Southeast Asia amounts 120-170 kg per capita per year. Food losses impact food security and nutrition by three main ways; first, a reduction of availability of food, second a negative impact on food access, third, a longer-term effect on food security results from the unsustainable use of natural resources on which the future production of food depends.

Post-harvest losses in durables (cereals and pulses) and perishables (fruits and vegetables) are 10 and 22 percent in the country, respectively. The cost of annual harvest and post-harvest losses is estimated around Rs. 228.8 billion for gains, fruits and vegetables only. The losses happened at harvest, threshing, storage and transportation stages. It is estimated that available storage facilities are three time less than the requirements. The main causes of food losses are imbalanced use of inputs, faulty irrigation systems, diseases, insect and fungi damages, inappropriate harvesting practices, excessive supplies, poor grading and packaging, poor handling during transportation and storage etc. Public sector can contribute in R&D for reducing losses and wastage; whereas private sector's role is crucial for the improvement in harvest and post-harvest capacity building.

Policy measures:

i. Improve data collection and knowledge sharing on food losses and wastage
ii. Convene an inclusive process to identify hotspots, causes of losses and waste at different levels, potential solutions and levels of interventions
iii. Improve coordination of policies and strategies among the food system stakeholders
iv. Coordinate to implement a holistic food chain approach, with adequate research and extension services
v. Incentive to invest in infrastructure such as storage and processing facilities, reliable energy supply and transport facilities
vi. Take measures to support smallholders that yield economies of scale and allow them to move towards high value activities in the food supply chain
vii. Supporting to design and introduce procedures to ensure higher corporate accountability standards to monitor reductions in losses in the food processing and retailing sectors
viii. Development of skilled human resources in fruit and vegetable processing sector.
ix. Policy support for the development of advanced Controlled Atmosphere Storage.
x. Greater emphasis on post harvest research and technology.
xi. Consumer awareness on improved techniques for the household level storage

6.2Food Accessibility

The food insecurity situation today also revealed that people are hungry not because there is not enough food overall in the world, but because they cannot afford food or do not have means to produce enough food. It is a Household's ability to acquire adequate amount of food regularly through a combination of produce, barter, borrowings, food assistance or gifts. Furthermore, it also

relates with food distributions within household and gender that ultimately matters. In this section public sector programmes to control hunger through food assistance, market support of small farmers and development of economic zones along with China-Pakistan Economic Corridor (CPEC) have been discussed.

6.2.1 National Zero Hunger Programme

The government of Pakistan has expressed its strong commitment for the realization of Sustainable Development Goals (SDGs) as a national agenda, both at Federal and Provincial levels. Within this framework the achievement of zero hunger is emphasized as a top priority for Pakistan, with the commitment to pursue the goal of "ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture". The important components of zero hunger program are: i) Home Grown School Feeding; ii) Family Farmers Support program; iii) Income Generation Support Program; and iv) Nutrition Support Program.

The ministry of NFS&R has planned to start National Zero Hunger Programme. The focus will be to achieve goals like sustainable food production, improved food distribution, better nutrition and livelihood diversification. The programme will be developed and implemented in collaboration with Ministry of Planning Development and Reforms, Ministry of Finance, Ministry of Health and Services, Utility Stores Corporation, Pakistan Baitul Mall, Ministry of Education, Benazir Income Support Programme, Pakistan Agricultural Research Council (PARC), and Pakistan Agricultural Storage and Services Corporation (PASSCO). The international development partners will include United Nations Food and Agricultural Organization (FAO), United Nations World Food Programme (WFP), United Nations Children and Education Fund (UNICEF), World Health Organization (WHO), United Nations Entity for Gender Equality and Empowerment of Women (UN WOMEN) and World Bank.

Policy measures:

i. Reduction of food losses along production and supply chain including post-harvest losses
ii. Establish one window operation to extend support to family farmers
iii. Benefit cards to meet cost of inputs
iv. School feeding programmes in most food insecure districts
v. Cash transfers to the most food insecure households
vi. Zero hunger shops in low income areas of major cities of Pakistan
vii. Nutrition programme for children under 5 years of age, and pregnant and lactating mothers
viii. Food and nutrition education and awareness campaigns
ix. Provision of food subsidy on wheat flour and its transportation to the poor people of far flung areas

6.2.2CPEC Agricultural Development Zones

China is second largest importer in the world with imports of 1966 billion USD. Pakistan's share in Chinese imports is only 2.93 billion USD. China-Pak economic corridor (CPEC) has provided an opportunity to increase trade on the principles of complementary advantages and mutual benefits. The key areas for agricultural economic and technical cooperation between China and Pakistan will be determined by fully considering the comparative advantage and cooperation needs. There will be an opportunity to produce high-tech value added agricultural products at international standards for different potential markets. The commodities that can be potentially exported to China include cereals, dairy, eggs, honey, live animals, tobacco, meat, sea food, fruits and nuts. The model is based on developing business clusters for more than 40 commodities identified across the corridor for promoting rural businesses through developing entrepreneurship, processing zones, skilled

manpower and modern market infrastructure. The corridor crosses through the nine agro-ecologies. On the basis of these agro-ecologies, the corridor is divided into 9 sections, each of which possesses distinct opportunities for establishing diverse agro-based businesses. Overall the establishment of agricultural economic zones along CPEC in collaboration with Chinese counterparts can help to achieve: a) food sovereignty; b) benefitting farmers and rural communities; c) smarter food production and yields; d) biodiversity conservation; e) sustainable soil health and cleaner water; f) ecological pest management; and g) resilient food systems.

Policy measures:

The following measures will be taken in collaboration with Chinese R&D and private sector partners;

i. Preparation of feasibility reports of tradable commodities for each sub zone
ii. Pilot testing of rural businesses for the identified commodities
iii. Capacity building of rural entrepreneurs and agricultural service providers
iv. Introduction of innovations for quality production, post-harvest handling and processing
v. Developing investment portfolios for public-private partnerships to promote rural businesses
vi. Modern production and market infrastructure development for grain and fruit crops, fisheries, livestock and livestock products
vii. Development of business models to promote value added agriculture all along CPEC route.

6.2.3Market Support

Markets play a key role in the transfer of products from farms to consumers. The markets in Pakistan have poor standards, lack basic hygiene and traceability, inconsistent grading practices and inefficient transportation services. Smallholders are mostly isolated from markets and are dependent upon middlemen to harvest and sell their produce, and as a result are often exploited. The consumers also suffer in terms of paying higher prices, which affects their purchasing power and have negative implications on household food security. The key issues of markets are: a) lack of market intelligence and knowledge; b) lack of access to cold storage; c) inadequate road infrastructure which leads to high post-harvest losses; d) poor packaging materials; e) lack of smallholder access to high end markets; and f) lack of value addition in agro based products

Policy measures:

The ministry will facilitate provinces in:

i. Improving market intelligence for informed decision making
ii. Market regulations for better transparency and access
iii. Providing policy support for enhancing modern cold storage facilities, post-harvest handling to reduce post-harvest losses and improved quality for exports
iv. Developing standard grading, processing and packaging entrepreneurship
v. Promotion of contract farming in collaboration with private sector
vi. Identification of potential key food products for overseas markets to enhance international market access and putting up enabling environment for exports
vii. Promoting the use of ICTs to transfer market information to producers
viii. Development of modern market concept to be run by farmers and private dealers
ix. Facilitate and promote farmers' marketing system and establishment of e-marketing of food products

6.3 Food Utilization

It is "safe and nutritious food which meets people's dietary needs". The availability and access to food on their own are not enough, people have to be assured of "safe and nutritious food". The food consumed has to provide sufficient energy to enable the consumer to carry out routine physical activities. Utilization also covers factors such as safe drinking water and adequate sanitary facilities to avoid the spread of disease as well as awareness of food preparation and storage procedures. Utilization therefore covers a range of aspects that hinge on the consumer's understanding of what foods to select and how to prepare and store them.

With the passage of time there is increased recognition of human health and well-being risks and benefits associated with the industrialization, intensification and concentration of production and expanded international trade with longer, more complex food supply chains. Food-borne diseases resulting either from biological contamination (pathogens, microbes) or chemicals are significant cause of human health problems related mainly to fresh food products such as animal sourced food products as well as fruits and vegetables. In case of chemicals, such as formalin used to avoid the spoilage of fresh milk, or additives introduced to achieve specific properties such as taste, longer shelf life or appearance. The consumers in urban centers are often unaware of the processes by which their food is produced, pointing to the loss of 'protective factors' in the shift from more traditional diets to these that are emerging today, pointing to loss of nutrients and dietary diversity, including microbial diversity.

6.3.1 Safety of Food and Environment

Healthy food systems and environment are critical for the effective utilization of food by human beings. The irrational use of agrochemicals (fertilizers and pesticides), improper disposal of city waste, sewerage and industrial water are polluting food production systems and environment. A considerable share of vegetables and fodder crops are produced in peri-urban areas by using sewerage water. Future use of GMO crops' production may have certain implications on food systems. Droughts in dry areas, coastal belts, salt ranges and desert ecologies can affect sweet water availability in shallow depths. People from these areas are threatened of malnourishment and scarce clean water availability. The research system has to suggest appropriate policy measure and technologies for promoting good agricultural practices.

Policy measures

i. Reduction in the use of chemicals while promoting bio-fertilizers and bio-pesticides
ii. Promoting resource conservation technologies for healthy and sustainable natural resource use
iii. Promoting the use of bio-remediation for treating sewerage and industrial waste water in collaboration with local governments, towns and city administrations
iv. Facilitating the use of water desalination technology in collaboration with donors and provincial governments
v. Production and promotion of compost from city bio-waste, animal manure and crop residues for organic production of fruits, vegetables and nurseries
vi. Developing institutional capacity to regulate and monitor the food safety aspects of GMO crops
vii. Developing federal and provincial institutional capacity for monitoring the safety of food from pollutants and chemical
viii. Implementing relevant provisions of approved National Environmental Policy 2005 in letter and spirit.
ix. Promoting preventive approach of food safety throughout supply chain of food products instead of corrective approach

x. Establishing infrastructure and effective controls for effective monitoring of imported food commodities on food safety standards

6.4 Food Stability

Stability must be present "at all times" in terms of availability, access and utilization for food security to exist. Stable supply of food in the country can be ensured through quality production of food commodities and their trade. Sustainable agriculture could be achieved by utilization and management of natural resources to maximize the social, economic and environmental benefits. Climate change and management of resulting disasters is also important to maintain supply of food in calamity stricken areas. Immediate dissemination of knowledge continuously generated through research system is required to increase crop and livestock production and stabilize nutrition level of the people overtime.

6.4.1 Quality Production and Trade

Agreement on application of Sanitary and Phyto-Sanitary (SPS) measures describes the Food Safety, and Animal and Plant Health Regulations. All member countries of WTO have to adhere to SPS measures for import and export of quality and safe food products. It allows countries to set standards and make regulations to apply these standards to protect human, animal, and plant life and health. Pakistan has to comprehensively implement Food Safety Laws for provision of safe food to the consumers.

A bill for National Food Safety, and Animal and Plant Health Regulatory Authority has been approved by the Prime Minister of Pakistan with stipulation to have organogram. With approval of the draft bill from the parliament it will become act. This legal framework will improve the implementation of food safety standards in Pakistan in light of the SPS measures.

Policy measures:

i. Guidelines on SPS measures for compliance to international quality standards in relation to import and export of agricultural products.
ii. Formulation of science based technical regulations for the SPS measures.
iii. Administration of all legislative and regulatory acts adopted by the federal government regarding the SPS measures.
iv. Implementation of inspection and quarantine controls regarding food products exports at points of entry and exit
v. Certification of consignments in relation to compliance with the SPS measures.
vi. SPS risk assessments and communication of information regarding risks of SPS hazards to relevant stakeholders and consumers
vii. Co-ordination with Provincial Governments on matters relating to management of SPS risks associated with the production and marketing of agricultural products
viii. Nomination of the accredited testing facilities and laboratories which may undertake testing for official controls relating to the SPS measures
ix. Co-ordinate with international organizations and representing Pakistani interests at international level regarding SPS matters
x. Signing agreements regarding SPS matters for bilateral and multi-lateral co-operation with international organizations
xi. Developing legal and regulatory framework for improved implementation of food safety standards in light of SPS measures

xii. Promoting the food fortification particularly for wheat flour, oil and salt for improving the nutritional status of masses
xiii. Addressing food safety regulations particularly for milk, meat, fruits and vegetables

6.4.2 Climate Change

Increased climate variability and extreme weather events are negatively impacting food stability, food production and livelihoods of the farmers and vulnerable peoples. Threatened ecosystem services are limiting our capacity to achieve sustainable agriculture in the long run. The national average yields of almost all crops are low and productivity is declining over time due to climate change effects. Ongoing breeding programmes are less focused on utilizing climate resilient breeding materials. Reorientation of breeding programmes to develop new cultivars addressing changing climate scenarios across diverse ecologies of Pakistan is a real challenge for national agricultural research system. The current advancement in the field of breeding/genetics, bio-technology, and use of simulation modeling has enhanced the capabilities of researchers to develop climate smart and resilient crops. It requires a well-coordinated institutional arrangement for the development of new cultivars at national level. Collaborative efforts will be made to undertake strategic research involving federal and provincial research systems, and CGIAR organizations. The human resources will be trained to address the new breeding and crop production challenges under emerging climate change regimes.

Policy measures:

i. Impact assessment and optimization of adaptation strategies under climate change scenario
ii. Develop a well-coordinated breeding programme involving national and international research centers
iii. Conduct basic, strategic and anticipatory research in the major thrust areas
iv. Develop climate-smart crop management technologies for diverse ecosystems of the country
v. Evaluating the performance of breeding lines in Target Population of Environments (TPE) and identifying the hot spots for dissemination of suitable varieties
vi. Enhance productivity and profitability while preserving environmental quality
vii. Undertake an adaptation program in order to better deal with climate change impacts
viii. Promoting crop insurance schemes as risk coping strategy particularly in rain-fed areas under public private partnership
ix. Judicious exploitation of bio-diversity and genetic resources for food security and nutrition.

6.4.3 Conflicts and Disaster Management

Conflicts, natural disasters and migration are critical challenges that create emergency situations, which affect food security and nutrition conditions. The regional conflicts, internal displacement of people due to security operations, floods and droughts create such situations. The global analysis of climate change shows adverse impacts on South-Asian economies including Pakistan. The climate-related natural disasters have increased many times in terms of frequency and intensity of extreme climate events, including floods, droughts, cyclones, disease catastrophes, earthquakes and landslides. The climate change impacts on the economy of Pakistan cannot be ignored. To address the disaster management in a holistic manner in changing climate, the government of Pakistan has created the Ministry of Climate Change by renaming Ministry of National Disaster Management in 2011 to deal with the threats posed by global warming and to protect environment in the country. Climate change related disasters are managed through coordinated efforts of several organization

including federal ministries, provincial governments, international NGOs, UN agencies, international donors, and civil society. However MNFS&R has the mandate to develop technologies for appropriately mitigating the impacts of climate change on natural resources and farming communities. There is need to implement all relevant provisions of approved National Climate Change Policy 2012 in letter and spirit. The areas need to be addressed include: a) food for the displaced human population; b) feed for livestock; c) animal health; d) genetic improvements in crop and livestock; and e) preservation of natural resources.

Policy measures:
Pre-Disaster Phase

i. Coordination with National Disaster Management Authority (NDMA)
ii. Prepare emergency preparedness plan on food security, agriculture and livestock sector
iii. Developing agriculture and livestock assessment checklists using remote sensing as a tool for early warning
iv. Developing emergency response plan for crop and livestock extension departments, and farmers in collaboration with provincial governments
v. Identification of food insecure areas of disaster prone districts in collaboration with WFP
vi. Create awareness about livestock feed resources among livestock owners and promote its production in disaster prone districts
vii. Develop guidelines and minimum standards for cattle camps
viii. Prepare an inventory of equipment, vehicles, agriculture inputs, and animal vaccine and medicine suppliers

Emergency Response Phase

i. Designate a representative to the NDMA for coordination
ii. Develop plan for agriculture sector for the early recovery phase after disaster
iii. Conduct initial rapid assessment to assess the crops and livestock losses
iv. Support to provincial livestock department for the provision of fodder, de-worming medicines and vaccines for animals during drought and flood period
v. Assessment of post disaster pest attack on the crop and take effective measures for control
vi. Prepare a detailed report to document the response experiences for future planning
vii. Preparing alternate crop-livestock production plans for the rehabilitation of effected communities.
viii. Collaboration with national and international agencies in food and fodder production in conflict affected and disaster hit areas

6.4.4 Knowledge and Technology Dissemination

Information and education are critical for the policy makers, farmers and consumers to make appropriate policy, adopt improved farming practices and consume balanced diets. The research system is continuously generating new technologies for increasing crop and livestock production for domestic consumption and exports. The information flow on technologies and nutrition is inadequate both for producers and consumers. The climate change has further highlighted the importance of use of IT based information sharing for quick adjustments in the production plans. The global food stock and trade situation updates are frequently needed to help farmers in making rational production decisions. The consumers are also needed to be frequently informed about the benefits of using balanced diet and reducing over use of edible oil, sugar and food grains. Hence use of IT is necessary for sharing technological as well as improved consumption knowledge with rural and urban communities.

Policy measures

i. Regular information collection for accurately measuring food insecurity situations, consumption patterns and impacts of healthy diets on human health and productivity
ii. Promoting and assessing the role of innovations in agriculture including precision agriculture, nanotechnologies and next-generation biotechnology in the perspective of sustainable food systems
iii. Integration of diverse forms of knowledge from the national and international system to facilitate technological change and adaptation in practices
iv. The government support to allocate time for continuously sharing innovation on terrestrial channels
v. The government support to open new radio channels in different regions for frequent communication with local communities
vi. Frequently sharing weather forecast information through electronic media
vii. The government support to open exclusive channels on agriculture
viii. Development of demonstration centers in different agro-ecologies
ix. Special programs on human health by promoting use of balanced and nutritious diets
x. Launch and run mass media campaigns for bridging the knowledge gaps of consumers in food safety, nutrient requirements and preventive approach.
xi. Targeting the future generation through addition of food and nutrition chapters at school level curricula

7.Linkages between Policy Elements and Agriculture and Food Security

Linkages between food policy elements and the national flagship programmes for agriculture development and food security have been developed (Figure 1). The policy elements and national flagship programmes will help to achieve the four aims of the policy, which are conducive to improving the four pillars of food security (i.e., availability, accessibility, utilization, and stability), as well as the final aim of the policy, which is to ensure stable and adequate nourishment and nutrition for the healthy life of all segments of the population in Pakistan.

8. Implementation Arrangements

Implementation of the policy will require the involvement of various ministries, departments, and institutions at the federal level, although the main operational responsibility for most actions will be at the provincial level. In addition, the new policy directions will require drawing in government institutions, including agriculture and agriculture extension agencies and departments for food, dairy and livestock, on-farm water management, irrigation, forestry and fisheries, on the agriculture side, as well as from departments for health, education, social welfare, and women's development at the sub-provincial level – particularly at the district and union council levels. It will require working with the private sector, NGOs/CSOs, academia, and farmers' organizations.

In order to implement this policy, complementary policies, plans, and programmes will need to be prepared by each of the provinces and regions and, where needed, the MNFSR shall provide support. To date, a policy framework for expanding agriculture base in the country is already prepared in close collaboration with all partners from provincial and federal governments, private sector, NGOs, and other development agencies.

8.1 Role of the MNFSR

The MNFSR would play an overarching role, including monitoring, reporting, and addressing high-level policy issues. The MNFSR will also continue to take the lead in addressing national, interprovincial, and international coordination issues including international trade and cross-sectoral linkages.

The MNFSR will have oversight of policy implementation through an Implementation Committee. The Committee will be chaired by the Federal Secretary of the MNFSR and include the secretaries of relevant ministries, commissions, and programmes at the federal and provincial levels and representatives from academia, the private sector, and civil society organizations. The Committee will review the progress of overall actions at the federal level, including the formulation and enforcement of legislation and regulations, and report regularly to the MNFSR and the prime minister. The MNFSR will also create councils or commissions to monitor and report on specific activities and programmes. One of these will be the National Food Security Council, which will address food and nutritional security issues and comprises of concerned government agencies at the federal and provincial levels, as well as NGOs/CSOs and the private sector. Although the provinces are to take the lead in agriculture matters, the MNFSR will continue to play an overall coordination and support role in many aspects related to agriculture and food security. These will include:

- The handling of interprovincial issues, such as the interprovincial trade in inputs and outputs, and the framing of legislative and regulatory measures, ensuring that provincial and federal regulations and laws are complementary rather than conflicting
- The coordination of research activities between national and provincial systems and the sharing of research outputs and best practices between these systems
- The promotion of international collaboration with the CG-system, United Nations, and other international partners and with other countries
- The monitoring of national food and agriculture supplies to ensure their timeliness and adequacy and, along with other concerned agencies, the management of the import and export of essential items
- The provision of advice on international trade and tariff regimes, particularly with regards to phyto-sanitary and quarantine measures
- The surveillance of national quarantine and trans boundary pests and diseases, and the coordination of control measures; and
- Cooperation and collaboration with other federal and national institutions whose work relates to agriculture and food security.

8.2 Role of Federal and Provincial Governments

The institutional setup for agriculture and food security has undergone significant changes after the devolution that took place following adoption of the 18th Amendment, with the provinces taking over responsibility for agriculture and rural development. The creation of the MNFSR in 2011, which replaced the devolved ministry of Food, Agriculture and Livestock, clearly indicated that there was a need for a new national policy direction, particularly to address key challenges such as technology gaps, food insecurity, and poor nutritional levels. These factors affect all provinces, but need a strong direction and coordinating effort at the national level. The provincial governments are supposed to substantially increase resources to implement activities under their Annual Development Plans. In order to guide their activities and investments in agriculture, some provinces have started work on the preparation of provincial policies, strategies, and investment plans. However, the provinces need an overall vision and direction for agricultural development to ensure that synergies are maximized and overlaps minimized. Moreover, certain activities, such as national priority setting, trade policies, national and trans-boundary pest and disease surveillance,

the certification of agriculture products at international standards, and strategic and basic research on topics of national importance, remain areas that the federal Government needs to take the lead in consultation with the provinces.

Figure 1. Policy elements for agriculture and food security