**** DRAFT UNDER CONSULTATION***

** NOT TO BE QUOTED AND SHARED*



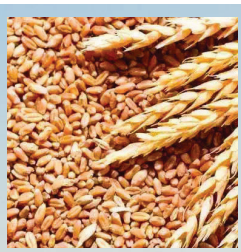




Review of Essential

Commodities to Identify and Address Market Distortions


RESEARCH DEPARTMENT

WWW.CC.GOV.PK

Competition Commission of Pakistan
Creating a level playing field

Comments may kindly be sent to:

mhasib@cc.gov.pk
ahaseeb@cc.gov.pk

Table of Contents

List of Tables

List of Figures

Executive Summary

- Agriculture in Pakistan remains by far the biggest employer of labor (37%)[1] and is principally an important sector from a social, livelihood and foreign exchange perspective. It contributed around 50% in the GDP during 50s but its share declined to 30% during 80s and further slipped to around 20% in recent years.[2] Pakistan's population growth and rate of urbanization is pressurizing the agriculture sector not only to increase production, but also to respond to a changing and diversifying food consumption pattern. Despite considerable public spending with support from development partners, agriculture growth slowed down from an average of over 4% per year during 1970-2000 to below 3% thereafter.[3] Poorly functioning agricultural markets with significant government intervention, and a pattern of public spending on agriculture characterized by inefficient and poorly targeted subsidies, discourage a move to a more water and land efficient, higher value agriculture.
- Inflation is a key economic indicator that provides important insight on general cost of living and price movements. Price stability is essential for all kind of economic decision making that leads not only to economic growth, but also uplifts the poor and fixed income citizens who are the most vulnerable segment of the society. For a developing country like Pakistan, stable inflation environment is necessary to ensure productive investments and savings to achieve sustainable and inclusive growth.
- The inflation in Pakistan has remained in double digits since November, 2021 and reached its highest level in July 2022 with inflation rate of 24.9%, which is highest in past five years.[4] The food inflation on the other hand has remained in double digits since August 2019 and has been the major reason for high inflation.[5] For the outgoing fiscal year, the inflation target was set at 8.0 percent, but abnormal increase in global commodity prices resulted in average annual inflation to reach at 12.1 percent.[6] Owing to an inflationary pressure, the Economic Coordination Committee attempted to capture the food inflation and the Competition Commission of Pakistan (CCP) was made a part of National Price Monitoring Committee (NPMC) to look into the reasons of price increase in essential commodities.
- The NPMC regularly monitors the trend in Sensitive Price Indicator (SPI) which is computed on weekly basis to assess the price movements of essential commodities at a shorter interval of time. CCP shortlisted ten major food items from the list of 51 essential commodities in SPI.[7] These commodities are tomatoes, onion, potato, poultry, edible oil & ghee, wheat & wheat flour, sugar, rice, milk and pulses.
- These commodities have a share of 63% in monthly expenditure on major food items.[8] Furthermore, these commodities combined showed a 35% increase in price in July 2022 as compared to July 2021.[9] The highest increase in prices of Masoor (92%), Onion (89%), Edible oil (77%) and gram (52%) was observed during the same period.
- The current study outlines underlying causes of the price hikes which include inappropriate policies and regulations that distort markets, inhibit competition and

[1] Pakistan Economic Survey 2021-22. Chapter 2: Agriculture
[2] https://www.sbp.org.pk/departments/stats/pakEconomy_HandBook/Chap-1.2.pdf
[3] https://www.worldbank.org/en/country/pakistan/brief/pakistan-agriculture-food-systems
[4] CPI_Monthly_Review_June_2022.pdf (pbs.gov.pk)
[5] cpi_review_november_2020.pdf (pbs.gov.pk)
[6] PES07-INFLATION.pdf (finance.gov.pk)
[7] https://www.pbs.gov.pk/sites/default/files/price_statistics/weekly_spi/SPI_Executive%20Sumary%26Report_11082022.pdf
[8] https://www.pbs.gov.pk/sites/default/files//pslm/publications/hies2018-19/TABLE_17.pdf
[9] Calculations based on PBS data for prices.

discourage private investment, as well as limited and poorly implemented efforts for research, innovation and technology dissemination. On the production side, insufficient productivity, market distortions, and limitations of trade result in market rigidities that push prices. Subsidies provided by government on urea fertilizer, water and energy to support agriculture distorts the market and encourages more urea fertilizer intensive crops.

- CCP conducted a pilot study during 2021 on Tomato and Onion to better understand supply chain distortions, pricing mechanisms, potential anticompetitive practices, and other factors influencing prices throughout the supply chain of these two commodities. A survey was conducted in five districts across Pakistan consisting 70 farmers, 256 retailers, 45 wholesalers, 10 commission agents, and 10 market committee/district administration representatives.
- The study found significant price variations from farm gate to retail in which commission agent had a major role in controlling the flow of commodities across different mandis. The supply is affected due to shortage, perishability, post-harvest losses and inadequate awareness about prices and availability. Onion is both a Rabi & Kharif crop, availability of onion is throughout the year however a dip/shortage appears in December-January period. The gap between the actual and the potential yield of onion is attributed to poor management practices and storage facilities resulting in post-harvest losses (30%). Farmers do not get enough return due to the poor marketing system.
- The policy of Minimum Support Price (MSP) for wheat in Rabi season and for sugarcane in Kharif season distorts competition among crops and makes other crops risky. The decline in production of these crops results in increase in prices of wheat flour and sugar. Additionally, the procurement and storage of wheat by government not only distorts investment from private sector in storage industry but it has also created a circular debt of Rs. 548 billion till 2020-21. However, there are examples of other crops such as maize and rice which have witnessed growth despite having no support price. The common factor behind success of these crops is a stable local demand from industry and consumers. The same factor of stable demand also holds in the cases of wheat and sugarcane. Hence, a gradual withdrawal from MSP and procurement will increase the competition among crops and will encourage investment in variety development, procurement and storage.
- Pakistan's total annual edible oil requirement stands at 4.1 MMT. The domestic production meets only 14% of demand and 86% is met through imports. In the international market, the edible oil prices did not show high variation until FY19, however post Covid the international prices have increased rapidly. In Indonesia, due to rise in domestic palm oil prices, the Indonesian government has found evidence of cartel activity.
- Potato is one of the most important edible and profitable crops of Pakistan having three growing seasons. It was cultivated on an area of 313.8 thousand hectares and produced 7.9 million tons of potatoes. Punjab accounts for 97% of total production. Domestic consumption of potatoes is around 4 to 5 million tons and the remained is exported. The cost of producing 1 kg of potato is Rs. 12 on average and its sale price has reached to Rs. 49 in June 2022. Financial incentives to invest in cold storage can help better management of produce.
- Pakistan is the 11th largest producer of the poultry products in the world with a production of around 2 million tons in 2021-22. The per capita consumption of poultry meat in Pakistan is approximately 6.62 kg per annum. Feed is the major cost component that accounts for around 75% of the total cost of broiler and variations in feed price

cause to variations in the price of poultry. The price determination mechanism in poultry is anti-competitive and the government may consider promoting a market based mechanism of poultry price determination.

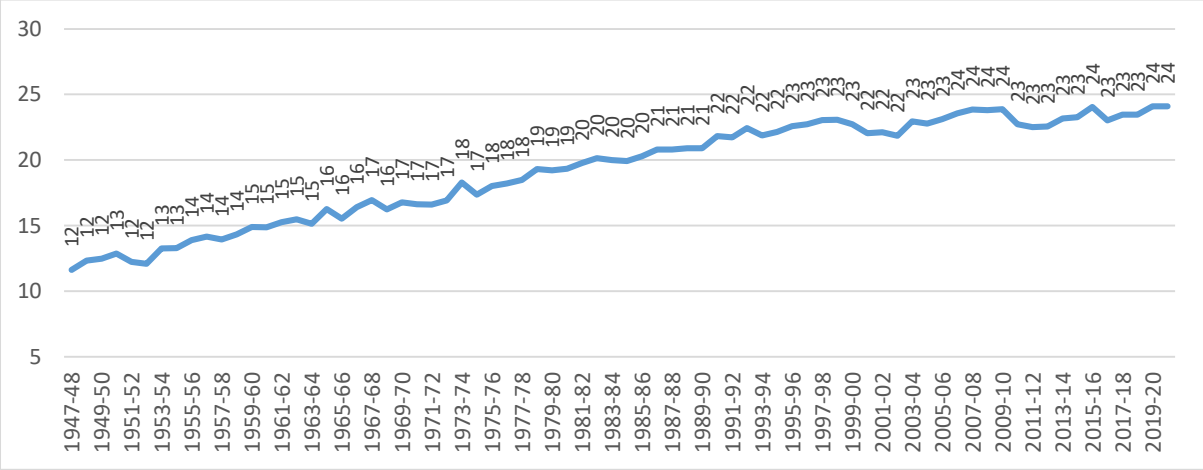
- Rice is Pakistan's third largest crop in terms of area sown with area of 3.5 million hectares. Pakistan is 11th largest producer with production of 9.3 million tons and 4th largest Exporter of Rice in the world with exports amounting to 4 million tons, valuing Rs. 357 billion during 2021-22. Price of Basmati rice and Irri rice increased to Rs. 119 and Rs. 88 in July 2022 respectively, a rise of 26% and 22% due to surging exports. The Government of Pakistan has managed to register the Basmati rice having the Geographical Indication of Pakistan in European Commission which resulted in safeguarding rice exports.
- Pakistan is the 4th largest producer of milk. Buffalo milk accounts for 60% of the total production as well as consumption. Milk production is related to the availability of green fodder which is available in abundant quantity between January and April and low from May to August. A shortage of fodder occurs between May-June and December-January. There is a wastage of 20% mainly due to faulty transportation. The consumption declines during winters and peaks in summer. Regulated prices along with distortions across the value chain result in higher prices and lower quality of product.
- Pulses are a minor crop and grown on around 6% of the total cropped area. Gram is the major pulse produced in Pakistan. Its share in the total pulse production is 54% followed by moong 44% whereas Mash and Masoor account for a negligible share in pulses. The production of Gram and Moong has observed an increase during FY2021-22 whereas, the production of Mash and Masoor have declined. The major cause of decline in production is lower yield, lack of R&D on seed development and government's focus on cereals. Prices of pulses are affected by import price as the consumption of pulses is largely fulfilled through imports.
- Review of these commodities has identified multiple issues that hinder the efficiency and competition in these commodities. Government's policy focus on major three crops (wheat, rice and sugarcane) is impeding the growth of other crops. Lack of R&D in high yield varieties and under-developed seed dissemination mechanism is resulting in lower yield and inefficient use of resources. Limited access to finance for farmers growing crops other than cereals acts as disincentive to grow other crops, leading to non-level playing field for all crops. Access to agricultural markets and asymmetric information of market situation often deprives farmers of their optimal return and incurs losses to their produce. High government involvement in storage of grain has resulted in crowding out of private sector from storage industry. Furthermore, the storage capacity is less than the requirement of country which results in losses of crops. Therefore, the government shall encourage and incentivize the private sector to invest in establishing silos, warehouses and cold storage facilities. Similarly, the use of water for growing crops is inefficient which results in wastage of scarce resource. There is a need to introduce water efficient techniques in agriculture sector of Pakistan. Trade barriers act as barriers to entry for traders to enter international markets of agricultural products. This also results in inefficient allocation of resources and promotes in-competitive crops. Promoting contract farming and vertical integration in agriculture sector can promote efficiency, efficient allocation of resources and achieve economies of scale. The structure of agriculture produce markets is also obsolete and requires complete over haul.

SECTION-I

Introduction

- According to an estimate, worldwide each year around 1.3 billion tonnes or 1/3rd of the food produced is wasted[10] and the major contributors in this are the under developed and the developing countries. On the contrary, the ever rising world population and incomes have resulted in a constant higher demand for food globally. According to Food and Agriculture Organization (FAO) between May 2020 and February 2022 the food price index went up by 55.2%, led by 159.4% rise in the prices of edible oils, 63% rise in the price of sugar, 50% rise in dairy and 48% rise in cereals.[11]
- Agriculture in Pakistan remains by far the biggest employer of labor (37%)[12] and is an especially important sector from a social, livelihood and foreign exchange perspective. It contributed around 50% in the GDP during 50s but its share declined to 30% during 80s and further slipped to around 20% in recent years.[13] Pakistan's population growth and rate of urbanization is pressurizing the agriculture sector not only to increase production, but also to respond to a changing and diversifying food consumption pattern.
- In the Federal Budget FY2022-23 Rs. 21 billion has been allocated to boost performance of the agriculture sector, with focus on crop and livestock production, farm mechanization, self-sufficiency, value addition and processing. However, despite considerable public spending with support from development partners, agriculture growth slowed down from an average of over 4% per year during 1970-2000 to below 3% thereafter.[14]
- Figure 1 shows the time series data on the total cropped area in Pakistan. The data shows that the cropped area till the 80's grew at an increasing rate however the 90's era onwards there has been a slow growth in cropped area with frequent dips.

Figure 1: Cropped Area of Pakistan (Million Hectares) since independence



Economic Survey of Pakistan

- During 2021-22, agriculture sector recorded a remarkable growth of 4.40 percent and surpassed the target of 3.5 percent and last year's growth of 3.48 percent. This growth

[10] Globally, around 14 percent of food produced is lost between harvest and retail, while an estimated 17 percent of total global food production is wasted (11 percent in households, 5 percent in the food service and 2 percent in retail), https://www.un.org/en/observances/end-food-waste-day

[11] Deloitte Insights, Sizzling food prices are leading to global heartburn, www2.deloitte.com

[12] Pakistan Economic Survey 2021-22. Chapter 2: Agriculture

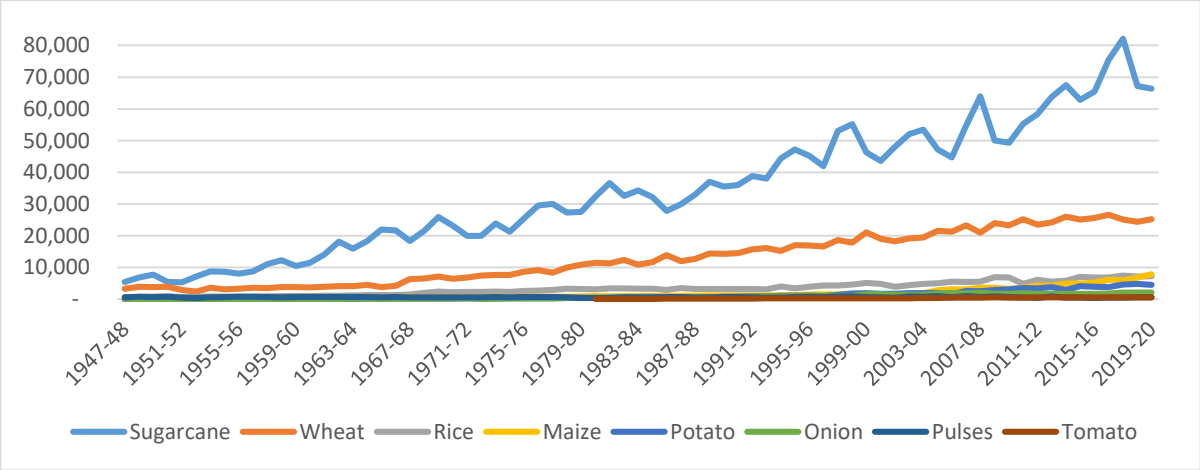
[13] https://www.sbp.org.pk/departments/stats/pakEconomy_HandBook/Chap-1.2.pdf

[14] https://www.worldbank.org/en/country/pakistan/brief/pakistan-agriculture-food-systems

is mainly driven by high yields, attractive output prices and supportive government policies, better availability of certified seeds, pesticides and agriculture credit. The crops sector posted a growth of 6.58 percent during 2021-22 against 5.96 percent last year. At sub sectors level, important crops, other crops and cotton ginning depicted a significant growth of 7.24 percent, 5.44 percent and 9.19 percent, respectively, against last year's growth of 5.83 percent, 8.27 percent and -13.08 percent. The growth in production of important crops namely cotton, rice, sugarcane and maize are estimated at 17.9 percent, 10.7 percent, 9.4 percent and 19.0 percent respectively.

- Other crops having share of 13.86 percent in agriculture value addition and 3.14 percent in GDP, grew by 5.44 percent on the back of increase in the production of pulses (29.82 percent), oilseeds (24.75 percent), vegetables (11.52 percent), fruits (1.53 percent) and fodders (0.36 percent). Livestock having share of 61.89 percent in agriculture and 14.04 percent in GDP, recorded a growth of 3.26 percent in 2021-22 compared to 2.38 percent during same period last year.[15]
- The ten essential commodities in SPI include; onion, tomato, potato, edible oil & ghee, rice, wheat, sugar, poultry, milk and pulses. Further, these commodities have a share of 63% in monthly expenditure of food items.[16] The figure below compares growth in production of major crops in Pakistan from 1947 to 2020.

Figure 2: Production comparison among crops in Pakistan (000 tons)



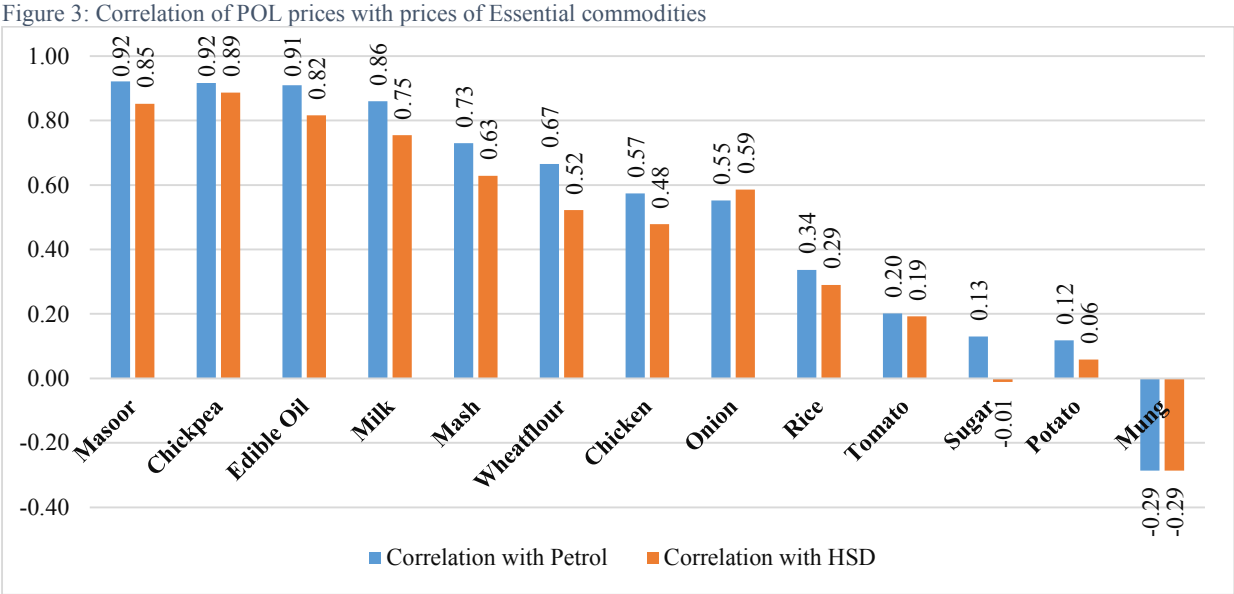
Source: AMIS

- It can be observed that production of sugarcane and wheat have seen a sharp increase whereas, the production of other crops did not increase as comparably. The production of Rice, Maize and Potato has started to increase recently however, their production is not comparable to the production of the earlier two crops. The private sector has played a vital role in the growth of these crops (rice, maize and potatoes). The demand for these crops is stable due to high exports of rice, use of maize in poultry feed and potatoes in processing industry. The production of pulses and tomatoes have remained however low due to multiple reasons.

[15] https://www.finance.gov.pk/survey/chapter_22/PES02-AGRICULTURE.pdf
[16] https://www.pbs.gov.pk/sites/default/files//pslm/publications/hies2018-19/TABLE_17.pdf

Correlation between POL prices and prices of essential commodities

Figure 3: Correlation of POL prices with prices of Essential commodities



*Note: Values at or close to zero imply a weak or no linear relationship. Correlation coefficient values less than +0.8 or greater than -0.8 are not considered significant.

- Correlation is used to test relationships between quantitative variables. Prices of petroleum oil lubricants (POL) are expected to affect the prices of essential commodities. The POL prices, in Pakistan, are generally announced bi-monthly, at the start and mid of month. To compute the correlation, the prices of essential commodities[17] were taken covering the period of January 2019 to August 2022. Figure above presents the correlation between POL prices and prices of essential commodities. A high correlation between prices of POL with prices of masoor, chickpea, edible oil and milk can be observed. Except for milk all of these commodities are highly import oriented and strong correlation may be attributed to transportation charges. The correlation is stronger in the prices of petrol as compared to diesel.
- Furthermore, these commodities combined showed a 35% increase in price in July 2022 as compared to July 2021.[18] The highest increase in prices of Masoor (92%), Onion (89%), Edible oil (77%) and gram (52%) was observed during the same period.

Objective

- Food inflation in Pakistan has remained in double digits since August 2019, a major reason for high inflation.[19] As of July 2022, it has reached to 24.9%, which is highest in past five years.[20] For the outgoing fiscal year, the inflation target was set at 8.0 percent, but abnormal increase in global commodity prices resulted in average annual inflation to reach at 12.1 percent.[21] Owing to an inflationary regime, the Finance Division vide its notification dated 23-04-2019 made Competition Commission of Pakistan (CCP) a part of National Price Monitoring Committee (NPMC), objective of the said committee being *to review supply and prices of essential commodities and to put in place timely measures to avoid any shortages in the country.*

[17] The prices of commodities prevailing one week after the announcement of POL prices were taken
[18] Calculations based on PBS data for prices.
[19] cpi_review_november_2020.pdf (pbs.gov.pk)
[20] CPI_Monthly_Review_June_2022.pdf (pbs.gov.pk)
[21] PES07-INFLATION.pdf (finance.gov.pk)

- The NPMC regularly monitors the trend in Sensitive Price Indicator (SPI) which is computed on weekly basis to assess the price movements of essential commodities at a shorter interval of time. CCP shortlisted ten major food items from the list of 51 essential commodities in SPI[22] to identify and address the market distortions.
- These commodities are as follows;
    - Tomato,
    - Onion,
    - Potato,
    - Poultry,
    - Edible Oil & Ghee,
    - Wheat & Wheat flour,
    - Sugar,
    - Rice,
    - Milk
    - Pulses (Gram, Moong, Mash, Masoor)

- This study aims to;
    - map out supply and demand of the selected commodities at international and domestic level,
    - identify distortions in the value chain from production to consumption, and;
    - propose measures to improve competition and enhance efficiency of the commodities through improvement in their production, marketing, distribution, and sale mechanism.

Layout of Study

- After executive summary, Section I provides the introduction and objective of the study. Section II covers the review of selected ten commodities. Finally, Section III comprises of key findings and recommendations of the study.

22 https://www.pbs.gov.pk/sites/default/files/price_statistics/weekly_spi/SPI_Executive%20Sumary%26Report_11082022.pdf

SECTION-II

REVIEW OF TEN ESSENTIAL COMMODITIES

1. Onion

Introduction

- Onion is an essential food item widely used in a Pakistani kitchen in traditional cooking. It is an essential food item for daily use. A cold-humid climate is suitable for its cultivation. There are five varieties of onions cultivated in Pakistan.[23]

Table 1: Onion varieties produced in Pakistan

Province	Variety
Sindh	Phulkari
Punjab	Desi Red
Baluchistan	Sariab Surkh, Chiltan 89
K.P	Swat-1

Global Perspective

Table 2: World Top Onion Production Countries (2019)

Country	Production (tons)	Area (Hectare)	Yield (kg/hectare)
China	24,966,366	1,128,970	22,114
India	22,819,000	1,220,000	18,704
U.S.A	3,170,270	52,370	60,536
Egypt	3,081,047	87,948	35,033
Turkey	2,200,000	68,713	32,017
Pakistan	2,079,593	148,272	14,026
Source:www.atlasbig.com			

- The above table shows production of top 6 onion producing countries in the world. China ranks at the top in onion production, followed by India and U.S.A. These 3 countries together produce 50% of total onion production in the world. Pakistan is ranked 6th in terms of total production, however in terms of yield per hectare Pakistan is ranked lower than Iran, Sudan, Nigeria and Uganda. Comparing Pakistan's yield of 14,026 kg/hectare or 14 ton/hectare, it is very low compared to Turkey with production close to that of Pakistan however their yield is double also evident from the area under cultivation.

Onion Market in Pakistan

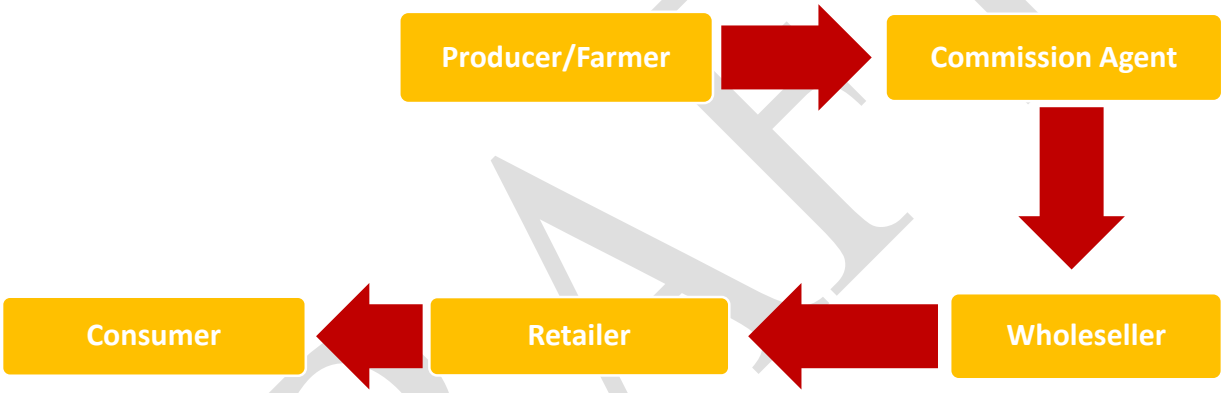
- In Pakistan onion is both a Rabi and Kharif crop and is ready to harvest in 5 months. It is a Rabi crop (sowing during Oct-Dec that includes nursery sowing and transplanting to farm and harvesting during April-May) in upper Sindh, Punjab and KPK[24] and in lower Sindh sowing in July-August and harvesting in January-February. In Balochistan it is Kharif crop (Sowing during Apr-Jun and harvesting during Oct-Dec)[25]. Compared to other vegetables onions can be stored for a longer period.

[23] https://www.pakissan.com/english/allabout/horticulture/vegetables/onion.shtml
[24] http://www.crs.agripunjab.gov.pk/crop_details
[25] https://balochistan.gov.pk/wp-content/uploads/2020/08/EXPLANATORY-NOTE-ON-AGRICULTURE-SECTOR-2.pdf

Figure 4: Value Chain/ Marketing Channel of Onion

Channel I

Channel II



Planting and Harvesting Seasons

Table 3: Provincial Season of Planting and Harvesting of Onion

Province	Nursery Sowing	Transplanting	Harvesting
Lower Sindh (Jamshoro, Hyderabad, Matiari, Tando Allah Yar, Badin, Thatta, Karachi etc.)	July-August	September/October	January/February
Upper Sindh (Shaheed Benazirabad, N. Feroz, Khairpur, Sukkur, Larkana etc.)	October	December/January	April/May
Balochistan	-	February-March (Direct Seeding)	August-Nov.
Punjab	October/November	December/January	May-June
KPK	October	December/January	June/Jully
Source: https://www.pakissan.com/english/allabout/horticulture/vegetables/onion.shtml			

Major Districts in Onion Production

Table 4: Major Districts of Onion Production

Province	Districts
Sindh	Hyderabad, Mirpurkhas, Sanghar, Sukkar, N. Feroze and Badin
KPK	Swat
Punjab	Kasur, Gujranwala, Sheikhupura, Vehari, Khanewal, D.G. Khan and Jhang
Balochistan	Mastung, Kalat, Chagai, Khuzdar and Turbat
Source: https://www.pakissan.com/english/allabout/horticulture/vegetables/onion.shtml	

Domestic Production

- During July 2020- March 2021 the onion was grown on area of 153.8 thousand hectares. Total production of onion during the said period accounted for 2305.7 thousand tonnes with a yield of 13,651 kgs per hectare. The area under onion and production of onion has seen an increase during last five years. Following table presents the trend in area, production and yield of onion in Pakistan from 2015-16 to 2021-22.

Table 5: Area, Production and Yield of Onion

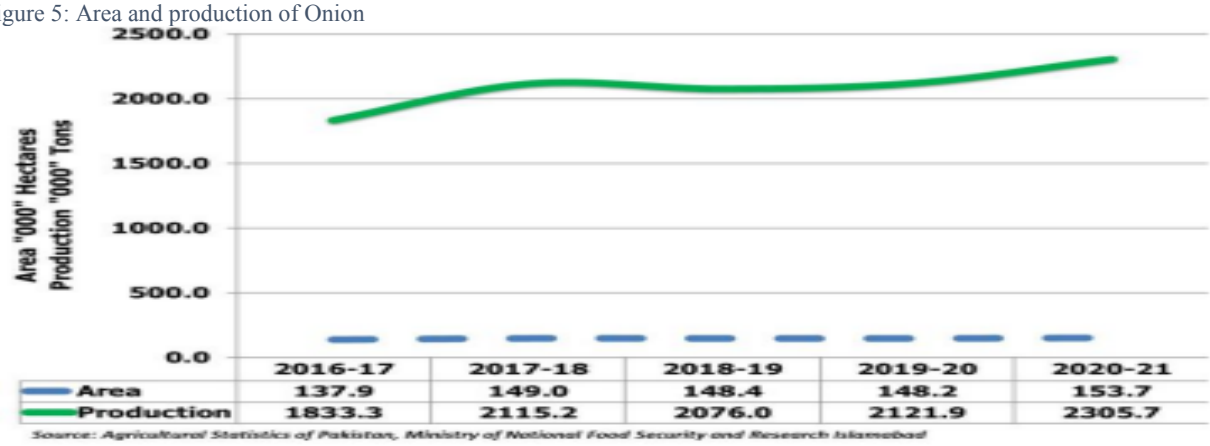
Years	Area (000 Hectares)	Production (000 Tonnes)	(Average Yield Kg Per Hectare)*
2015-16	135.9	1,736.4	12,777 (12.7 ton)
2016-17	137.9	1,833.2	13,294 (13.2)
2017-18	150.2	2,080.8	13,853 (13.8)
2018-19	148.3	2,079.6	14,022 (14)
2019-20	148.2	2,122.0	14,318 (14)
2020-21	153.8	2,305.7	13,651 (13.6)
2021-22 (P)	141.0	2108.8	14,956 (14.9)

(P): Provisional (July-March)
Source: Economic Survey of Pakistan, 2021-22
*Author's Calculation (Production/Area), 1 ton= 1000kg

- The table above shows that where the area under cultivation of onions has increased resulting in higher onion produce, however the yield per hectare has remained low between 12 -14 tons/hectare compared to its potential of 22 tons/hectare. During 2021-22, the production of onions decreased by 8.5 percent.[26]

[26] Vegetables such as onions, garlic and chilies is about 1.67% of the total cropped area.

Figure 5: Area and production of Onion



Source: Supply & Price Situation Report 2022, amis.pk

Provincial Share in Production

Figure 6: Provincial Share in Production

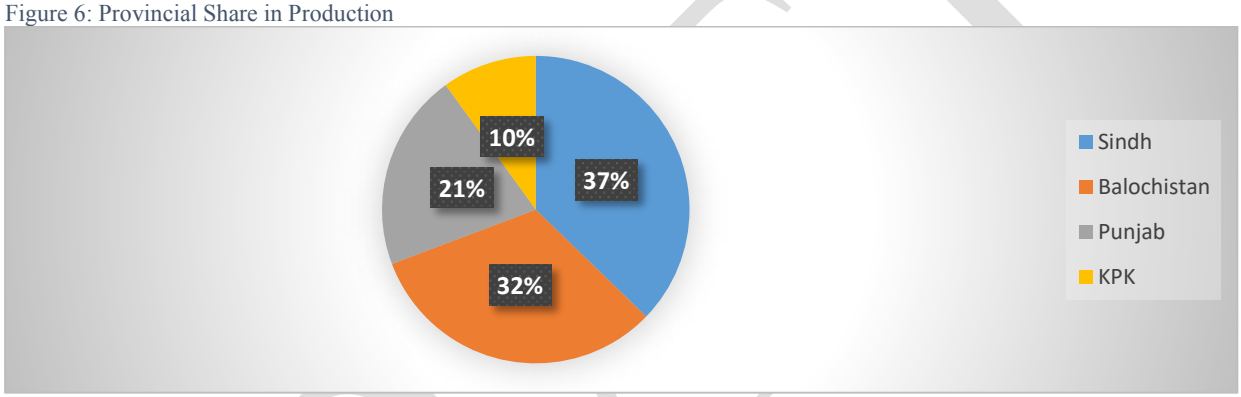
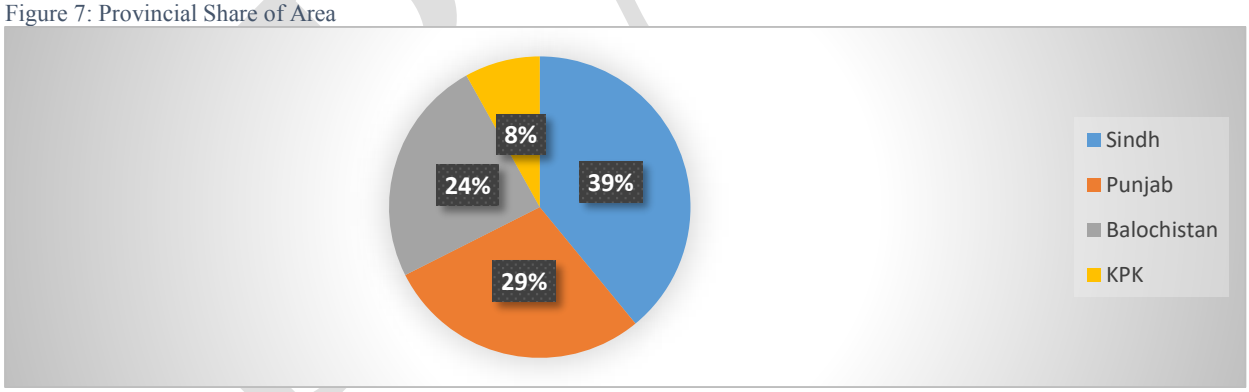


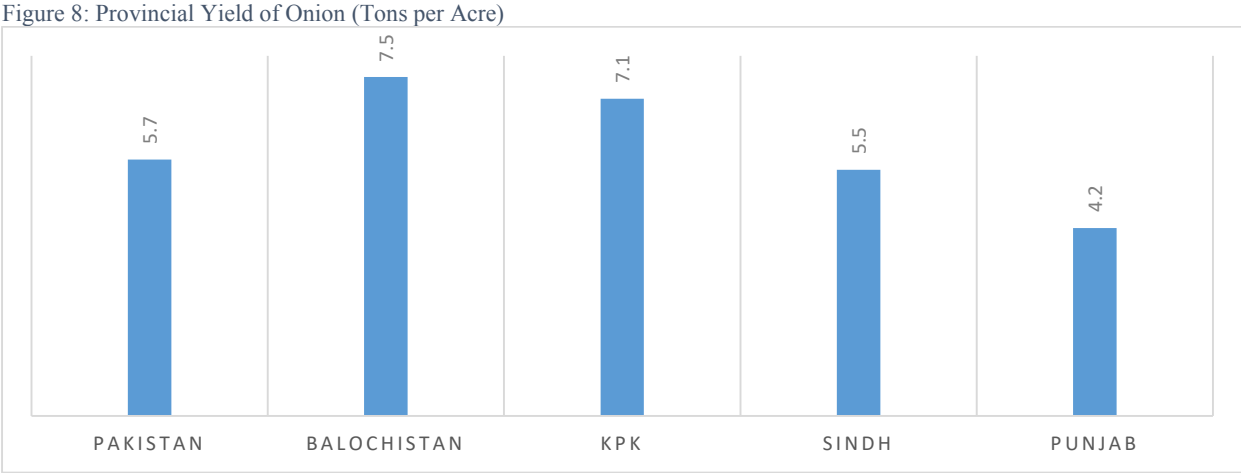
Figure 7: Provincial Share of Area



Source: Author's Calculation from data of AMIS

- Sindh is the major onion producing province, as its share in total onion production alone is 37%, followed by Balochistan at 32%, Punjab 21% and KPK 10%. An important insight from the total production and the yield per hectare or acre is this that whereas the share of Sindh is the highest in production but the onion yield is the highest in Balochistan and KP province and Punjab has the lowest per acre yield.

Figure 8: Provincial Yield of Onion (Tons per Acre)



Source: Author's Calculations from data of AMIS

Consumption of Onion

- According to PBS, monthly per capita consumption of onion ranges between 0.77 kg to 1.16 kg during 2018-19.[27] Table below presents the consumption of onion with respect to household size.

Table 6: Monthly Per Capita Consumption of Onion

Quintile (Household Size)	Consumption (Kg per capita)/month	Total Projected Yearly Consumption (Million Tons [1])
Total (6.24)	0.95	216,565,317*0.95*12= 2.5
Quintile 1 (8.11)	0.77	2.0
Quintile 2 (7.27)	0.87	2.3
Quintile 3 (6.42)	0.94	2.4
Quintile 4 (5.78)	1.00	2.6
Quintile 5 (4.72)	1.16	3.0

Source: PBS
[1]Author's Calculations based on World Bank's Population Statistics
The projection of total consumption is based on the formula given as
Total consumption per year= Total Population* per capita consumption of onion*Number of Months

Onion Price Trend

Table 7: Onion Price trend (Rs.)

Price July'22	Price July'22	Price June'22	Price July'21	%Change July'22 over Jun'22	%Change July'22 over June'21
83.22	82.33	79.46	43.48	3.61	89.35

[27] The recommended intake by the government is 0.83kg onions per month.

Figure 9: price trend of onion

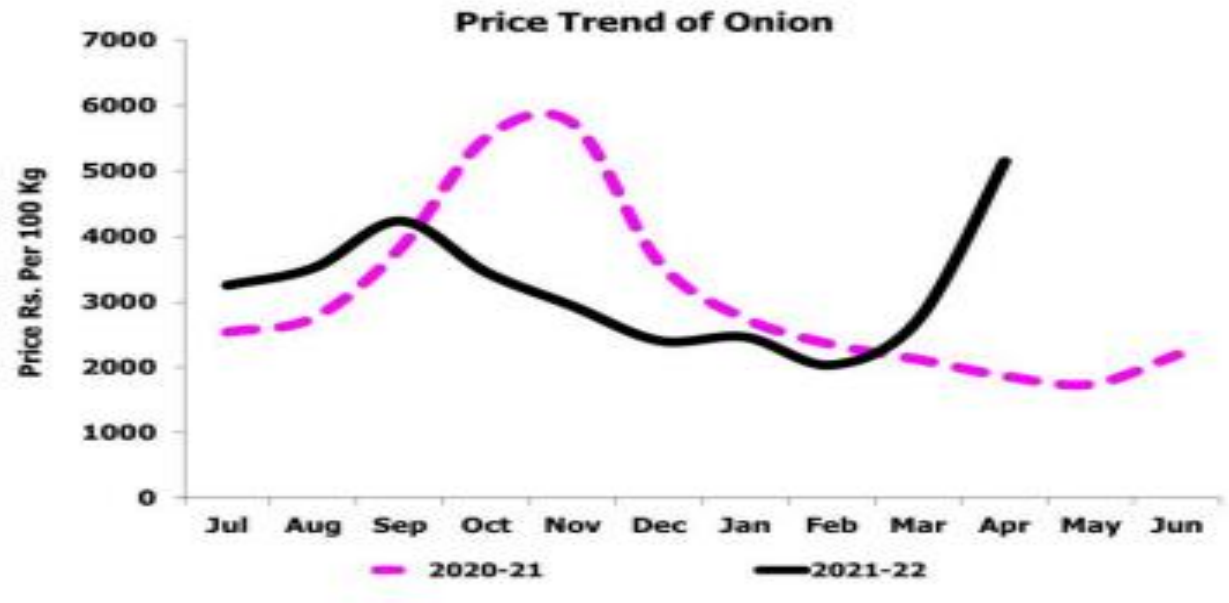


Table 8: Cost of Production at Farm Gate for 2021-22

Sr. No	Operations/Inputs	Cost per Acre (Rs.)	%Share in Total Cost
1	Land Preparation	6335	9.4%
2	Seeds & Sowing	11039	16.4%
3	Water	8040	12%
4	Fertilizer	11280	16.8%
5	Dung	366	0.54%
6	Pesticides	2012	3%
7	Weedicides	2635	4%
8	Harvesting	5939	8.8%
9	Land Rent	15000	22.3%
10	Transportation	4613	7%
	Total Cost	67,259	100%

- The Total Cost without land rent is Rs. 52,259, Total cost of 40kg is Rs. 634 (including land rent) and Rs. 492 (without land rent). Source: Crop Reporting Service, Government of Punjab.

Exports of Onions

Figure 10: Export of Onions

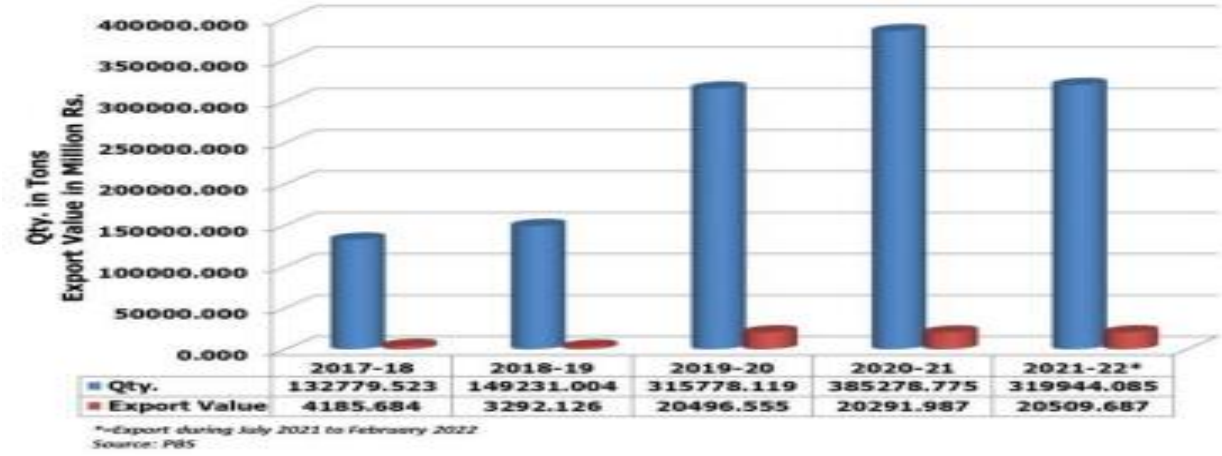


Figure 11: Exports of Onion

Source: Onion export of Pakistan 2010-2019, FAO

- The export surplus is available when there is a bumper crop of onion during the year, February for onion cultivated in Sindh province, whereas September for KP. In case of higher domestic demand and a supply shortage, the export of onions is banned by the government to meet the domestic demand and to keep a check on the domestic price of onion.[28]

Table 9: Major Export Destinations of Onion from Pakistan in 2020

Country	Share
Malaysia	32.9%
Sri Lanka	18.5%
UAE	16.2%
Bangladesh	14.0%
Qatar	5.3%
Oman	5.2%
Singapore	3.7%
Source: https://www.tridge.com/intelligences/onion/PK/export	

[28] https://www.brecorder.com/news/40124130

Import of Onions

Figure 12: Country-Wise import of onions

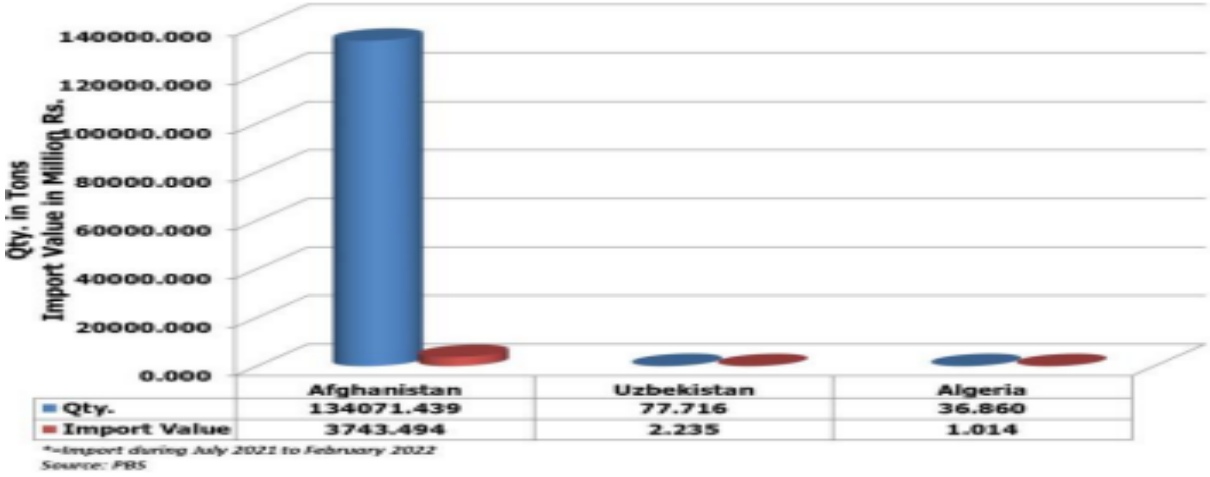
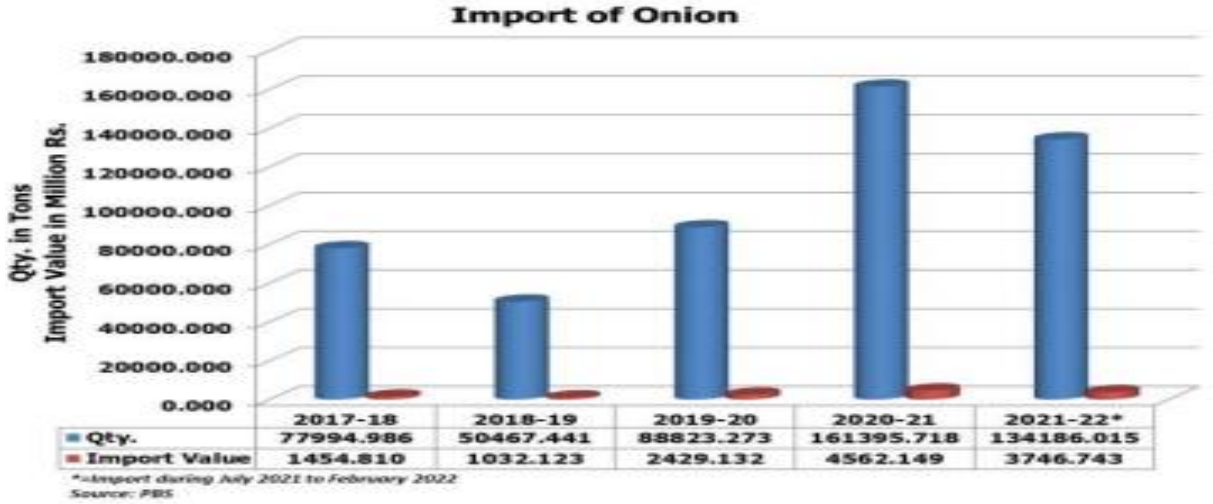


Figure 13: Import of onion



Issues & Recommendation

- The global average yield is 19 tonnes/ha whereas in Pakistan it is between 13-14 tonnes/ha. There is a yield gap of 6 tonnes/ha, or 29% lower than global average and the potential for improvement.29
- The examination of regional onion cultivation shows that there is fresh availability of onion due to the difference in the harvesting season. However the harvesting season also shows that the supply of onions falls short during December-January period and prices soar (can rise as much as five times) compared with normal season.30 The onion supply increases from September to November. A comparison with Indian market shows similar results with rise in onion prices in pre winters (December).

[29] https://www.pc.gov.pk/uploads/report/Onion_Cluster_Report.pdf
[30] https://www.pc.gov.pk/uploads/report/Onion_Cluster_Report.pdf

Province	Top Production Districts	Availability of Onion Crop in Markets
Punjab	Rahim Yar Khan, Multan, Lodhran, Rajan Pur, Bahawalpur, Muzaffargarh & Vehari etc.	March to July
Sindh	Mirpurkhas, Umer Kot, Jamshoro, Matiari, Sanghar, Shaheed Benazir Abad, Dadu & Tando Allahyar etc.	June – July & November – April
KPK	Swat, Dir Upper, Malakand, Dir Lower, Muhammad Agency, Bajour, Khyber & Chitral etc.	June – September
Balochistan	Khuzdar, Nasirabad, Awaran, Kalat, Kharan, Noshki, Lasbela & Jafferabad etc.	June - November

- **CPI** is a measure of inflation, and is the cost of a market basket of goods and services bought by an average urban or rural consumer. In the CPI, Food and beverages occupy a weight of 30.4 out of a total of 100. A comparison of July 2022 prices of food items with the prices of July 2021 shows an increase of 27.4% (the general inflation 24.9% during the same period). The table below shows the weight of onion in the urban and rural CPI. Further the change in prices over the given period is given in the table which shows 13.6% increase in the price of onion (urban) in July'22 compared to June'22. Likewise an annual comparison shows an increase of 89.48%.

Region	Weight CPI	% Change in Price in July'22 over June'22	% Change in Price July'22- July'21
Urban	0.6%	+13.65	+89.48
Rural	0.9%	+7.15	+100
Source: PBS			

- The **gap between the actual and the potential yield** is attributed to poor management practices, storage facilities resulting in post-harvest losses. Also, the farmers also do not get enough return due to poor marketing system. According to estimates, 30% of Pakistani onion is wasted due to lack storage facilities and substandard packing, handling, transportation and marketing.[31]
- The **variation/fluctuation in onion price is seasonal in nature**. Post-harvest the prices drop whereas off season the prices soar. When farmers have a good produce the prices fall and they are not able to get the desired returns, while when the prices soar in off season hurting consumers. The government imports onion during off season.
- Onion cultivation is greatly dependent on climate**. In 2020, a sharp rise in onion prices was seen resulting from heavy rains in Sindh and Balochistan.**
- **High quality seeds is also a key issue due** to which the yield per hectare is low. There is shortage of high yield –seeds which are easy to store and more resistant to pests and diseases.
- **Mal practices by traders/middlemen, collusive tendencies in the market intermediaries (agents). Hoarding by retailers anticipating an increase in onion price** are other factors responsible for higher price of onion and other essential food items such as tomatoes.
- For **onion export there is a barrier to export in the form of a minimum dollar value ($400)[32],** smaller growers thus find it difficult to export and incur a financial loss due to not being able to export in the face of a bumper crop.

[31] https://www.ciie.org/zbh/en/news/exhibition/focus/20220303/31925.html
[32] https://profit.pakistantoday.com.pk/2021/11/10/horticulture-exporters-for-reduction-in-export-value-of-onion/

- Where exports have increased in value due to higher export quantity, however **the price of Pakistan onion in international market has remained stagnant** compared to other exporting countries due to meeting low international quality standards.
- **Lack of formal contract farming** with defined quantity, quality standards and pricing parameters.
- Sindh, Balochistan and KP have higher onion yield, however the onion market is underdeveloped. Some issues as discussed above are also presented in the table below

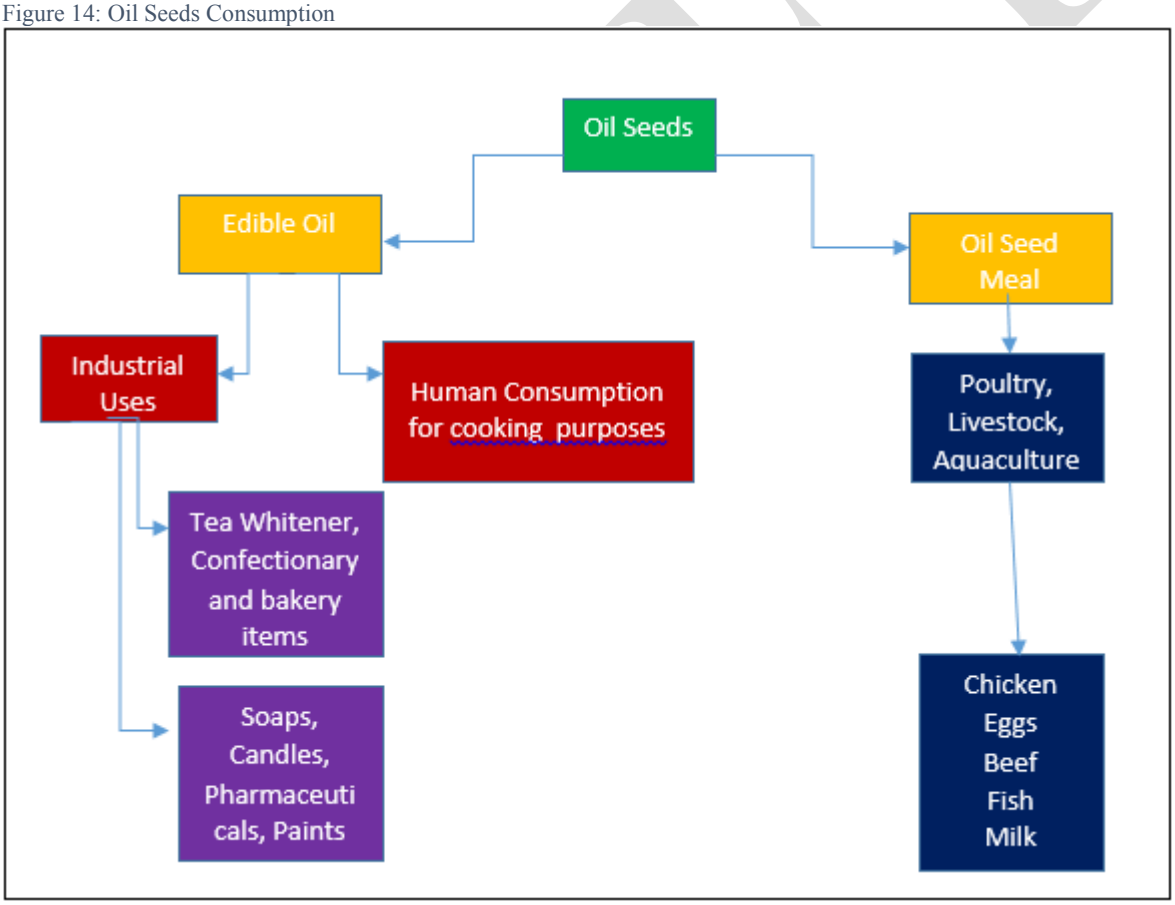
S. No	Parameters	Sindh	Balochistan	KPK
1	Marketing Channels	Traditional	Traditional	Traditional
2	E-commerce platforms	Not available	Not available	Not available
3	Contract Farming	Informal contract only	Informal contract only	Informal contract only
4	Export Readiness	Limited	Limited	Limited
5	Certifications	No	No	No
6	Branding	No	No	No

2. Edible Oil & Ghee

Introduction

- Edible oil is an essential cooking and food preparation item. It is extracted from a number of vegetables. The most common edible oils are soybean, palm oil, sunflower oil and rapeseed oil. Vegetable ghee is a hydrogenated blend (full or partial) of hard and soft oil. Hard oils, for instance, palm and coconut oil, are semi-solid at room temperature. In contrast, soft oils such as soybean, sunflower, and rapeseed oil are liquid at room temperature. Through the process of hydrogenation liquid or semi-solid fats are converted into solid fats. Through a process of hydrogenation (where hydrogen is added) liquid or semi-solid oils are solidified converting them into Vanaspati ghee. Hydrogenation helps to increase the shelf life of the food and maintain stability in flavor.[33]
- Oil seeds are high value agricultural crops generally processed to produce edible oil and oil seed meals. Edible oil apart from human consumption also has industrial uses (food and non-food), likewise oil seed meals are used as feed for livestock and poultry.

Figure 14: Oil Seeds Consumption



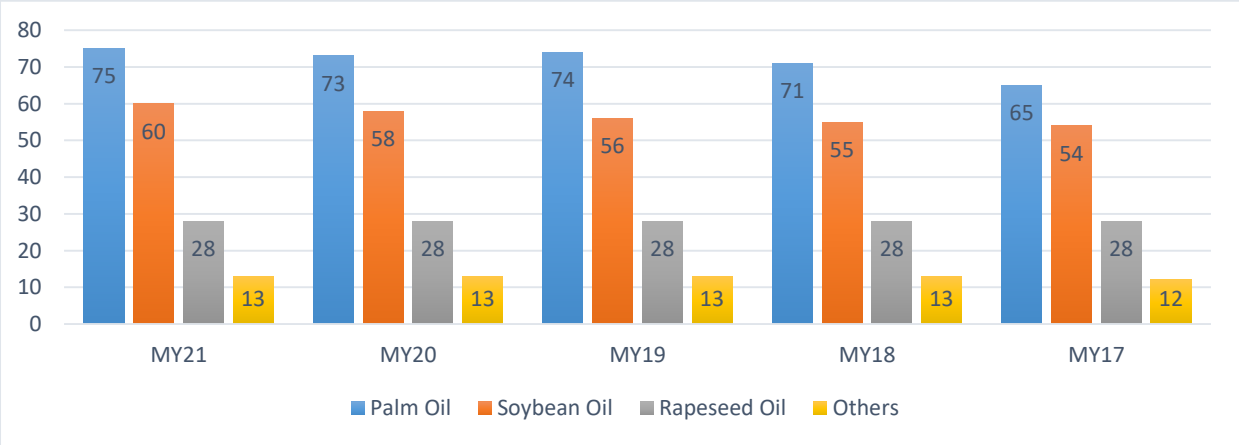
Source: SBP Quarterly Report 2021-22, https://www.sbp.org.pk/reports/quarterly/fy22/First/Special-Section.pdf

[33] https://www.fsai.ie/faq/trans_fatty_acids.html

Global Scenario

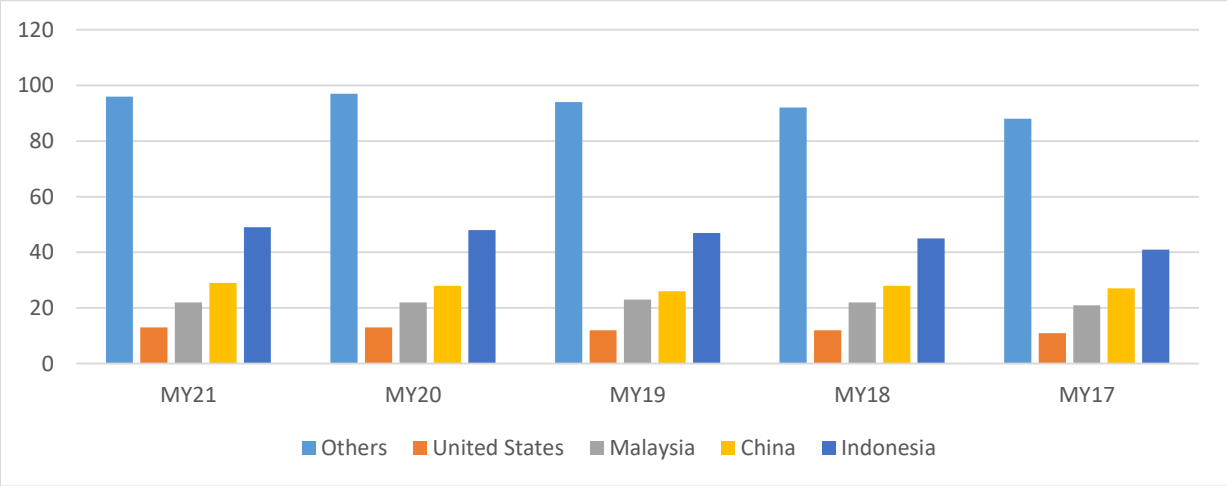
- The global edible oil production stood at 209 million MTs during 2021, with a YoY growth of 1%. In the global oil production Palm oil[34] has the largest share (75 million MTs) in 2021, followed by soybean and rapeseed. In palm oil, Indonesia is the top producer and exporter, accounting for 60% of the total supply. Malaysia's total production accounts for 25% of the total palm oil production.[35] U.S.A is the largest exporter of soybean seeds, Malaysia and Indonesia are the largest exporter of palm oil and their combined production stands at 85% of the total palm oil produced globally.[36] India is the largest importer of edible oil and also of palm oil. The graphs below show variant wise and country wise global edible oil production.

Figure 15: Edible Oil Production - Variant Wise (mln MTs)



Source: PACRA, 2022

Figure 16: Country wise Edible Oil Production (2013-14 to 2021-22)



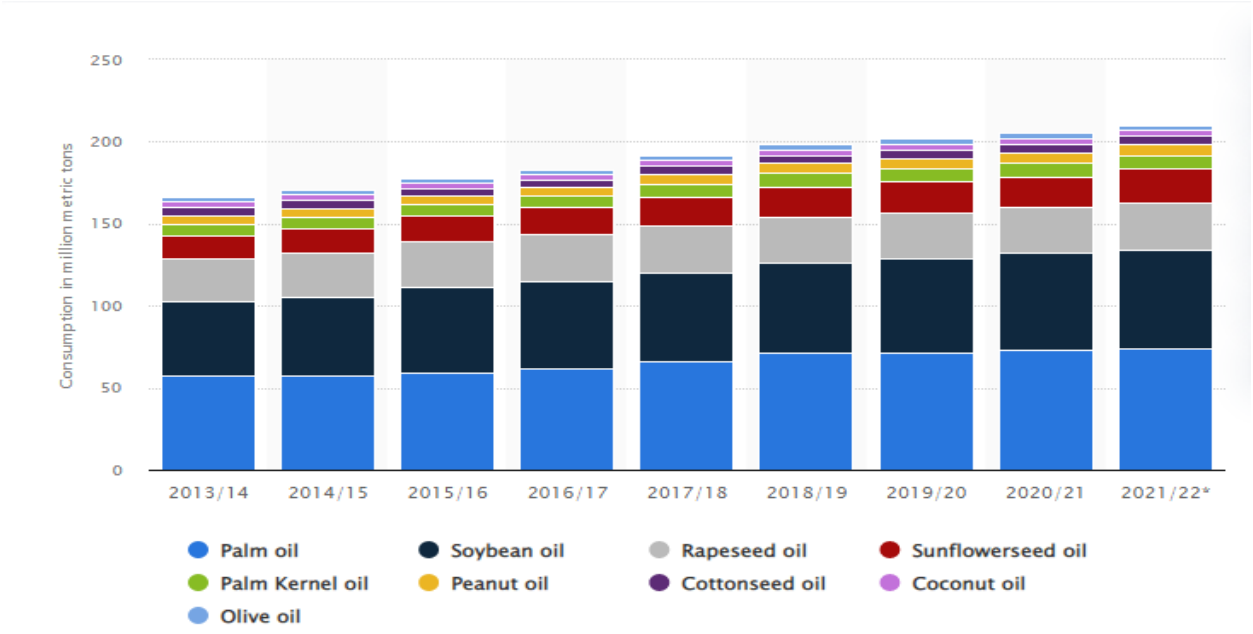
Source: PACRA, 2022

Figure 17: World Edible Oil Consumption (mln MTs)

[34] Two types of palm oil are produced, crude palm oil extracted from squeezing the pulp and palm kernel oil from crushing the kernel.

[35] https://www.reuters.com/business/energy/global-edible-oil-markets-simmer-after-shock-indonesia-ban-2022-04-22/#:~:text=China%20is%20by%20far%20the,Argentina%20(7.9%20million%20tonnes).&text=Argentina%20is%20the%20top%20soyoil,to%20its%20soybean%20growing%20season.

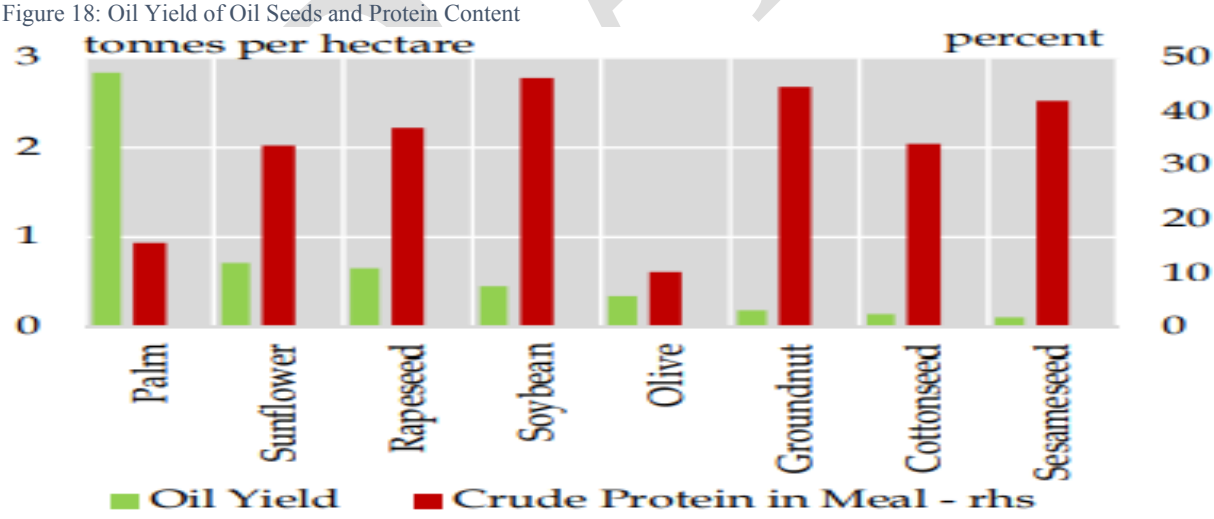
[36] https://www.pacra.com/sector_research/Edible%20Oil%20-%20PACRA%20Research%20-%20Feb'22_1644412856.pdf



Source: Statista

- The production and consumption data shows that palm oil has the highest share in global production and consumption. In comparison to other vegetable oils (soybean, sunflower and rapeseed) palm oil has the highest yield (tonnes per hectare) whereas the crude protein meal yield is lowest. Developing and poor countries have higher demand for palm oil compared to developed countries because palm oil price is lower in comparison to other edible oils.

Figure 18: Oil Yield of Oil Seeds and Protein Content

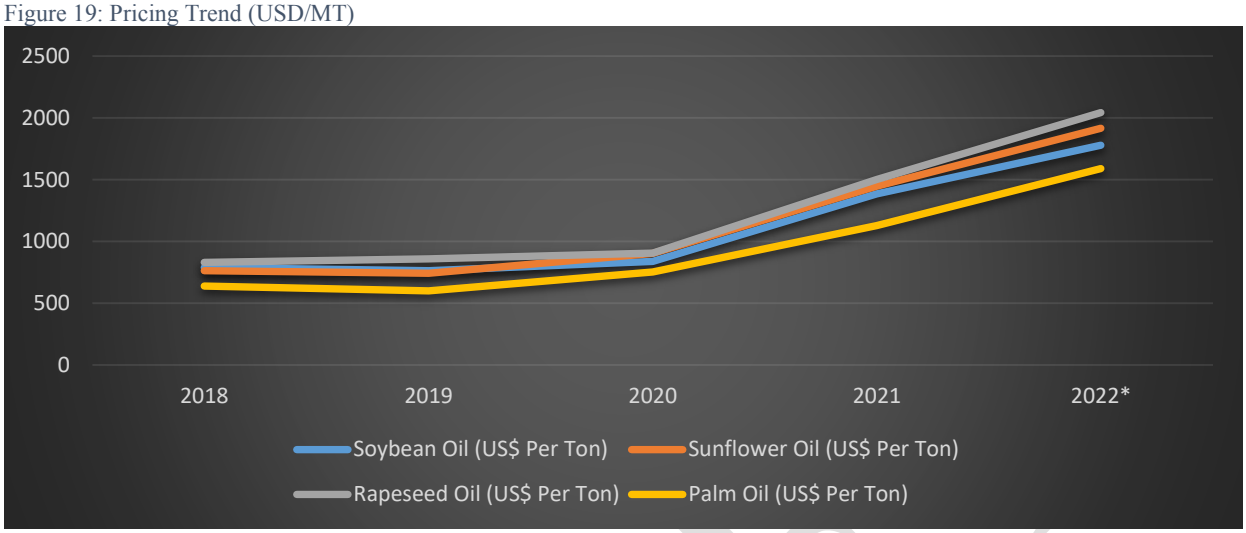


Source: SBP, Quarterly Report, 2022

- The total production of palm oil stands at 75 million MTs and has gradually increased over the years. Palm oil is used to manufacture many products such as margarine, biscuits, detergents and chocolates. Palm oil is the most produced, consumed and traded edible oil in the world and roughly accounts for 40% of the top 4 most popular edible oils: palm oil, soybean, rapeseed (canola) and sunflower seed oil.
- The global pricing trend of edible oil shows a sharp rise since FY 2020, in case of palm oil Malaysia and Indonesia faced labour shortage issues post COVID outbreak leading to supply chain disruptions and an increase in global palm oil prices. Soybean prices

rose due to weather conditions in Brazil and Argentina which are the leading exporters of soybean coupled by high demand from China and India. Russia and Ukraine produce 50% of global sunflower oil, drought conditions led to rise in its price.

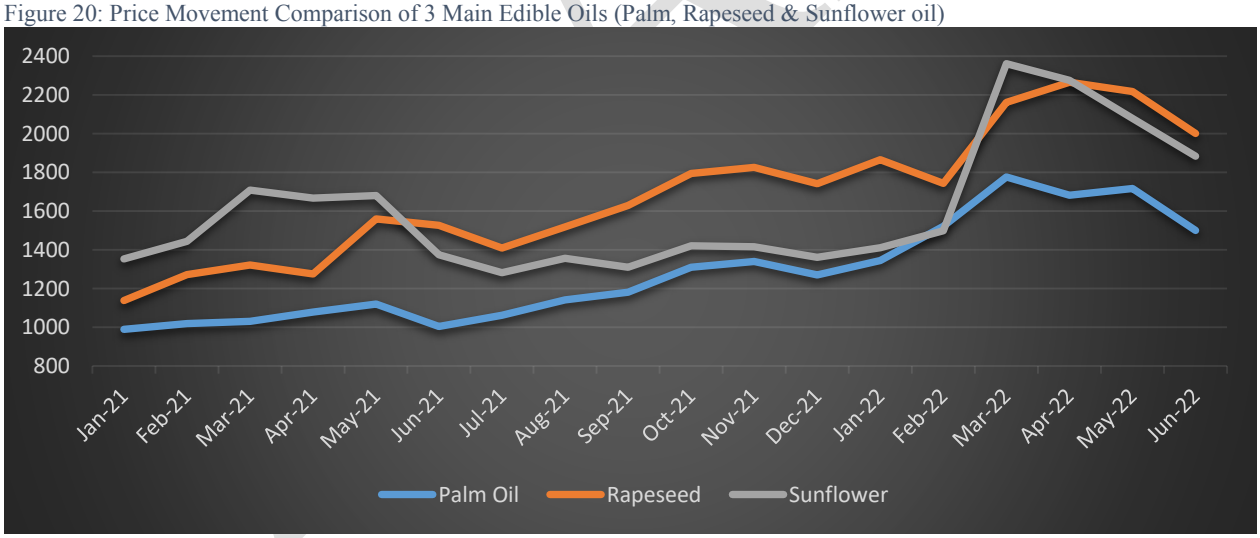
Figure 19: Pricing Trend (USD/MT)



Source: Index Mundi

- The graph below gives a comparison of month on month price movement of the three main edible oils consumed world over, palm, rapeseed and sunflower from Jan'21 to June'22. The trend shows a dip in international edible oil prices since March'22.

Figure 20: Price Movement Comparison of 3 Main Edible Oils (Palm, Rapeseed & Sunflower oil)



Source: Index Mundi

Edible Oil & Ghee Market in Pakistan

- Pakistan's total annual edible oil requirement is 4.1 MMT. The edible oil requirement is met through both the formal and the informal sources. According to estimates the informal sector (such as desi ghee and mustard oil etc.) constitutes 70-80% of the market share, while the formal sector constitutes 20-30%.[37] In 2021, the country only met 11% of its total demand through the domestic sources, remaining 89% was imported. During FY (Jul-Mar) 2022, it was 14% and 86% respectively. 2.754 MMT

[37] https://tdap.gov.pk/wp-content/uploads/2022/01/Oil-_-Ghee-copy.pdf

of edible oil (including oil seeds for crushing) was imported, valuing $3.681 billion during the same period.[38]

- The local production of edible oil during FY 2021-22 (July-Mar) is estimated at 0.460 million tons. The edible oil available from all sources i.e. imported and locally produced is provisionally estimated at 3.214 million tons.[39] The area and production of oilseeds crops domestically during 2020-21 and 2021-22 is given in the table below.

Table 10: Area and Production of Major Oilseeds Crops (000 Tonnes)

Crops	2020-21			2021-22 (Jul-Mar) Provisional		
	Area	Production		Area	Production	
	(000 Acres)	Seed (000 Tons)	Oil (000 Tons)	(000 Acres)	Seed (000 Tons)	Oil (000 Tons)
Cottonseed	5,137	1,782	214	4742	2126	255
Rapeseed-Mustard	608	338	108	692	377	121
Sunflower	151	87	33	253	141	54
Canola	77	49	19	124	79	30
Total	**5,073**	**2,256**	**374**	**5809**	**2723**	**460**
Source: Pakistan Economic Survey 2021-22						

- Comparing the area under cultivation, production of oilseeds and oil of 2020-21 with 2021-22 shows an increase in the area and an increase in production. The seeds total production increased by 20% and the oil production increased by 23% in 2021-22. Ministry of National Food Security & Research initiated 'National Oilseed Enhancement Programme' under National Agriculture Emergency Programme. A subsidy of Rs. 5000 per acre for seeds/inputs of sunflower, canola and sesame and 50% on purchase of oilseed machinery is provided to the farmers.
- Pakistan is the 8th largest consumer of edible oil and the 4th largest importer of palm oil globally with a per capita annual edible oil consumption of 22kg.[40] Palm oil is 100% imported, compared to palm oil only 14% of Soybean oil is imported. The palm oil consumption during FY21 was 3.4 MMT, compared to palm oil only 555 thousand tons of soybean, 481 thousand tons of rapeseed, 271 thousand tons of cottonseed and 61 thousand tons of sunflower oil was consumed during the same period. Moreover, Palm oil constitutes 98% of imported edible oil.

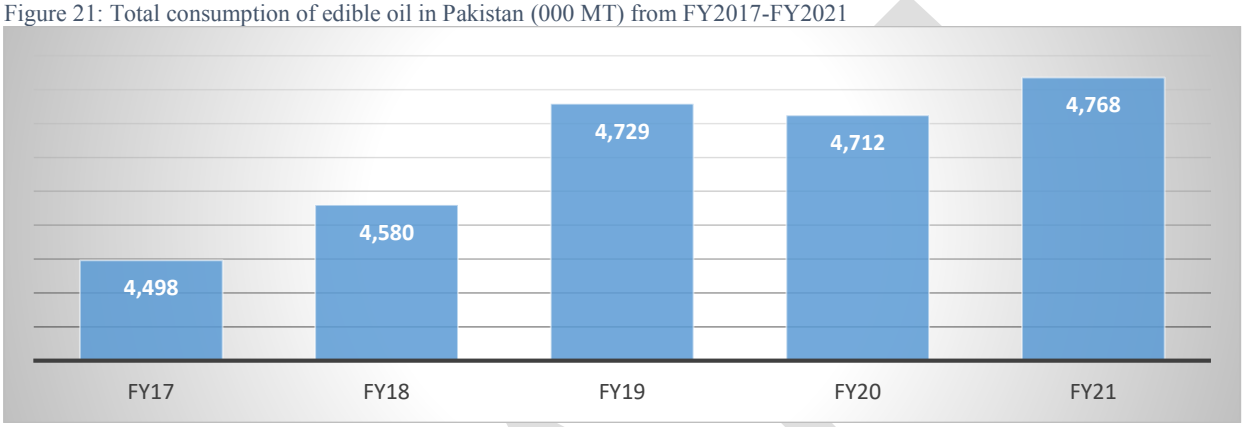
Table 11: Production and Import Data of Edible oils in Pakistan, 000 MT FY21

	Palm Oil	Soybean Oil	Rapeseed Oil	Cottonseed Oil	Sunflower Oil	Total
Opening Stock	260	5	19	3	5	292
Consumption	3410	555	481	271	61	4768
Import	3450	78	0	0	4	3534
Import % of consumption	100%	14%	0	0	7%	74%

[38] Pakistan Economic Survey, 2021-22
[39] ibid
[40] Edible Oil Sector Study PACRA February 2022 https://www.pacra.com

Local Production	0	487	462	271	56	1244
Local Production % of Consumption	0	88%	96%	100%	92%	26%
Closing Stock	300	15	0	3	4	302
Source: PACRA Report on Edible Oil, 2022.						

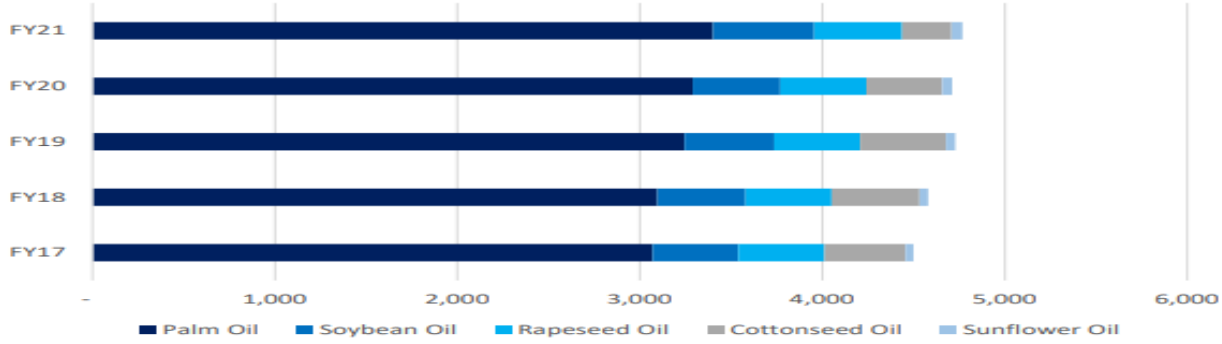
Figure 21: Total consumption of edible oil in Pakistan (000 MT) from FY2017-FY2021



Source: PACRA, 2022

- The graph above shows total consumption of edible oil in Pakistan from FY2017-FY2021, which shows a gradual rise. Comparison of consumption of FY2020 with FY2021 shows a rise of 1.2%.

Figure 22: Edible Oil Consumption (000 MT)



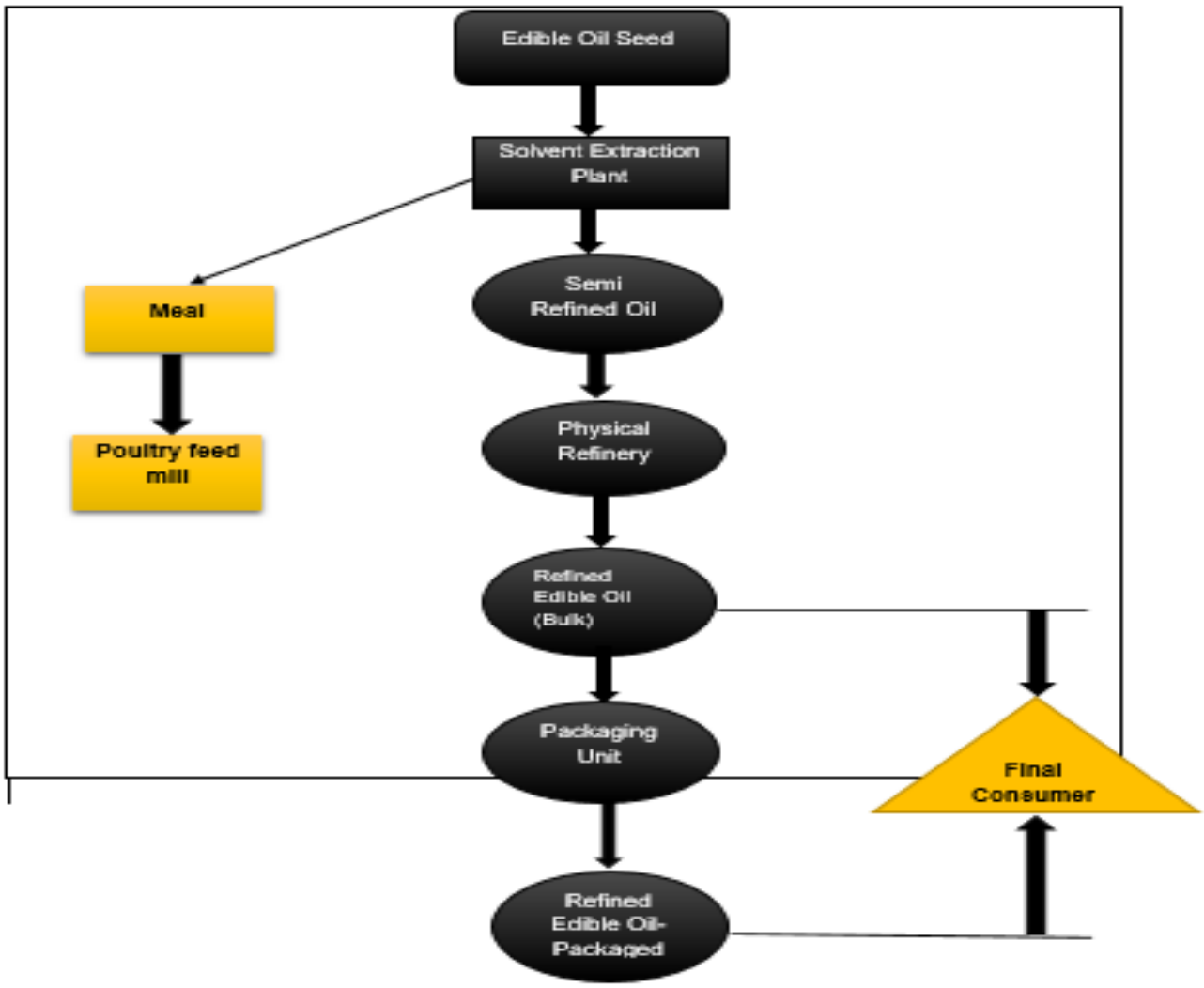
Source: PACRA, 2022

- The above graph shows that **palm oil has the largest share in consumption (75%)** followed by Soybean, Rapeseed, Cottonseed and sunflower oil. Indonesia and Malaysia are the major suppliers of palm oil to Pakistan. The country's consumption data of edible oil and ghee reveals 65% consumption of ghee and 35% of edible oil.[41] During FY 2020-21 Indonesia remained the leading exporter of palm oil with the share of 92% followed by Malaysia with 8% share[42].

[41] https://www.sbp.org.pk/reports/quarterly/fy22/First/Special-Section.pdf

[42] Pakistan Bureau of statistics (PBS)

Value Chain of Edible Oil & Ghee



Edible Oil Imports

Table 12: Palm Oil Imports (2017-2021)

Year	Quantity of Palm Oil Import (000 MT)
2017	3,000
2018	3,300
2019	3,175
2020	3,285
2021	3,450

Source: PACRA

- In the edible oil and oil seed category, palm and soybean imports account for 90% of the total imports in terms of value and 87% in terms of quantity. The combined imports

of palm and soybean have grown noticeably over the last twenty years, rising to 7.1% of total imports in FY21 compared to 3.2% in FY01. Presently, palm and soybean products are among the top 10 commodities imported by the country.[43]

Edible Oil Price

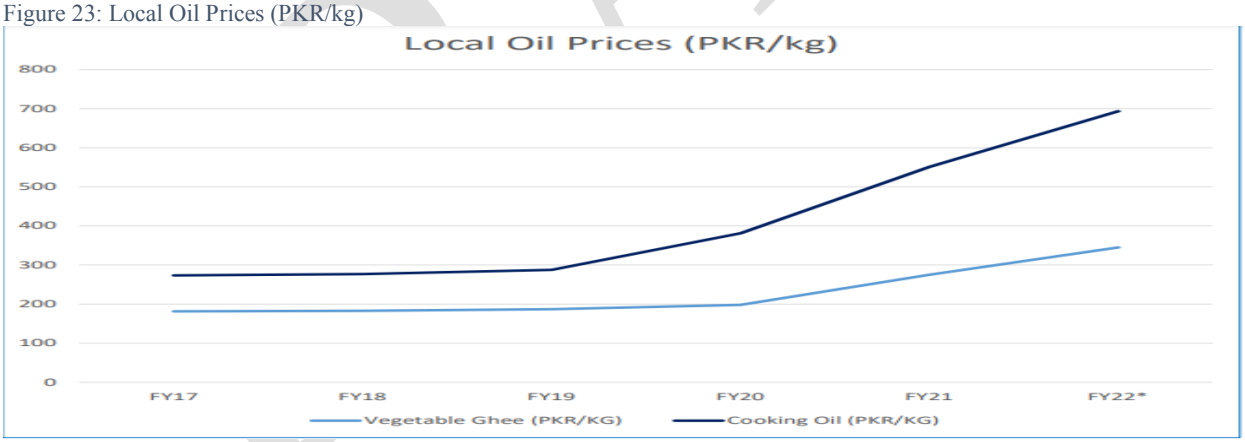
- The landed price plus tariffs play an important role in determining the consumer price. The duty structure on the oil seeds and on crude oil is kept in such a way to shift the value addition to the local industry, however the country still remains one of the major importers of refined palm oil. The table below gives a breakup of the duty structure on imported oilseeds, and edible oil:

Table 13: Duty Structure on Oilseeds, Soybean Meal and Edible Oil

Item	Canola	Sunflower	Soybeans	SBM	RBDPO	Palm Olein	CDSO
Customs Duty	3%	3%	3%	10%	Rs. 10,700	Rs. 9,050	Rs. 10,500
Duty Discount Indonesia					15%	15%	
Additional Duty	2%	2%	2%	2%	2%	2%	-2%
Reg. Duty					Rs. 50/MT	Rs. 50/MT	Rs. 50/MT
Sales Tax	17%	17%	17%	17%	17%	-	17%

SBM: Soybean Meal, RBDPO: Refined Bleached Deodorized Palm Oil, CDSO: Crude Deodorized Soybean Oil, CPO: Crude Palm Oil. Source: USDA Report on Oilseeds and Products Annual, 2022.

Figure 23: Local Oil Prices (PKR/kg)



Source: PACRA, 2022

Table 14: Average Prices of Edible oil & Ghee

Edible Oil Type	Average Price Rs. July'22	Average Price Rs. June'22	Average Price Rs. May'22	Average Price April'22	Average Price July'21	Percentage change in Price (July'22 over June'22)	Percentage change in Price (July'22 over July'21)
Mustard Oil (Average Quality) 1 kg	523.82	535.67	467.20	446.16	303.76	-2	72.45

[43] ibid

Cooking Oil Dalda or other similar (5kg)	2897.90	2807.84	2468.25	2437.87	1657.77	3.21	74.81
Vegetable ghee Dalda/Habib (2.5 kg)	1426.57	1369.17	1231.42	1215.76	836.65	4.19	70.51
Vegetable ghee Dalda/Habib (1 kg)	566.57	572.18	482.40	475.72	327.68	-0.98	72.90
Source: Average monthly price for the month of July'22, PBS							

- The pricing data shows over 70% increase in the price of cooking oil from July'21 to July'22. Vegetable ghee has also shown similar increase during the same period.
- The local edible oil demand is met through both the crushing of oilseeds (both domestically produced and imported) and also through the imported palm oil. Domestically produced cottonseed, rapeseed/canola, and sunflower seeds along with imported soybean and canola are crushed to produce edible oil.[44]
- In Pakistan the edible oil/ghee industry includes refiners, edible oil/ghee plants, and oil extraction units. The edible oil industry consists of three associations i.e. manufacturers of cooking oil, vegetable ghee and allied products (Pakistan Vanaspati Manufacturers Association)-PVMA, Solvent Extractors[45] (All Pakistan Solvent Extractors Association) and Pakistan Edible Oil Refiners (PEORA).[46] There are approximately 140 members of PVMA, around 103 solvent extractors[47] and 10 refiners in Pakistan[48]. The industry manufactures around 3.6 MMT of the products with an installed capacity of over 4.0 MMT.[49] The domestic edible oil industry is further divided into three segments (i) High end brand (ii) Middle priced brand (iii) low end loose cooking oil/vanaspate ghee. As there is difference in the quality, the prices of the three segments vary.

Issues & Recommendations

Region	Weight CPI	% Change in Price in July'22 over June'22	% Change in Price July'22- July'21
Urban			
Mustard oil	0.01%	+1.61	+81.95
Cooking oil	1.10%	+7.66	+72.56
Vegetable ghee	1.03%	+5.11	+74.08
Rural			
Mustard oil	0.01%	-0.04	+75.71
Cooking oil	0.60%	-0.77	+82.70
Vegetable ghee	2.38	+0.88	+82.22

[44] https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Oilseeds%20and%20Products%20Annual_Islamabad_Pakistan_04-01-2021.pdf

[45] Extract oil from vegetables, oilseeds and nuts, by grounding of oilseeds.

[46] Refine crude palm oil and soft oils. Provide fresh palm oil a[46] https://tdap.gov.pk/wp-content/uploads/2022/01/Oil-_-Ghee-copy.pdf

[46] Extract oil from vegetables, oilseeds and nuts, by grounding of oilseeds.
nd palm fatty acid distillate to soap/ghee industry

[47] http://www.apsea.com.pk/downloads/List-Of-Solvent-Plants-in-pakistan.pdf

[48] http://poram.org.my/wp-content/uploads/2013/12/Peora.pdf

[49] http://pvma.com.pk/

- The above table shows the weights of mustard oil, cooking oil and vegetable ghee in the CPI. Vegetable ghee in comparison to cooking oil has a higher weight both in urban and rural areas. The price of all three edible oil types has increased more than 70% in July'22 compared to July'21. In the urban area mustard oil had the highest increase, i.e 82% rise in price during the same period, whereas in the rural area cooking oil had the highest increase, i.e 83%.
- During FY17-FY21, the vegetable oil and ghee prices increased by (CAGR) 9% and 25% respectively.
- As the edible oil and ghee market of Pakistan is **highly dependent on imported palm oil which is 100% imported and the local sources have a share of only 14% in the total edible oil consumption**. Thus rise in international prices of edible oil and oilseeds and exchange rate fluctuations have a key impact on the domestic prices. It is also a market norm the producers pass on any increase in cost of purchase to the end consumers.
- In the international market, the edible oil prices did not show high variation up to FY19, however **post Covid the international prices have increased rapidly.** Many factors are responsible for the **global rise in prices**;
    - Rise in **demand for biofuels- renewable energy projects** in China, biodiesel plants in Southeast Asia (Indonesia & Malaysia) has resulted in higher demand for oilseeds and oils towards biofuels which has resulted in higher demand and pushed up the prices.
    - In case of **sunflower oil, a sharp decrease in supply due to Russia-Ukraine war**, as both these countries together account for 75% of sunflower oil production. Before the war Ukraine was the largest exporter of sunflower oil. Due to war the Ukrainian farmers will miss the planting and harvesting season.
    - **Sanctions against Russian firms** to export sunflower oil/seeds.
    - **In Indonesia, due to rise in domestic palm oil prices, the Indonesian government has found evidence of cartel activity**, where producers, distributors, business associations, government officials and retailers are colluding to restrict supply and fix prices.[50]
    - The World Bank expects edible oil prices to keep rising, more than 20% in the next year.
    - **In India, the domestic oil prices have risen by 25-56%** as well in last one year.
    - In the international commodity trading, the price of crude palm oil (Futures contract at the Bursa Malaysia Derivatives Exchange) was quoted 3,890 ringgit/ton on May 25th, 2022 compared to 2,281 ringgit/ton a year ago. Likewise on the Chicago Board of Trade (CBOT) the price of soybean for July delivery was $559.51/ton on 24th May'22 against $306.16/ton on 24th May, 2021.
    - A **shift of edible oils from food basket to fuel basket**.
    - **La Nina effect**, a weather pattern which causes drier weather in soybean crop growing areas of South America, while bringing heavier rainfall to palm oil regions of Indonesia and Malaysia disrupting harvesting and logistics on palm estates and affecting port operations.

[50] https://www.npr.org/sections/money/2022/05/03/1096044152/how-palm-oil-prices-are-affecting-the-global-economy

- **Post Covid labour shortages in Malaysia, resulted in less availability of workers in plantation areas, affecting harvesting and keeping the supplies low.**
- The Federal and provincial governments have launched oilseed promotion initiative, where the growers of oilseed receive a subsidy of PKR. 5,000 per acre to plant canola and sunflower up to 20 acres. Some planting increase has resulted from the subsidy however the expected increase did not occur due to competition from other crops such as wheat and sugarcane, receiving guaranteed support price.
- Soybean production remained low due to climatic conditions (harsh summers) and lack of seed varieties.
- Cottonseed that accounts for almost 84% of local oilseeds has decreased by 6% in 2022 compared to 2021 due to lack of availability of quality seeds. Further the pricing dynamics in favour of sugarcane over cotton growing has resulted in more area used for sugarcane production.
- Further where the oilseeds are Rabi crops, wheat production is preferred over oilseeds due to support price offered by the government. This year (current sowing season 2022) the wheat support price increased from PKR. 1,950 to PKR. 2,200 per 40 kg, this support price offsets any incentives to plant oilseeds.

3. Potato

Introduction

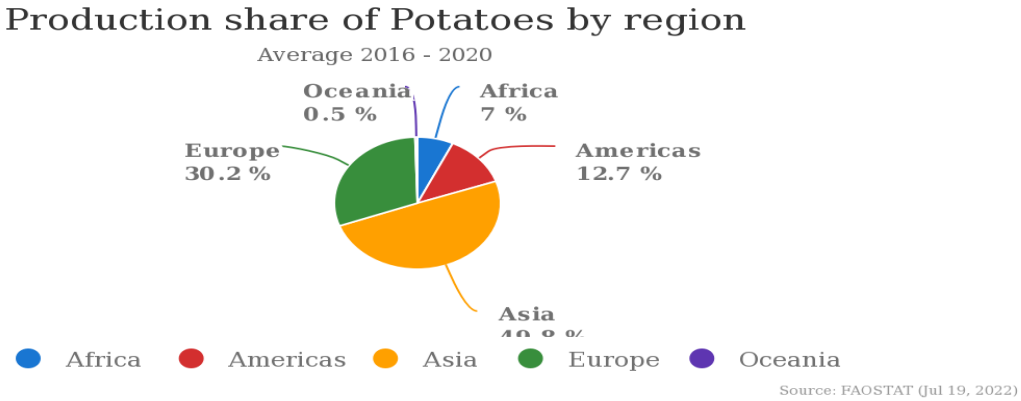
- Potato is one of the most important edible and profitable crops of Pakistan. It is the second most important crop after wheat, rice and maize and can be called a complete food. Being rich in starch it also contain vitamins, minerals and proteins. The potato crop is capable of yielding much more per unit area than other cereal crops.[51]
- At the time of independence, the total area under potato cultivation in Pakistan was limited to a few thousand hectares and the total annual production was less than 30,000 tons. In the decades since independence, potatoes have become the fastest growing food crop in the country, resulting in tremendous gains in cultivated area and average yields.[52]
- Once the potato crop is harvested, it can be used for numerous purposes i.e. vegetable for home cooking, raw material for processing of food products, food ingredients, starch and alcohol, feed for animals and seed tubers for next crop. There are about 5000 potato varieties cultivated worldwide. In Pakistan, following varieties are currently cultivated:

Table 15: Types of Potatoes

Red Skin	White skin
Desiree	Diamant
Ultimus	Patrones
Lal-a-Faisal	Multa
Raja Symphonia	Santana
Asterix	Sante
Cardinal	Ajax
Source: https://tdap.gov.pk/wp-content/uploads/2022/03/4.1-POTATOES-TDAP-Multan.pdf	

Global Perspective

- China and India are the World's leading potato producers contributing around one third of the total world production. In 2020, the potato production accounted for 359 million metric tons over an area of 16,494 thousand hectares with an average yield of 21.76 tons per hectare.[53] The figure below shows that Asia is the major potato producer having a share of 49.8% followed by Europe 30.2%, Americas 12.7%, Africa 7% and Oceania 0.5%.



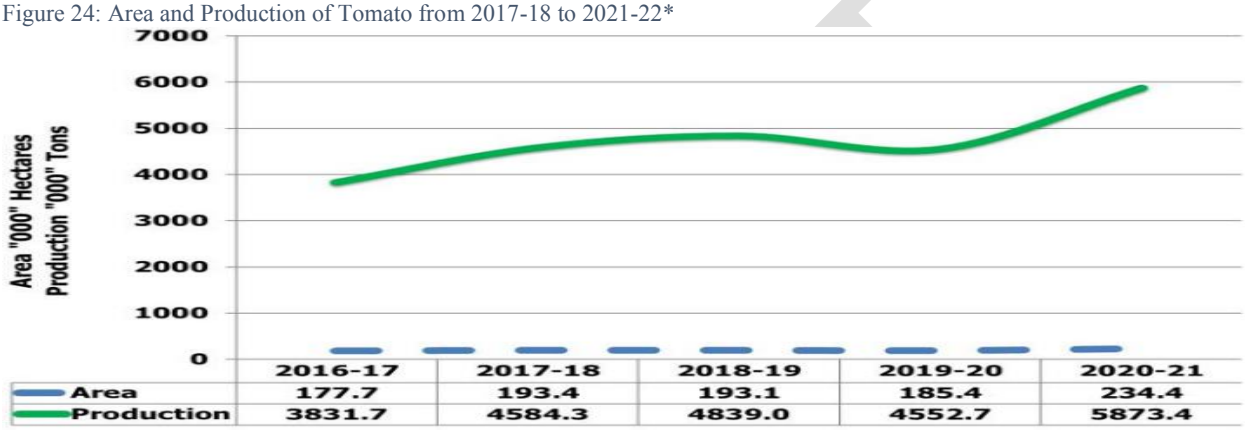
[51] https://aari.punjab.gov.pk/
[52] https://www.pc.gov.pk/uploads/report/Potato_Cluster_Report.pdf
[53] https://www.statista.com/statistics/382174/global-potato-production/

- In terms of consumption, China is the major consumer of potatoes with 63,875 thousand tons followed by India 34,112 thousand tons, USA 17,165 thousand tons and Russia 13,147 thousand tons. Pakistan ranked 13th in the list of top consumers.[54]

Domestic Production and Area of Potatoes

- During 2021-22, the potato was cultivated on an area of 313.8 thousand hectares with the total production of 7,937.1 thousand tons, witnessed an increase of 35%. The average yield for the year under review is calculated at 25.29 tons per hectare. The national consumption is around 4 to 5 million tons. Out of 157 countries Pakistan is the 18th leading potato producer in the world.

Figure 24: Area and Production of Tomato from 2017-18 to 2021-22*

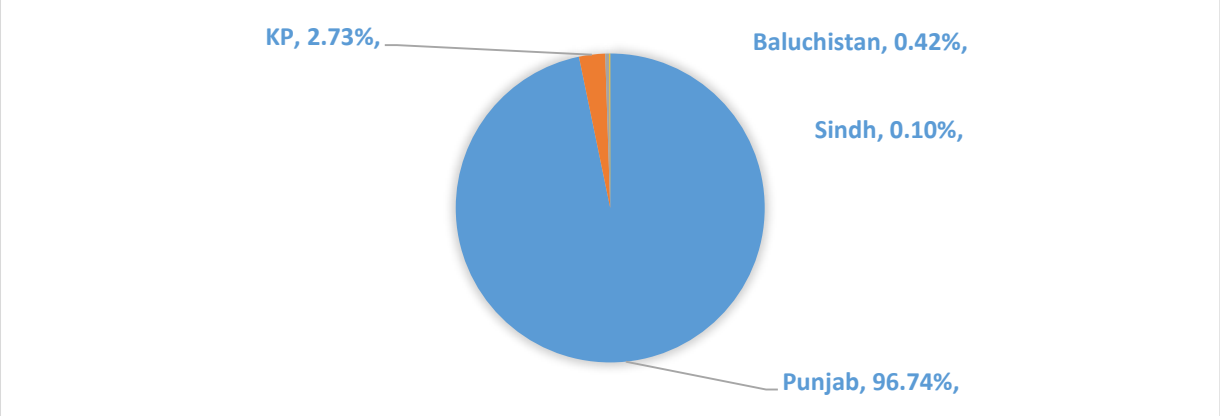


	2016-17	2017-18	2018-19	2019-20	2020-21
Area	177.7	193.4	193.1	185.4	234.4
Production	3831.7	4584.3	4839.0	4552.7	5873.4

Source: Punjab Crop Reporting Service

Provincial Share in Production

Figure 25: Provincial Share in production of Potato

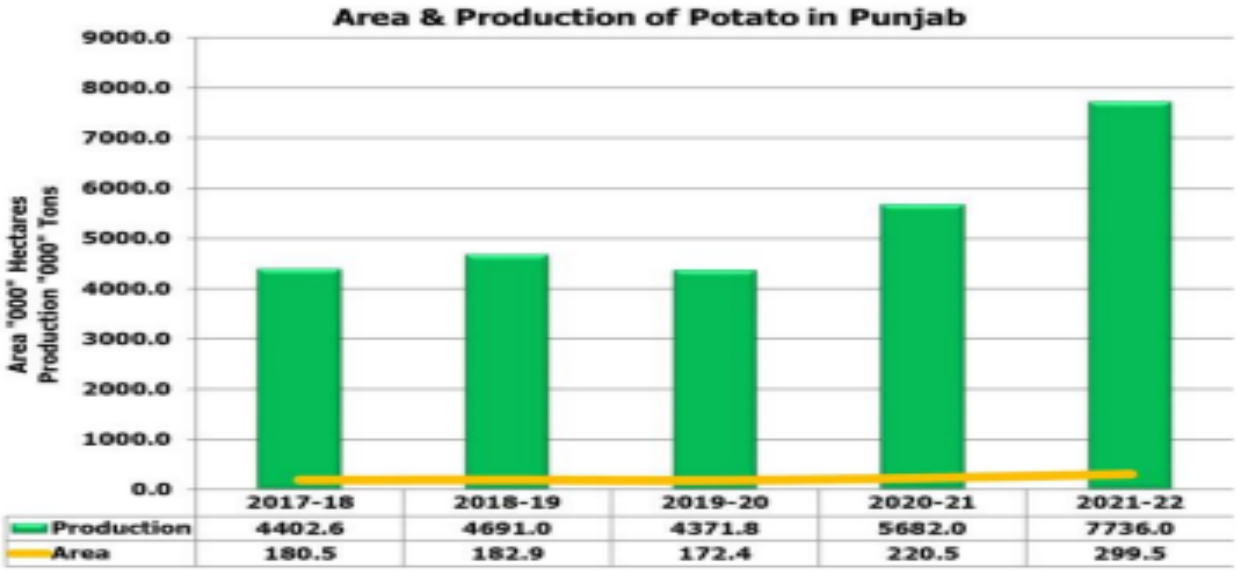


Source: Punjab crop reporting service

- Predominantly, Punjab is the major producer of potatoes with the production of 7,736 thousand tons during 2021-22 accounting for around 97% of the total national production. The graph below shows the production and area of potato during 2021-22.

[54] https://www.helgilibrary.com/indicators/potato-consumption-total/

Figure 26: Area & Production of Potatoes in Punjab



Source: Punjab crop reporting service

Supply Chain of Potato

Source:
https://www.ppaf.org.pk/doc/programmes/Final%20Report_MDC%20Market%20Assessment%20and%20Value%20Chain%20Analysis.pdf

Potato growing areas in Pakistan

- Potato cultivation is strongly concentrated in Punjab, where currently around 97 percent of the potato production originates.[55] 75% of the potato crop is cultivated in Kasur, Okara, Depalpur, Sahiwal and Pakpattan. It is also called as core areas of potatoes.

Table 16: Major growing areas of Potato in Pakistan

[55] https://www.potatopro.com/pakistan/potato-statistics#:~:text=Potato%20cultivation%20is%20strongly%20concentrated,KPK)%2C%20Balochistan%20and%20Sindh.

Provinces	Cities
Punjab	Okara, Sahiwal, Kasur, Sialkot, Jhang, Narowal, Pakpattan, Depalpur, T.T. Singh, Chiniot and Khanewal.
KP	Nowshera, Dir, Swat, Balakot, and Mansehra
Baluchistan	Pishin, Killa Saifulla and Kalat.
Gilgit Baltistan	Skardu, Shigar, Kharmang, and Ghanche. Gilgit, Ghizer, Hunza and Nagar.
Source: http://www.valleyirrigationpakistan.com/wp-content/uploads/2012/09/Potato-Cultivation-in-Pakistan.pdf, https://www.pc.gov.pk/uploads/report/Potato_Cluster_Report.pdf	

Sowing and Harvesting Season

- There are three growing seasons for potato i.e. spring, summer and autumn. The detail and production share is given in the following Table.

Table 17: Sowing and harvesting of Potato

Season	Sowing	Harvesting	Production Share
Spring	Jan-Feb	Apr-May	07.10 %
Summer	Mar-May	Aug-Oct	15-20 %
Autumn	Sep-Oct	Jan-Feb	70-75 %
Source: http://agribusiness.org.pk/wp-content/uploads/2020/12/8.-Potato_VCA_Report.pdf			

Commercial utilization of Potato in Pakistan

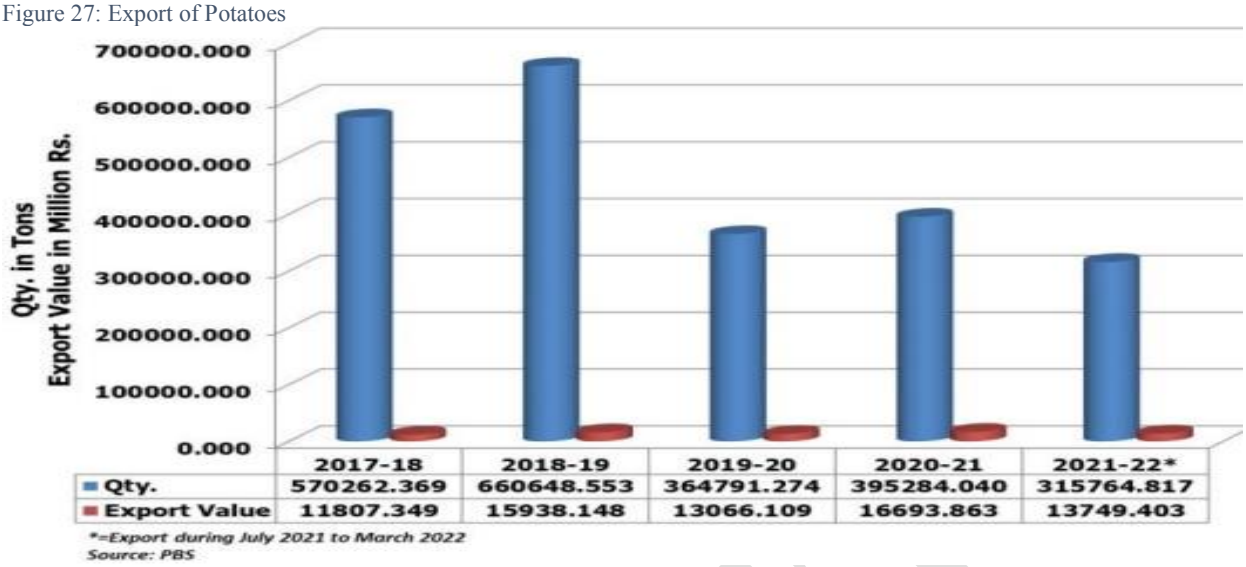
- Potato processing industry is comprised of four segments i.e. potato chips, French fries, potato flakes and starch flour. The snacks industry is experiencing an annual growth of 20-30%[56], chips being the most common and popular processed product constitutes around 85% of the snack business. The utilization of raw potato by the industry is around 6%[57] of the total production. The significant players in the potato processing industry are PepsiCo (Lays), Fauji fertilizer (Fresh n Freeze) and Ismail Industries (kurleez). They are linked with growers under contractual arrangement for the provision of raw material.

Potato exports from Pakistan

- Pakistan is one of the largest exporter of potatoes. During July 2021 to March 2022, Pakistan has exported 315,764 thousand tons of potato valuing PKR 13,749 million. The top destinations for the export of potatoes are Sri Lanka, UAE, Afghanistan, Qatar, Malaysia, Oman, Russia, Singapore etc. The graph below shows the export trends for the last five years.

[56] https://www.pacra.com/sector_research/Food%20Products%20-%20PACRA%20Research%20-%20Dec'20_1608986137.pdf
[57] https://www.pc.gov.pk/uploads/report/Potato_Cluster_Report.pdf

Figure 27: Export of Potatoes



Source: Punjab crop reporting service

Cost of production

- The table below shows the cost of production of potato in which major chunk of cost is associated to seed & sowing (45%), most of the seed sown is imported from Netherlands and India. The second major cost component is fertilizer (23%), surge in international prices of fertilizer have impacted the local fertilizer market. The farm gate price of 40 kgs of potato comes to the tune of Rs 458, which implies that a farmer spent approximately Rs 12 to produce one kg of potato.

Table 18: Cost of Production for Potato 2021-22

Cost of Production (Potato)		
Operation	**Total Cost (Rs./Acre)**	**%age of total Cost**
Land Prep	8,412	8%
Seed & Sowing	**45,211**	**45%**
Water	6,819	7%
Fertilizer	**23,280**	**23%**
Dung	227	0.23%
Pesticides	3,256	3%
Weedicides	788	1%
Harvesting	7,172	7%
Other Expenses	136	0.14%
Transport	4,545	5%
Full/Half Yearly Land Rent	15,000	
Cost of Production with Land Rent	**114,846**	
Cost of Production (at farm gate Rs/40kg)	**458**	
Source: Crop reporting service, Punjab		

Price Trend of Potatoes Domestic and International

- The following graph shows the average yearly prices of potato for the period starting from Jan-2019 to June, 2022. It can be observed that the prices are fluctuating during the years under review. During the calendar year 2019 the price of potato witnessed an increase of 74% (Rs 22 per kg) while during CY 2020, 2021 and 2022 experienced an increase in price by up to 33%, 22% and 21% respectively.

Table 19: Monthly Average Price Movement of Potato in last three years (PKR/kg)

Period	Price (Per Kg)	% Δ	Period	Price (Per Kg)	% Δ	Period	Price (Per Kg)	% Δ	Period	Price (Per Kg)	% Δ
Jan-2019	23	-	**Jan-2020**	45	-	**Jan-2021**	41	-	**Jan-2022**	42	-
Feb-2019	22	-4%	**Feb-2020**	39	-13%	**Feb-2021**	38	-7%	**Feb-2022**	37	-12%
Mar-2019	21	-5%	**Mar-2020**	44	13%	**Mar-2021**	39	3%	**Mar-2022**	37	0%
Apr-2019	22	5%	**Apr-2020**	47	7%	**Apr-2021**	44	13%	**Apr-2022**	36	-3%
May-2019	27	23%	**May-2020**	58	23%	**May-2021**	47	7%	**May-2022**	37	3%
Jun-2019	32	19%	**Jun-2020**	58	0%	**Jun-2021**	48	2%	**Jun-2022**	49	32%
Jul-2019	36	13%	**Jul-2020**	62	7%	**Jul-2021**	51	6%	**July-2022**	56	14.5%
Aug-2019	40	11%	**Aug-2020**	67	8%	**Aug-2021**	52	2%			
Sept-2019	41	3%	**Sept-2020**	69	3%	**Sept-2021**	50	-4%			
Oct-2019	45	10%	**Oct-2020**	70	1%	**Oct-2021**	55	10%			
Nov-2019	49	9%	**Nov-2020**	77	10%	**Nov-2021**	59	7%			
Dec-2019	45	-8%	**Dec-2020**	57	-26%	**Dec-2021**	49	-17%			
Net Δ	**22**	**74%**	**Net Δ**	**12**	**33%**	**Net Δ**	**8**	**22%**	**Net Δ**	**7**	**21%**
Source: PBS											

- The comparison of domestic price with the neighboring countries is given in the table below. It can be observed that the domestic price of potato is much lower as compared to other neighbor countries.

Country	Price (PKR/Kg)
Pakistan	40
India	80.39
Bangladesh	62.79
Iran	141.42
China	179.97
Sri Lanka	189.76
Oman	233.63
Qatar	237.25
Kuwait	236.83
UAE	241.80
Saudi Arabia	253.06
Source: https://www.numbeo.com/cost-of living/country_price_rankings?itemId=112&displayCurrency=PKR	

Current Situation

- The Federal Committee on Agriculture had fixed a target of 5.96 million tonnes of the crop for Punjab on 546,000 acres – an average of 273 maunds per acre.
- According to the Punjab Crop Reporting Service, the acreage has grown up to 740,400 acres, an increase of around 35 per cent.

- This 35% increase in acreage, translating into an increase of 3 million tons of overproduction in Punjab.
- According to the Punjab Crop Reporting Service, the reason for the increase in Potato production this year was the cultivation of more land by the farmers as the prices of potatoes were higher last year.

Issues & Recommendations

- Predominantly, Punjab is the major producer of Potato and contributes around 97% to total production in the country. Currently, the province has an overproduction of around 3 million tons, which is equal to the total average production between 2011 and 2015. [58] It is learnt that there are about 3000 privately owned cold storages situated in Okara, Sahiwal, Vihari, Pakpatan and Lahore where potatoes are stored and a fee of Rs 750 per 120kg bag is being charged for the storage period starting from mid-January till September of each year. The shelf life of potato is up to three months, since, the cost of storage is higher for farmer and in order to maintain balance of supply and demand in the market the government should facilitate the farmers either by establishing the cold storages or providing financial assistance. This measure will ultimately benefit the farmer in getting his fair share of profit rather than wasting the crop in a fear of price crash.
- Presently, Pakistan exports around 15%[59] of the total production which is very low. In order to handle the windfall production of potatoes, the government needs to identify and devise a plan for the export of potato to the countries facing shortage from Feb to March every year. Egypt and South Africa are the key markets for fast food restaurants and face shortages due to extreme weather.
- There are number of international food chains who are consuming imported potatoes. In order to promote the domestic potato, the government may encourage public private partnership program with the food chains keeping in view the protocols as set under the sanitary and phytosanitary (SPS) [60] framework. In this regard, assistance may be provided for the purchase of plant and machinery to fulfill the demand of international clientele.
- There is a need to create linkages of farmers with the processing industry. Provincial Agriculture departments/Research institutes are advised to do research and develop potato seed for farmers as per the requirements of processing industry so that the indigenous product may get recognition among the international food chains operating in Pakistan.
- Since potato is a bumper crop this year, government may consider operationalize barter trade mechanism with other countries i.e. Russia, Iran, China and India. Russia is a lucrative market for Pakistani potato and in order to capitalize this opportunity, the government should consider wheat procurement in exchange of potato.

[58] https://www.dawn.com/news/1676068
[59] https://www.pc.gov.pk/uploads/report/Potato_Cluster_Report.pdf
[60] WTO agreement: All countries maintain measures to ensure that food is safe for consumers, and to prevent the spread of pests or diseases among animals and plants. These sanitary and phytosanitary measures can take many forms, such as requiring products to come from a disease-free area, inspection of products, specific treatment or processing of products, setting allowable maximum levels of pesticide residues or limiting the permitted use of additives in food. Sanitary (human and animal health) and phytosanitary (plant health) measures apply to domestically produced food or local animal and plant diseases, as well as to products coming from other countries.

4. Poultry

Introduction

- The poultry industry of Pakistan is a major livestock sub-sector, playing a pivotal role in economic growth and rural development. Being the 11th largest producer of the poultry products in the world, the current investment in Poultry Industry is more than PKR 750 billion and progressing at an impressive growth rate of 7.5% per annum. The industry is providing employment (direct/indirect) to over 1.5 million people. [61]
- Approximately 60% of poultry farming is being carried out conventionally while 40% is based on environmentally controlled sheds .In 2021-22 the total meat production in Pakistan was 5,219 thousand tonnes in which poultry meat production contributes 1,977 thousand tonnes[62]. **Per capita consumption of poultry meat in Pakistan is approximately 6.62 kgs annually**[63].
- Similarly, egg production was 22,512 million posting a growth of 5.76% as compared to previous year majority of egg production is through commercial farming.[64] **The per capita egg consumption in Pakistan is 88 eggs annually**[65].
- **Poultry meat production has increased from 1,657 thousand tonnes in 2019-20 to 1,977 thousand tonnes in 2021-22** and it has registered an increase of 19.31 percent in 2021-22 compared to 2019-20. The comparative status of production of eggs, beef, mutton and poultry meat for last three years is given in the table below:

Table 20: Estimated Meat & Eggs Production

Type	Units	2019-20	2020-21	2021-22
Eggs (Commercial & desi)	Million Nos	20,133	21,285	22,512
Beef	000 tons	2,303	2,380	2,461
Mutton	000 tons	748	765	782
Poultry Meat	000 tons	1,657	1,809	1,977
Source: Pakistan Economic Survey 2021-22				

- The current turnover of Pakistan's poultry sector is about PKR 1,082 billion with an annual growth rate of 10-12%.[66] The table below shows that Punjab accounts for the highest share in broiler and layer production in Pakistan with 883 million broilers (57 %), 23.12 million layer birds (34%) and 9.84 million (66%) breeding stock respectively.

Table 21: Comparison of National Poultry Population with Punjab Province 2021-22 (Million)

Type	Punjab**	Pakistan*	Share of Punjab (%)
Broilers	883	1,548.51	57
Layer	23.12	68.49	34
Breeding Stock	9.84	15.06	66
Domestic Poultry	39.92	92.62	43
Total Poultry Birds	**955.88**	**1,725**	**55**
DOC	**1007.56**	**1,651**	**61**
Source: *Pakistan Economic Survey 2021-22 Source: Poultry Research Institute Punjab (these values pertains to the period 2019-20. Latest values are yet to be incorporated once published by PRI)			

[61] Pakistan Economic Survey 2020-21
[62] Pakistan Economic Survey 2021-22
[63] https://www.statista.com/statistics/758159/pakistan-poultry-consumption-per-capita/
[64] Pakistan Economic Survey 2020-21
[65] https://pakistanpoultry.org/wp-content/uploads/2020/10/AN-OVERVIEW-OF-PAKISTAN-POULTRY-INDUSTRY-2019-2020.pdf
[66] https://pakistanpoultrycentral.pk/news/an-overview-of-pakistan-poultry-industry-year-2019-2020/

- The poultry sector in Pakistan comprises of a large number of small farmers scattered over different areas. The total number of broiler and layer farms in Punjab alone are 13,865 and 2,300 respectively.

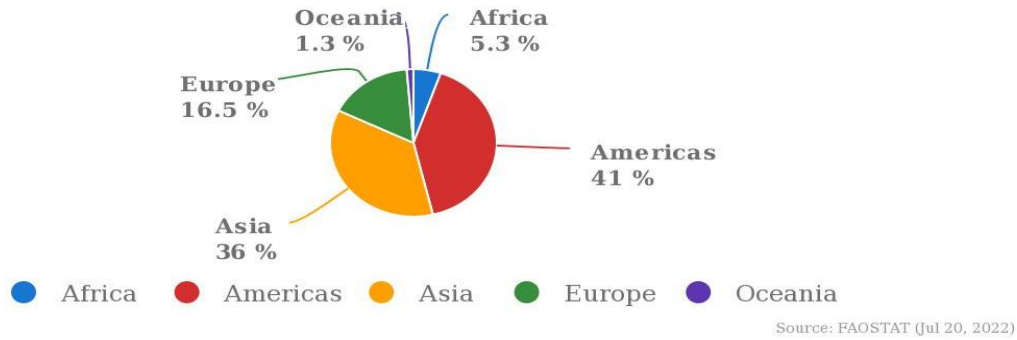
Table 22: Division wise Establishment of Private Poultry Farms & Capacity to maintain birds and Rural Population in Punjab 2019-20

Sr. No.	Division	Broiler/Rural Farms			Layer Farms			Rural Poultry
		No. of Farms	Capacity (Mill.)	Birds Maintained (Mill.)	No. of Farms	Capacity (Mill.)	Birds Maintained (Mill.)	Birds Maintained (Mill.)
1	Bahawalpur	983	36.61	30.57	46	0.79	0.79	4.27
2	D.G. Khan	1016	54.73	52.97	108	0.59	0.54	4.89
3	Faisalabad	2077	111.09	106.11	796	9.99	7.13	6.10
4	Gujranwala	2398	135.12	129.94	323	4.29	3.02	5.20
5	Lahore	1427	102.58	99.44	150	2.87	2.69	6.68
6	Multan	2132	135.50	131.42	199	10.41	2.04	3.91
7	Sahiwal	563	87.30	85.34	194	2.80	1.77	2.29
8	Rawalpindi	2208	99.35	96.08	352	4.67	3.97	3.57
9	Sargodha	714	138.15	133.73	32	0.97	0.78	2.94
10	Islamabad	347	18.47	17.40	100	0.60	0.40	0.07
Total Punjab		**13,865**	**918.89**	**883**	**2300**	**37.99**	**23.12**	**39.92**

Source: Punjab Poultry Research Institute, Rawalpindi

Global Perspective

- The poultry sector continues to grow and industrialize in many parts of the world. The United States of America is the major poultry producer around the globe. During the year, 2022 the USA has produced 20,525 million metric tons of poultry followed by Brazil 14,850 million metric tons and China 14,300 million metric tons.[67] The figure below shows the region wise share of poultry production.



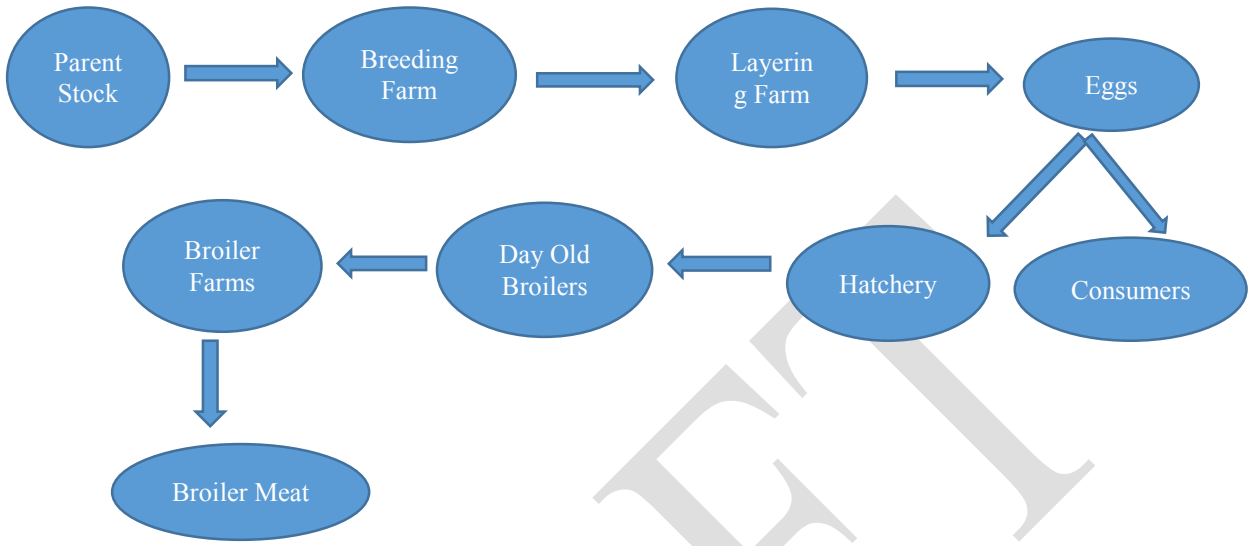
- Brazil and the United States are the two top exporters of broiler meat in the world, at about 3.9 million metric tons, and 3.3 million metric tons respectively. The per capita consumption of chicken meat in USA is about 43 kg in 2021.

Poultry Process Flow

- The poultry process comprises of import of GP stock, breeding of parent stock, hatching of day old chicks, layer farming, and broiler farming. Poultry feed, vaccines, and medicines are its ancillary or allied sectors. The production of broiler is based on the import of day old chick as grandparent flock, out of which the parent flock is produced

[67] https://www.statista.com/statistics/237597/leading-10-countries-worldwide-in-poultry-meat-production-in-2007/

as a layer for hatching the broiler chick. As per estimates of the livestock department this entire cycle takes 1.5 to 2 years. The process flow of the poultry is as follows:

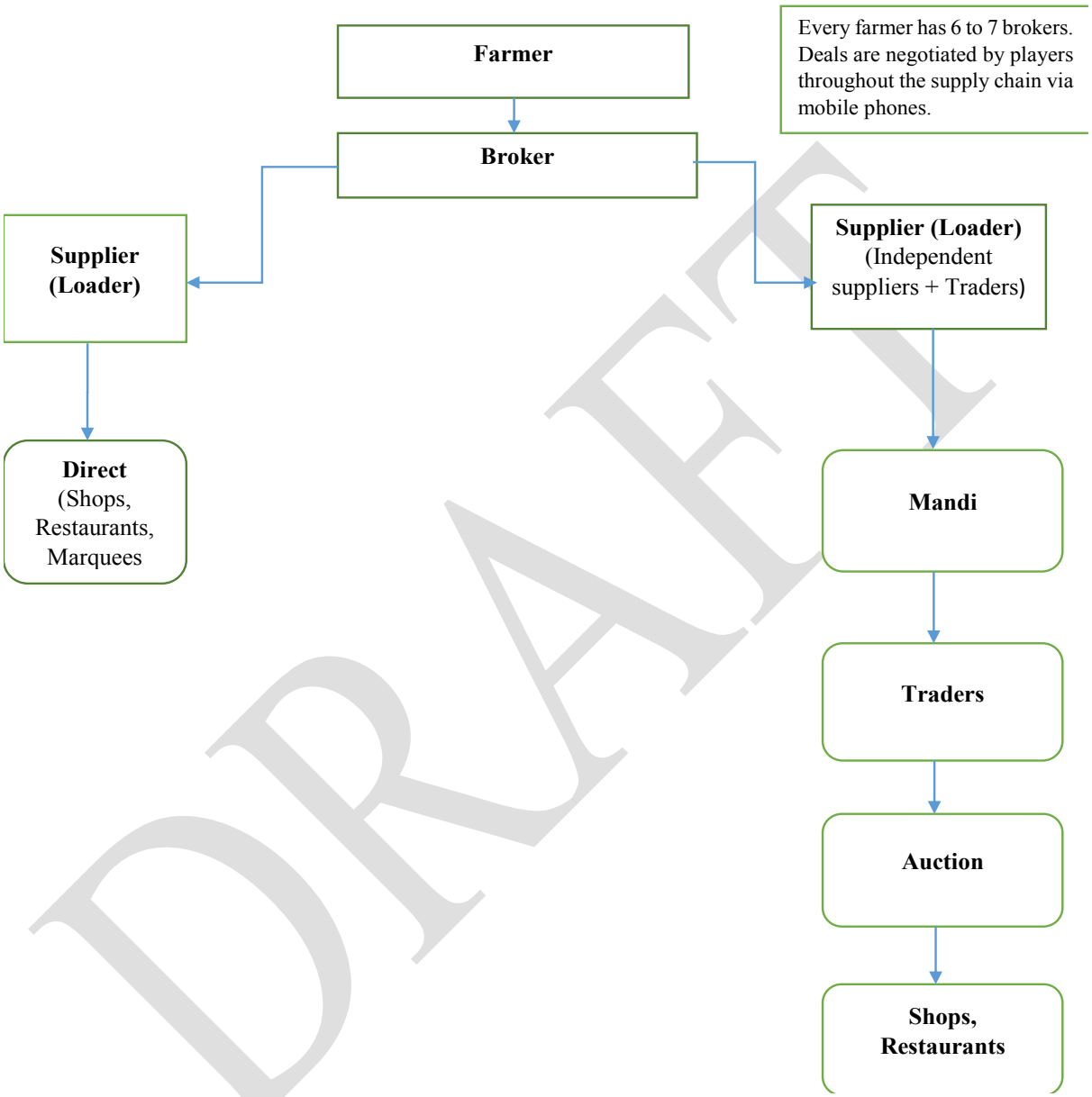


Marketing Mechanism of Poultry

- Since, Punjab is the major supplier of broiler and around 80% of the broiler is sold through direct marketing system in which sales are made directly from farm gate to wedding halls, traditional nais, restaurants and shopkeepers. This marketing system runs through brokers, generally every farmer has 6 to 7 brokers to whom farmer tells them the availability of broiler and negotiate price with them. The rest 20% is sold through indirect channel i.e. mandis, Punjab has four mandis: 2 in Lahore (Tollinton and Sheranwala), 1 Faisalabad and 1 Rawalpindi. The traders sell broiler through open auctions in the mandi, which include shops, marquees and restaurants. [68] There are few companies who are involved in the poultry processing through which they distribute frozen chicken as whole or cut-ups to the consumers. The supply chain of poultry is as follows:

[68] CCP Enquiry: In the matter of Anti-Competitive activities in the poultry sector, 2021.

Figure 28: Supply Chain of Poultry



Price Trend of Chicken

- The monthly average price movement in the last three years of domestic chicken price is tabulated below. It can be observed that during the calendar year 2019 the price of chicken witnessed an increase of 17% (Rs 13) while during CY 2020, 2021 and 2022 experienced an increase in price by up to 48%, 31% and 46% respectively.

Table 23: Monthly Average Price Movement of live chicken in last three years (PKR/kg)

Period	Price (Per Kg)	% Δ	Period	Price (Per Kg)	% Δ	Period	Price (Per Kg)	% Δ	Period	Price (Per Kg)	% Δ
Jan-2019	135	-	**Jan-2020**	172	-	**Jan-2021**	184	-	**Jan-2022**	196	-
Feb-2019	152	13%	**Feb-2020**	168	-2%	**Feb-2021**	231	26%	**Feb-2022**	222	13%
Mar-2019	179	18%	**Mar-2020**	157	-7%	**Mar-2021**	254	10%	**Mar-2022**	288	30%
Apr-2019	192	7%	**Apr-2020**	139	-11%	**Apr-2021**	258	2%	**Apr-2022**	272	-6%
May-2019	185	-4%	**May-2020**	208	50%	**May-2021**	295	14%	**May-2022**	314	15%
Jun-2019	166	-10%	**Jun-2020**	205	-1%	**Jun-2021**	215	-27%	**Jun-2022**	293	-7%
Jul-2019	153	-8%	**Jul-2020**	195	-5%	**Jul-2021**	188	-13%	**Jul-2022**	281	-4%
Aug-2019	183	20%	**Aug-2020**	136	-30%	**Aug-2021**	161	-14%			
Sept-2019	203	11%	**Sept-2020**	150	10%	**Sept-2021**	216	34%			
Oct-2019	172	-15%	**Oct-2020**	184	23%	**Oct-2021**	257	19%			
Nov-2019	159	-8%	**Nov-2020**	224	22%	**Nov-2021**	256	0%			
Dec-2019	148	-7%	**Dec-2020**	225	0%	**Dec-2021**	207	-19%			
Net Δ	**13**	**17%**	**Net Δ**	**53**	**48%**	**Net Δ**	**23**	**31%**	**Net Δ**	**97**	**46%**
Source: PBS											

Issues & Recommendations

- The Punjab government's interventions in the poultry market to fix the maximum retail price of products, although taken in the spirit of ensuring consumers would not pay exorbitant prices for an important essential commodity, thus protecting them from price increases, can result in quite different and unintended consequences.
- Since feed is the major cost component that accounts for around 75% of the total cost of broiler, recently the price of feed has increased by (27%)[69], which is attributed to the increase in the prices of Maize (25%)[70], soybean meal (67%)[71], vaccines and medicines (20-50%).
- Average current broiler cost of production is around Rs.202/Kg (live), in which major chunk of cost is associated to feed i.e Rs. 151 per kg.
- Post-harvest pollution[72] (dust pollution) caused respiratory illness in chickens, outbreak of major viral diseases e.g. Newcastle Disease, Infectious Bronchitis & Avian Influenza, sudden increase in ambient temperature and low moisture resulted in the death of chickens and affected the production.
- Farmers are reluctant to place chicks due to high feed cost and uncertainty in prices of broiler market.
- Middle man is getting unjustified profit to the tune of Rs. 28 against the decided margin of Rs=16 per kg live (Rs. 8/- for trader and Retailer each).

[69] Last year the price of 50kg bag was Rs.3700 and now it is being sold at Rs. 4670 and it is predicted that the price will further increase by Rs.300 to 400 per bag.

[70] During FY 2021-22 the Maize production was recorded at 10,635 thousand tons, witnessed an increase of 19% as compared to FY 2020-21.(Pakistan Economic Survey 2021-22). Due to the Russia-Ukraine war, the world maize prices have increased by almost 50%. Pakistan's corn exports have increased by 10 times in value, growing from about 15 million dollars in FY21 to 120 million dollars in 10MFY22. Business recorder, 30th May 2022.

[71] The imposition of 11% import duty and 17% GST has doubled the price of soyabean meal and is being sold at Rs.155 per kg. It is noted that soyabean is completely an imported commodity and an important ingredient of the feed.

[72] Wheat thrashing season caused dust pollution and severely affected the production of broiler.

- Poultry prices should be based on demand and supply mechanism, the fixation of poultry prices by the government should be discouraged and let the market forces decide the prices.
- Export of maize should be banned to stabilize the domestic prices.
- Maize hoarded by the stockiest be checked by the Industry, Agriculture Departments and the District Administration immediately to assess the quantity of stocks in hand.
- Poultry is highly perishable commodity being reared in environmentally controlled houses, processing and storage of poultry meat is the viable solution to stabilize poultry prices.
- Improving the bio-security of the flocks by restricting the movements of individuals and vehicles.
- Currently 11% import duty and 17% sale tax is levied on import of soybean seed, which need to be withdrawn immediately to reduce the price of soybean meal.[73]
- Maintenance of proper temperature and moisture to save birds from extreme weather.

[73] Poultry Research Institute, Rawalpindi.

5. Wheat

Introduction

- Wheat is Pakistan's main staple crop and essential for the food security of the country. Wheat flour currently contributes 72 percent of Pakistan's daily caloric intake with per capita wheat consumption of around 124 kg per year, one of the highest in the world.[74]
- Wheat is one of the major agricultural crops in Pakistan, which is grown by 80 percent of farmers on an area of around 9.0 million hectares (close to 40 percent of the country's total cultivated land). It accounted for 7.8 percent of the value added in agriculture and 1.8 percent of the GDP during 2021-22.[75] It weighs between 3.7% and 7.0% in the consumer basket of Pakistan. Table 1 below presents the weight of wheat and wheat flour among urban and rural consumers of Pakistan.

Table 24: Weight of Wheat in Consumer Price Index (%)

Region	Weight of Wheat	Weight of Wheat flour	Wheat Products	Total
Urban	0.612	3.007	0.094	3.713
Rural	3.474	3.430	0.107	7.011
Source: PBS				

Global Scenario

- During MY 2021-22, wheat production stood at 778.6 million tons in the world.[76] European Union produced around 17.5 percent of total wheat in world. China alone produced around 17 percent of total wheat during same period. While India's share stood around 14% in world wheat production. These three producers combined contribute to around half of wheat production in world. However, Pakistan stood at 8th in wheat production, 6th in wheat consumption and 29th in yield across world.

Table 25: Production, Consumption and Yield of wheat across countries

Rank	Country	Production (000 MT)	Consumption* (000 MT)	Yield (MT/Hec)
1	**European Union-27**	136,500	107,650	6
2	**China**	135,000	148,500	6
3	**India**	108,500	104,250	4
4	**Russian Federation**	80,000	41,750	3
5	**United States**	47,050	30,971	3
6	**Canada**	33,000	9,100	3
7	**Australia**	30,000	7,550	2
8	**Pakistan**	26,400	27,200	3
9	**Ukraine**	21,500	8,800	4
10	**Argentina**	20,000	6,450	3
Source: Indexmundi, *Statista				

Wheat Production in Pakistan

- During 2021-22, area sown decreased to 8,976 thousand hectares (2.1 percent) against last year's production of 9,168 thousand hectares. The production of wheat declined to 26.394 million tons (3.9 percent) compared to 27.464 million tons of last year. Wheat production declined due to decline in area sown, shortfall in irrigation water and drought conditions at sowing, less fertilizers offtake and heat wave in March/April,

[74] Raza, A., & Sentella, R. (2020). *Pakistan Grain and Feed Annual Report*. USDA Foreign Agricultural Service, Islamabad. Pg. 3.
[75] Ministry of Finance. (2022). *Pakistan Economic Survey 2021-22*. Pg. 23
[76] https://www.statista.com/statistics/267268/production-of-wheat-worldwide-since-1990/

though the government has increased Minimum Support Price to Rs 2200/40 kg this year to account for increase in the cost of production.[77]

- Unavailability and/or high prices of nitrogen fertilizer led to an estimated 8 percent reduction in urea fertilizer application.[78] Table below presents the trend in area, production and yield of wheat in Pakistan since 2016-17 to 2021-22.

Table 26: Trend of Area, Production and Yield of Wheat in Pakistan

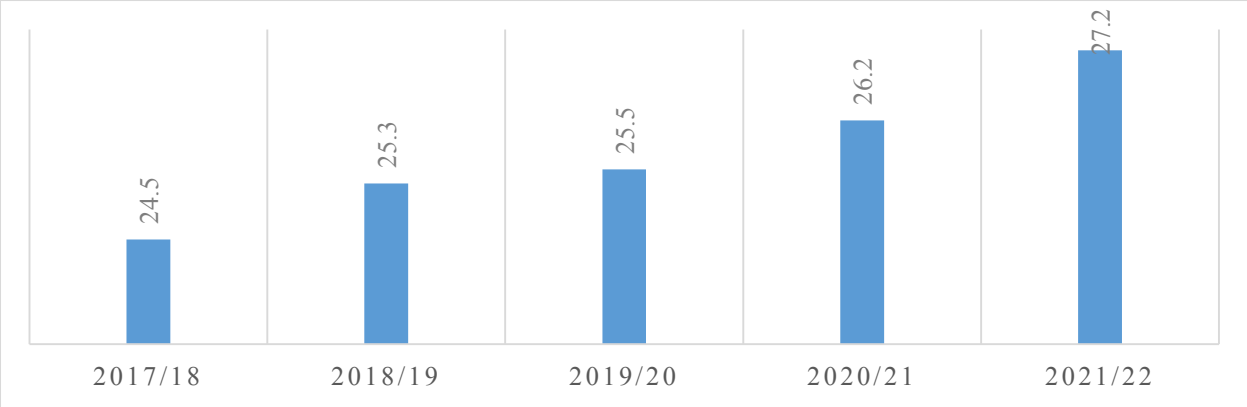
Year	Area (000 Hec)	Production (000 tons)	Yield (Kgs/Hec)
2016-17	8,972	26,674	2,973
2017-18	8,797	25,076	2,851
2018-19	8,678	24,349	2,806
2019-20	8,805	25,248	2,867
2020-21	9,178	27,293	2,974
2021-22	8,976	26,394	2,940
Source: Economic Survey of Pakistan (2020-21)			

- Farming yields in Pakistan have remained static mainly because of a lack of investment in research, machinery, and improved seeds and fertilizers.[79]

Domestic Consumption of Wheat

- Wheat is a staple food in Pakistan and it contributes 72 percent of Pakistan's daily caloric intake with per capita wheat consumption of around 124 kg per year. Its consumption stood at 27.2 MMTs during MY 2021/22. It grew by 3.8 percent during 2021/22 as compared to previous year.

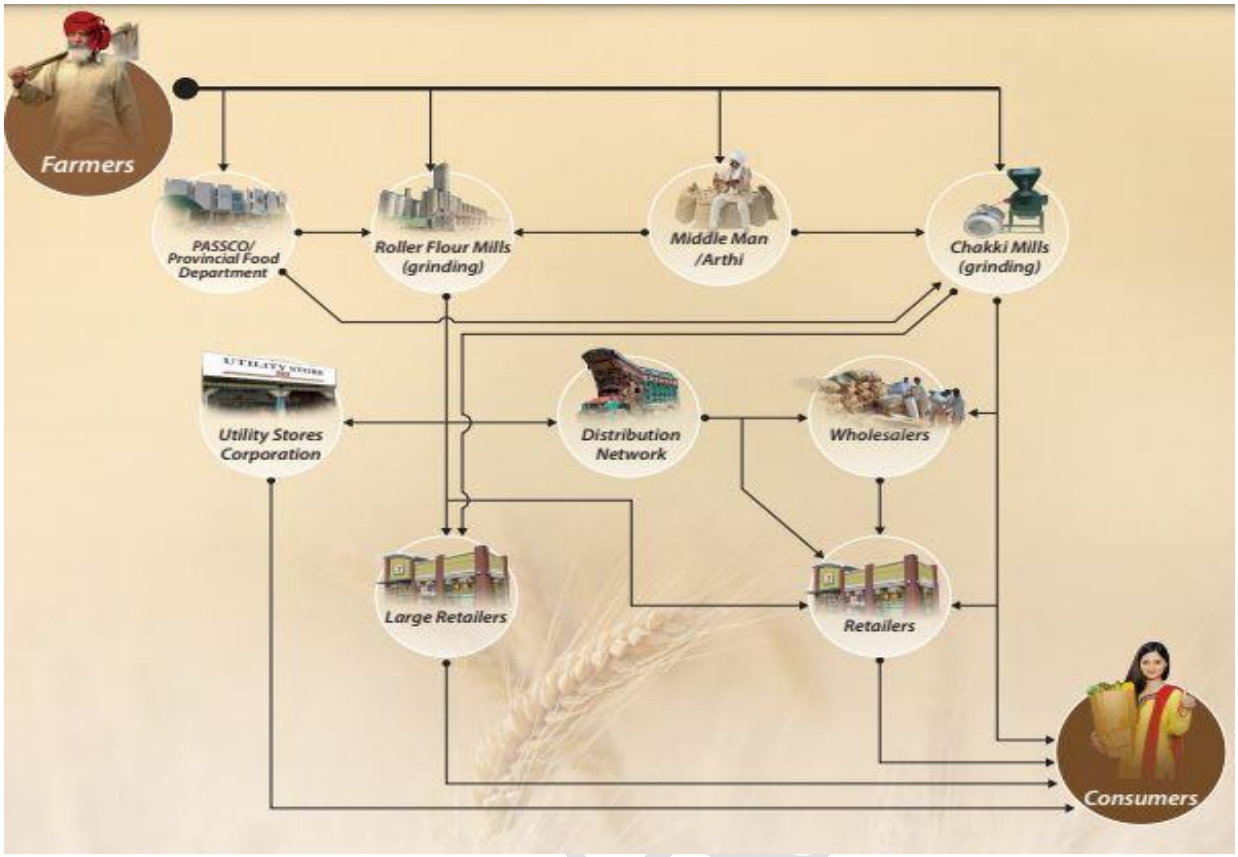
Figure 29: Consumption of Wheat in Pakistan (Million Tons)



Source: Grain and Feed Annual, USDA

[77] Ministry of Finance. (2022). Economic Survey of Pakistan 2021-22.
[78] Raza, A. (2022). Pakistan: Grain and Feed Annual. United States Department of Agriculture.
[79] https://reliefweb.int/report/pakistan/pakistan%E2%80%99s-stagnant-crop-yields-spell-doom-poor

Supply Chain of Wheat



Source: CCP, Wheat Policy Note, 2020

Sowing and Harvesting of Wheat

- Wheat is cultivated during the winter or "Rabi" season in Pakistan. However, the month of sowing and harvesting differ across provinces due to difference in climate conditions. Table 2 below presents the months of sowing and harvesting across provinces.

Table 27: Sowing and Harvesting Season of Wheat

Province	Sowing	Harvesting
Pakistan	October-December	March-May
Punjab[1]	November-December	April-May
Sindh[2]	November-December	March-May
KPK[3]	October-December	April-May
Balochistan[4]	November	April-May

Source: [1]https://namc.pmd.gov.pk/assets/crop-reports/2112131358Fsd_wheat_2014-15.pdf
[2]http://sagpme.com/assets/docs/Sindh-Major-Crop-Sowing-Dates.pdf
[3]https://www.aup.edu.pk/sj_pdf/an%20analysis%20of%20planting%20dates%20on%20yield.pdf
[4]https://www.academia.edu/13580617/Factors_Affecting_Wheat_Production_in_Balochistan_Province_of_Pakistan

- Table presents the sowing and harvesting seasons of wheat across provinces in Pakistan. The sowing of wheat takes place in October to December and is harvested during March-May. The sowing season starts in the month of November and lasts till December in the provinces of Punjab and Sindh. However, the sowing starts in the month of October and lasts till December in the province of KPK. The sowing is carried out in the month of November in the province of Baluchistan. The harvesting starts in the month of April and lasts till May in the provinces of Punjab, KPK and Baluchistan.

However, in the province of Sindh it starts in March due to warmer weather and continues till May.

Provincial Share in Production, Area, & Yield

- Punjab is the major producer of wheat having a share of 77% with a production of around 19.4 million tons in 2019-20. Figures below present the provincial share in production and area of wheat in Pakistan.

Figure 30: Provincial Share in Production

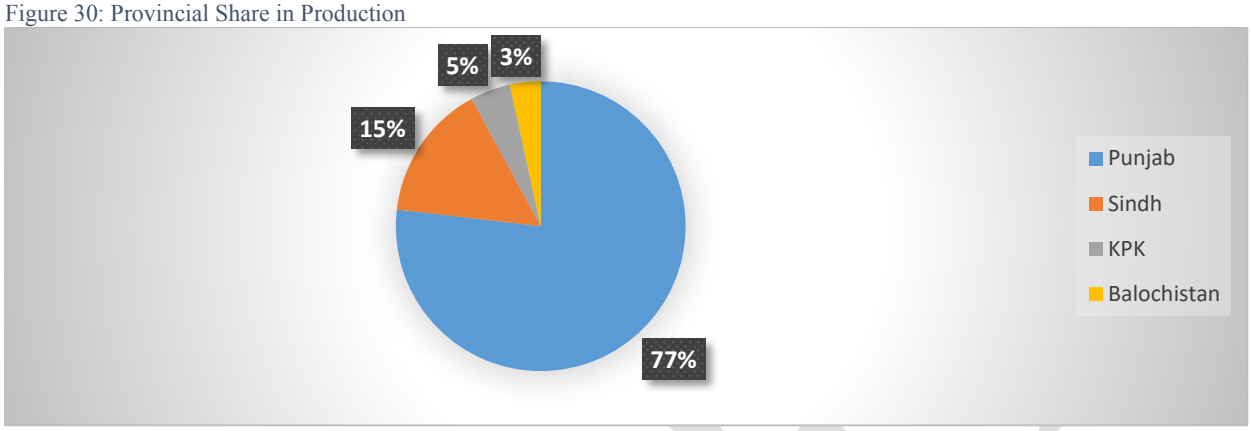
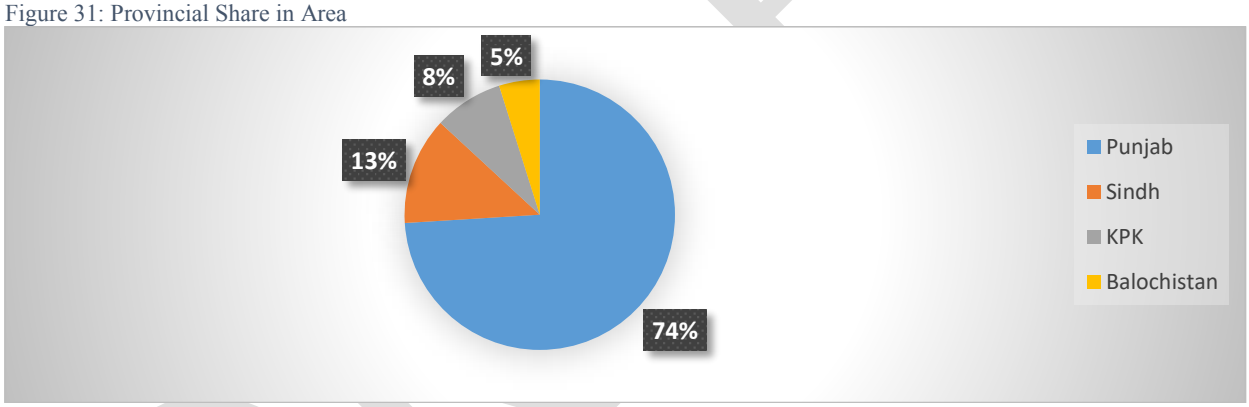
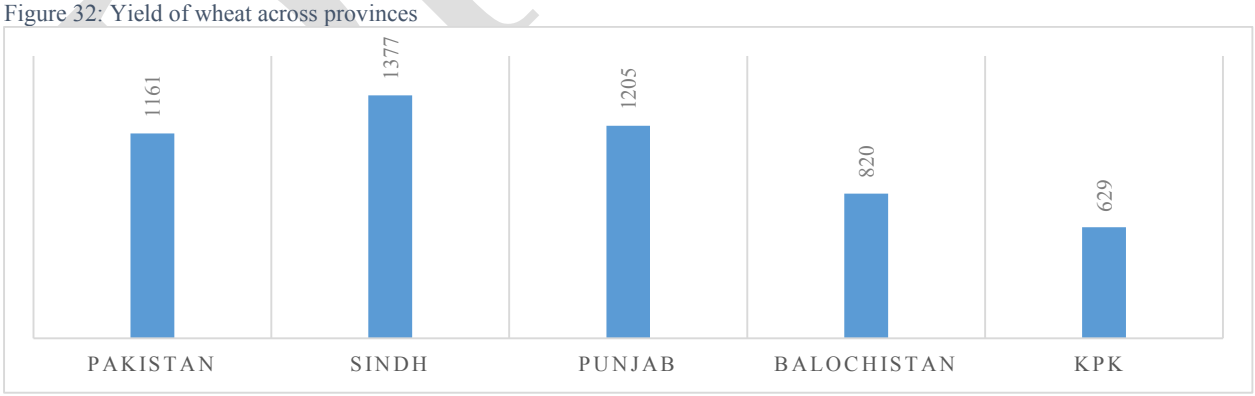


Figure 31: Provincial Share in Area



Source: Calculations based on AMIS

Figure 32: Yield of wheat across provinces



Source: AMIS

- Sindh has 14% higher yield as compare to Punjab due to use of high yield verities. The popular wheat seed varieties used in Sindh province include TD-1, TJ-83, and Kiran-95, Benazir, SKD-1, Sarsabz 90, Mehran-89, and others. These are known as high-

yielding varieties, which the dealers claim to give 50-60/maund per acre average yield.[80]

Minimum Support Price of Wheat

- Pakistan maintains a largely government controlled wheat marketing system and the government considers wheat as the key strategic commodity. The federal government sets a minimum guaranteed support price or procurement price and an issue price for wheat sold to flour mills. Through provincial food departments, the GOP procures wheat from farmers at the support price and then releases wheat to the flour mills at the government fixed issue price. The issue price is set at a rate that captures some of the cost of buying and storing the wheat, but there are significant implicit costs that are not fully captured. Following table presents the trend in Minimum Support Price of wheat.

Table 28: Minimum Support Price of Wheat (Rs. per 40 Kg)

Year	Minimum Support Price
2015-16	1300
2016-17	1300
2017-18	1300
2018-19	1300
2019-20	1400
2020-21	1800
2021-22	2200
Source: Economic Survey of Pakistan 2021-22	

- Revision of Minimum Support Price is necessary to increase the supply of wheat. From a farmer's perspective, if the purchase rate is not revised for many consecutive years and the government can forcibly buy it in announced rate, he will plant more if he estimates that the rate is profitable and less if not. We, therefore, get into a cycle of high production when rates are revised upwards, followed by years of declining production as the purchase rate remains stagnant but the cost keeps going up.
- What is needed is an annual revision of government announced purchase rate based on the cost of seed, fertilizer, pesticides and water. This revision coupled with no forced purchase will ensure that the supply will remain stable and market forces will keep increasing the cultivated areas as the demand grows.

Cost of Wheat Production

- On average it costs Rs. 47,432 to produce wheat from one acre. In terms of per kg it cost Rs. 39.33 to produce wheat from one acre of land. Land rent has the major cost share in wheat production whereas fertilizer and harvesting also have a larger share of 17% and 14% respectively. Combined these three categories account for 43% of total cost for wheat production. Table below presents the shares of different categories in cost of wheat production from one acre of land.

Table 29: Cost of Wheat Production (Rs. per Acre)

Operation	Cost	Share in cost
Total Cost	47,432	
Land Rent	20,000	42%
Cost of Fertilizer	7,925	17%

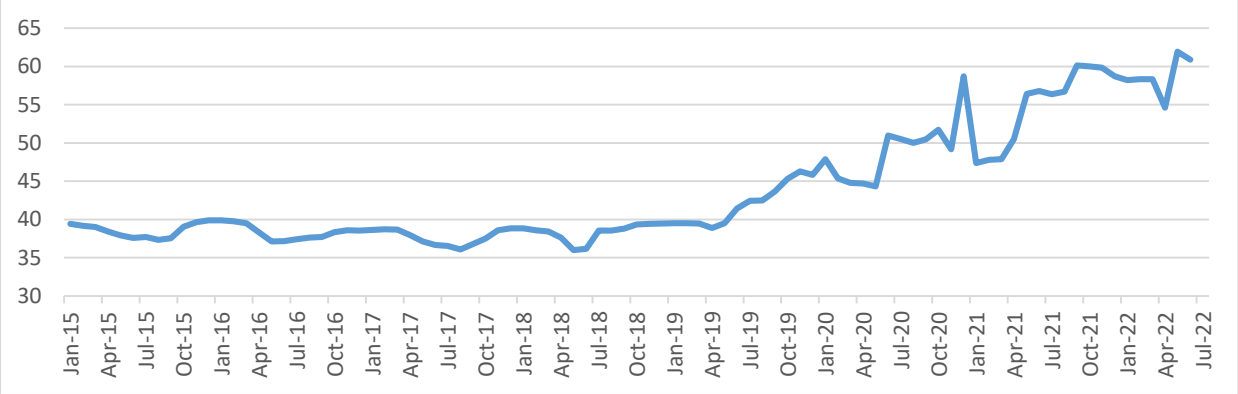
[80] Wheat sowing hangs in balance as growers unsure of seed quality (thenews.com.pk)

Cost of Harvesting	6,674	14%
Land Preparation	4,489	9%
Seed and Sowing	3,495	7%
Cost of Water	3,109	7%
Cost of Other	1,186	3%
Cost of Weedicides	369	1%
Cost of Dung	185	0%
Source: AMIS		

Retail Price of Wheat Flour

- The retail price of wheat flour have increased by 56% from Rs. 39 per kg in 2015 to Rs. 61 per kg in June 2022. Major factor of increase in retail price is the increase in MSP for farmers which increased by 69% from Rs. 1300 per 40 kg in 2015 to Rs. 2200 per 40 kg in 2022. This indicates that the increase in retail price is less than the increase in MSP. Similarly, the increase in price remained 7% YoY basis from June 2021 to June 2022 when prices increase from Rs. 57 per kg to Rs.61 per kg respectively.
- The prices of wheat flour normally adjust according to the MSP in April and remain stable till October when the wheat supply diminishes in market. The government starts supplying wheat to mills according to the quota from November till the arrival of new crop in market. Figure below presents the trend in prices of wheat flour in Pakistan.

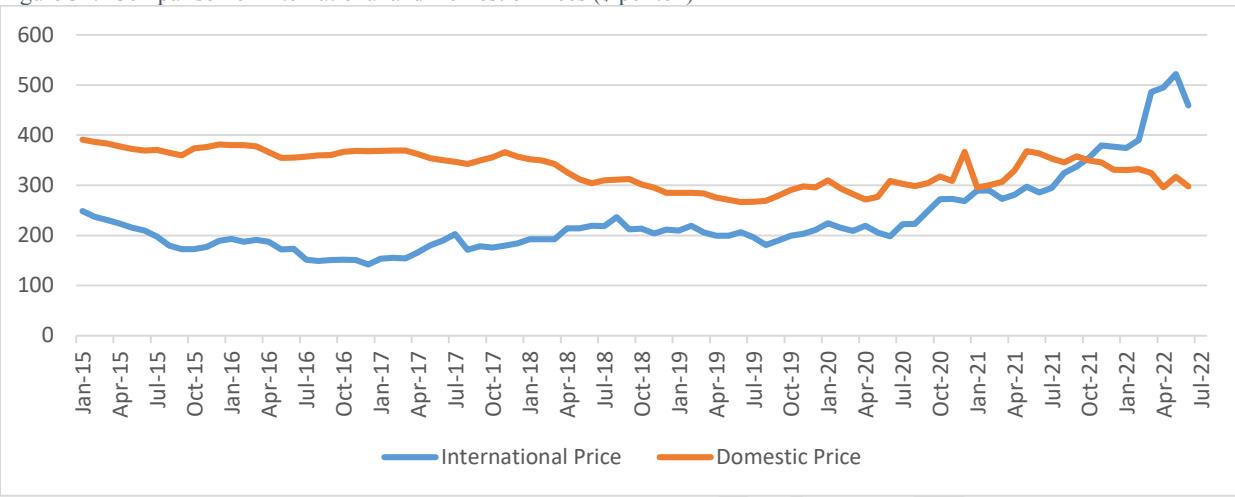
Figure 33: Average Retail Price of Wheat Flour in Pakistan (Rs. per Kg)



Source: PBS

- When we compare the domestic retail price of wheat flour with international price of wheat we find that the domestic prices remained substantially higher than international price from January 2015 till October 2021. Afterwards the international prices have been higher by 54% at $460 per ton in international market and $298 per ton in domestic market in June 2022. This shows that there are chances of smuggling of commodity to neighboring countries especially Afghanistan. Following figure presents the comparison in international and domestic prices.

Figure 34: Comparison of International and Domestic Prices ($ per ton)



Source: Indexmundi, PBS, SBP

International Trade and Stocks of Wheat in Pakistan

- Pakistan remained a net exporter of wheat till 2019-20. But the situation changed owing to the increasing price of commodity in domestic market in 2019. Wheat prices and the movement of wheat are controlled at the provincial and district levels. Grain stocks are procured and maintained by the provinces. Table below presents the stocks of wheat in Pakistan.

Table 30: Exports, Imports and Stocks of Wheat in Pakistan (000 tons)

Year	Exports	Imports	Stocks
2016-17	4	0	4,351
2017-18	1,190	0	4,828
2018-19	684	0	3,333
2019-20	48	0	1,292
2020-21	0	3,612	2,854
2021-22	0	2,207	4,154
Source: PBS, Grain and Feed Annual, USDA			

- It can be observed that ending stocks of wheat stood at its high during the period starting from 2016-17 till 2017-18. But the stocks started depleting and reached their lowest in 2019-20 due to massive exports and lower production.
- The level of minimum support price for wheat affects the quantum of subsidy the Federal and Provincial governments need to give to export any surplus stock. Domestic prices were not competitive with international prices of the commodity during 2016-2018. As a result of that, any wheat that couldn't be sold in the international market (exceeding local demand) was to be preserved and thus became prone to wastage/spoilage as a common occurrence. Owing to increasing stocks of wheat ECC approved export of wheat by Punjab and Sindh Governments on a support of $55 and $45 per ton respectively in January 2016.[81] The subsidy was later increased to $120 per ton in August 2016. A relatively high wheat support price, rising procurement and flat offtake resulted in record stocks of government-held wheat following the 2017 harvest. Furthermore, the Government authorized exports of up to 2 million metric tons of wheat with subsidy.[82] The subsidy was intended to reduce stocks prior to the

[81] FECL2-Notifi.pdf (sbp.org.pk)
[82] https://www.fas.usda.gov/data/pakistan-pakistan-subsidizes-wheat-exports

conclusion of the 2018 harvest. The main export destinations were Afghanistan, Sri Lanka, Bangladesh and some African countries.83 Except to some regional markets, exports without a subsidy were not commercially viable because Pakistan's domestic wheat prices were significantly higher (100 percent) than prevailing international prices.

- As a result of export subsidies, a record 1.2 million tons of wheat was exported during 2017-18. This resulted in lowering the stocks of domestic reserves to 3.333 MMTs in 2018-19. Below-average irrigation water supplies and reduced precipitation at the start of the season resulted in a lower-than-expected wheat output in 2019. Although domestic availabilities were estimated to be still adequate at country level, the Government decided to halt wheat exports amid raising concerns over a hike in the domestic prices of wheat products and because of the reduced volume of wheat procured during 2019-20 compared to a year earlier.84
- In 2020, the ECC allowed private sector to import wheat to control prices of wheat in the domestic market.85 As a result of increasing imports, the stocks started building up and current stocks stand over 4 MMTs which is above critical level. As, the current year wheat production stood at 26.4 MMTs and adding the stocks it accounts for 30.4 MMTs of wheat available for ongoing year. Whereas, Pakistan's consumption of wheat stood at 27.2 MMTs. If the smuggling of wheat is controlled then it is expected that the current year wheat production will be sufficient for country. But owing to the arising situation in Afghanistan it is expected that wheat will be exported/smuggled to Afghanistan which may create shortage in domestic market. Similarly, the Ukraine war can also have impact on domestic availability of wheat in Pakistan. As, Pakistan imported 58% of wheat from Russia and 13% of wheat from Ukraine during FY 2020-21. Due to the war, Pakistan will not be able to import the required wheat from these countries.

Issues and Recommendations

- The provincial governments impose ban on inter provincial and inter-district movement of wheat during shortage of the commodity. Additionally, the purchase of wheat is also banned sometimes for private sector which is against the spirit of free market.[86] Additionally, at one hand the government is providing MSP to safeguard the interests of farmers and on the other hand it prohibits movement and purchase by private sector at the time when farmer can get highest benefit from his produce. For example, in January the price of wheat increased in KPK due to ban imposed by Punjab government on interprovincial movement of the commodity.[87] Similarly, the Punjab government imposed a ban in April 2022 on inter district movement of wheat in the wake of poor crop and to achieve the target of procuring 3.5 million tons of wheat.[88] In light of above, it is recommended that the laws empowering provincial governments to ban inter-provincial/inter-district movement and purchase of wheat by private sector may be reconsidered.
- The Competition Commission of Pakistan in its Policy Note dated August, 26th 2020 has identified the increasing circular debt in the procurement and release of wheat by government. The Government uses commercial loans to finance the purchase, storage,

[83] https://www.fao.org/giews/food-prices/food-policies/detail/en/c/1202821/
[84] https://www.fao.org/giews/food-prices/food-policies/detail/en/c/1202821/
[85] ECC allows private sector to import wheat (radio.gov.pk)
[86] Sindh, Punjab ban wheat purchase by private sector (thenews.com.pk)
[87] https://www.pakistantoday.com.pk/2022/01/15/flour-price-sour-in-kp-following-ban-on-inter-provincial-movement-of-wheat/
[88] Inter-district wheat movement banned in Punjab - Pakistan - DAWN.COM

and sale of wheat. The outstanding debt for the commodity operation as of June 30 2021 was Rs548 billion, which is estimated to rise to Rs640 billion by the end of June 2022.[89] The recommendation of CCP to revise such costly policies is still pending for implementation.

- The CCP's recommendation in the above mentioned Policy Note on Government's gradual exit from support price and providing level playing field to chakki mills is also still pending for implementation. The government involvement may be limited to only times of emergency. Therefore, the government may plan a gradual exit from intervention which may also provide room for private sector to invest in storage and handling industry.
- CCP's recommendation of providing targeted subsidy to end consumers, transparency in issuance of quota, monitoring of subsidized wheat issued to flour mills are also pending implementation.
- The decision to export any surplus stock shall be taken considering the local demand and domestic stocks along with the cushion for smuggling which is unavoidable.
- Any decision to import wheat shall be taken in time considering the time required for transportation of commodity from country of origin and procedural requirements.
- There is overcapacity in flour milling due to subsidized wheat as around 500 mills are non-operational. Hence, this also requires the government to monitor the sector aggressively.
- Lower yield is due to lack of investment in research, machinery, awareness on fertilizer use, improved seeds and low acceptability of high yield seeds. Therefore, the government may develop mechanism to promote high yield varieties among farmers (especially in the province of Punjab) such as adopted in Sindh province.
- Sowing of recommended seed cultivar in a particular region is crucial because only that cultivar could produce optimum yield keeping in view the elements of climate such as light, temperature, rainfall, wind and humidity etc. By and large, non-recommended seed cultivars are sown in the fields. The supply of certified seed is extremely less than the actual requirements of the major crops. Resultantly, up to 92 percent seed sown in the country is uncertified.[90] Pakistan has developed different varieties of wheat that give the yield of up to 7000 kg/ha. [91] However, their adoptability among farmers is very low. The government may promote these cultivars through Seed Certification and Registration Department.

[89] https://tribune.com.pk/story/2361902/wheat-policy-costs-punjab-dearly
[90] https://www.dawn.com/news/229075/identifying-causes-of-low-farm-yield
[91] http://www.parc.gov.pk/index.php/en/csi/137-narc/crop-sciences-institue/710-wheat-and-barley-research-program

6. Sugar

Introduction

- Sugarcane is a high value cash crop of Pakistan and is of great significance for sugar related industries, second largest agro-industry sector after textile. Sugarcane is grown on approximately 1.2 million hectares and provides the raw material for 90 sugar mills.[92] In addition to sugar, sugarcane is used in the production of pharmaceuticals, ethanol, bagasse for paper and chip board manufacturing, and press mud - a source of organic fertilizer used in crop production. Its production accounted for 3.7 percent in agriculture's value addition and 0.8 percent in GDP during 2021-22.[93] Sugar industry weighs 3.4% in LSM.[94] Sugar production grew by 38% from 5.6 million tons in 2020-21 to 7.8 million tons in 2021-22.
- Pakistan stood the world's fourth largest producer of sugarcane, the sixth largest producer of cane sugar and the eighth largest consumer of sugar.[95] Sugarcane accounted for 4.8% of total cropped area during 2020-21.[96] Per capita consumption of sugar is hovering around 25 kg per year.[97] Consumption of sugar weighs 1.15% in consumer basket of urban regions and 2.18% among rural people. Table 1 below presents the proportion of sugar in Consumer Price Index.

Table 31: Weight of Sugar in Consumer Price Index

Region	Sugar	Gur	Total
Urban	1.113%	0.038%	1.151%
Rural	2.03%	0.152%	2.182%
Source: PBS			

Global Scenario

- Brazil, India and China are the major producers of sugarcane in the world. Total production of sugarcane stood at 1,869 million tons during 2020. Brazil accounted for a share of 40% in the world production of sugarcane. India produced 19.8% of sugarcane produced in 2020. However, China's share stood at 5.8% of total sugarcane production. Following table presents the production and yield of major sugarcane producing countries in the world.

Table 32: Production and Yield of Sugarcane in World in 2020

Rank	Country	Production (Million Tons)	Yield (Tons/Hec)
1	**Brazil**	757	75.6
2	**India**	370.5	77.3
3	**China**	108	79.5
4	**Pakistan**	81	69.5
5	**Thailand**	75	40.9
6	**Mexico**	54	69.4
7	**USA**	33	85.4
8	**Australia**	30.3	82.6
9	**Indonesia**	28.9	68.8
10	**Guatemala**	28.4	112.9
Source: FAO, UNData			

[92] Bitter reality of sugar industry | Political Economy | thenews.com.pk
[93] Ministry of Finance. (2022). Economic Survey of Pakistan 2021-22. Chapter 2: Agriculture.
[94] Ministry of Finance. (2022). Economic Survey of Pakistan 2021-22.
[95] https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Sugar%20Annual_Islamabad_Pakistan_04-15-2021.pdf
[96] Calculation from data of Economic Survey 2021-22.
[97] Pakistan Sugar Mills Association (psmacentre.com)

- India is the largest producer and consumer of sugar in world with production accounting for 29.66 million tons and consumption reaching 25.51 million tons in 2019. Brazil stands second in sugar production despite being the largest producer of sugarcane in world. Following table presents the trend in production and consumption of sugar in different countries.

Table 33: Sugar production by Countries in 2019 (Million Tons)

Rank	Country	Production	Rank	Country	Consumption
1	**India**	29.66	**1**	**India**	25.51
2	**Brazil**	29.17	**2**	**EU-28**	18.11
3	**EU-28**	16.65	**3**	**China**	16.20
4	**Thailand**	14.05	**4**	**Brazil**	10.55
5	**China**	10.57	**5**	**USA**	10.24
6	**USA**	7.22	**6**	**Indonesia**	6.95
7	**Russian Federation**	7.2	**7**	**Russian Federation**	5.95
8	**Mexico**	6.18	**8**	**Pakistan**	5.35
9	**Pakistan**	5.33	**9**	**Mexico**	4.09
10	**Australia**	4.25	**10**	**Egypt**	3.19
Source: About Sugar | International Sugar Organization (isosugar.org)					

- In Brazil sugarcane is used for two purposes; fuel production and sugar production. Brazil started its program of producing ethanol from sugarcane as substitute to gasoline during 1970's due to oil crisis. During 1990 to 2002, the Brazilian sugarcane sector was privatized and both the sugar and ethanol production were made commercial. But after 2003, the introduction of flex fuel technology offered consumers the possibility to run their cars with 100% gasoline, 100% hydrated ethanol, or any proportional mixture between the two fuels. The sales of flex-fuel new cars increased rapidly and reached the actual level of about 86% of new car sales.[98]

Domestic Production of Sugarcane and Sugar

- During 2020-21, the crop was cultivated on 1,165 thousand hectares with a production of 81.0 million tonnes. The crop experienced 8.15 percent increase in area under cultivation and a slight increase in yield by 1 percent. It was mainly due to favorable weather conditions, better management, timely availability of quality inputs and higher economic returns. The area, production and yield of sugarcane during the last five years are given in Table 3 below.

Table 34: Area, Production and Yield of Sugarcane

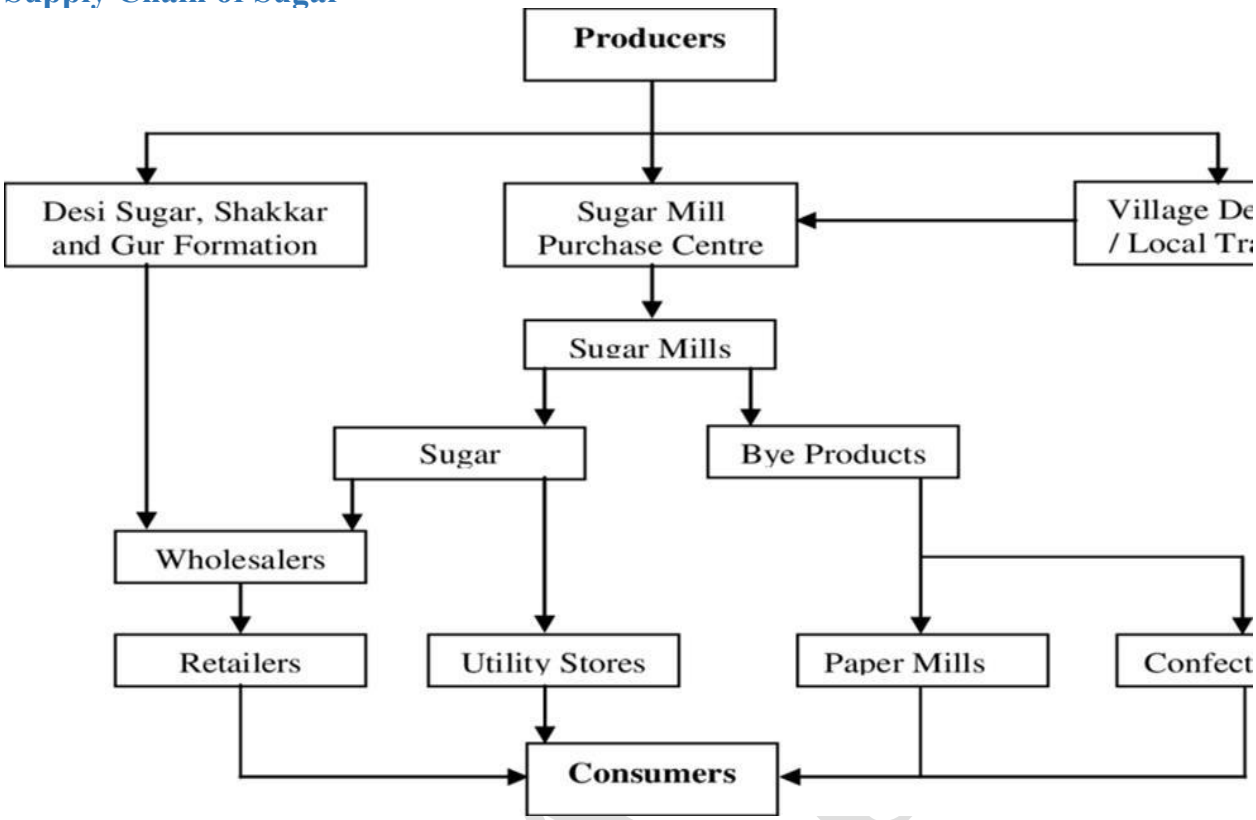
Year	Area (000 Hectares)	Production (000 tonnes)	Yield (Kgs/Hec)	Sugar Production (000 tons)
2015-16	1,131	65,482	57,897	5,115
2016-17	1,218	75,482	61,972	7,049
2017-18	1,342	83,333	62,096	6,566
2018-19	1,102	67,174	60,956	5,260
2019-20	1,040	66,380	63,827	4,881
2020-21	1,165	81,009	69,534	5,694
2021-22 (P)	1,260	88,651	70,341	7,760
Source: Economic Survey of Pakistan				

[98] Matsouka, S. (2009). The Brazilian experience of sugarcane ethanol industry. The Society for In Vitro Biology 2009

- Since 2015-16, sugarcane area and sugarcane production started increasing. The years 2016-17 and 2017-18 witnessed peak crops which resulted in sugar production much higher than national requirement. This resulted in prices of sugar lower due to abundance of quantity. But following two years witnessed decline in area, production of sugarcane and sugar. Resultantly the production of sugar and stocks of sugar declined and speculation of shortage of sugar started. This resulted in increase in price of sugar during 2019.[99] The government increased MSP to increase the production of sugarcane which resulted in increase in production of sugarcane and sugar in past two years.
- In Pakistan, sugarcane production rises and falls in a 3-to-5-year cycle, depending on how the level of government support influences farmers' planting decisions, and on crop yields.[100] For example, Year 2015-16 sugarcane production was 65 MMT, rising to 75 MMT in Year 2016-17 and to 83 MMT 2017-18, before dropping to 67 MMT and 66 MMT in 2018-19 and 2019-20, respectively. The cycle continues with increased production of 88 million tons in 2021-22.
- The major by-products of sugarcane are bagasse, molasses and filter cake. About 3.50 million metric tonnes of bagasse is produced in the country with an average recovery rate of 30%.[101] Bagasse is traditionally used as captive fuel in sugar factory, i.e., in boiler for producing steam required for the generation of power and driving the prime movers (Dotaniya, 2014). Moreover, it is a raw material for making hard paper boards, which are used for making office racks, cupboards, table tops, partition walls, and ceiling etc.
- About 3.20 million tonnes of molasses are produced in the country as a by-product of sugar production at an average recovery of 4.5%.[102] It is the final mother liquor leftover after the crystallization of sugar, which is further processed as a bi- product and is used to make ethyl alcohol, citric acid, lactic acid, cattle feed, oxalic acid, baker's yeast, mono sodium glutamate, lysine, acetone-butanol-alcohol (Shakarganj Ltd., 2017).
- Filter Cake is an essential end product of sugarcane crushing, accounting for 3%, is used as fertilizer and used in brick kilns.[103] It is also combined used with distillery effluent and nitrogen fixing bacteria. Some processors/factories have acquired certificates of halal and Organic Products like Sugar/Gurr/Shakar.

[99] Sugar-Inquiry-Committee-Main-Report-dated-24.03.2020.pdf (app.com.pk)
[100] USDA. (2021). Sugar Annual
[101] SUGARCANE COMMODITY (pc.gov.pk)
[102] SUGARCANE COMMODITY (pc.gov.pk)
[103] SUGARCANE COMMODITY (pc.gov.pk)

Supply Chain of Sugar



Provincial Share in Production, Area and Major Districts

- Punjab is the major province of sugarcane production with a share of 65% in area and production. Sindh is second largest producer of sugarcane with share of 26% in production and 29% in area. Following figures present the provincial shares in production and area of sugarcane in 2019-20.

Figure 35: Provincial Share in Production

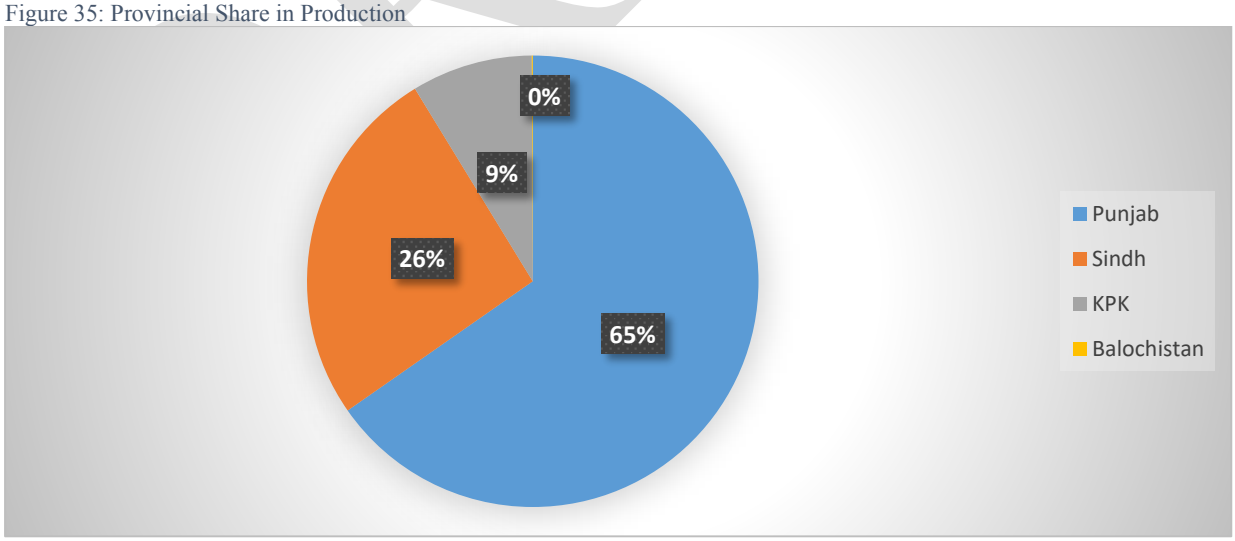
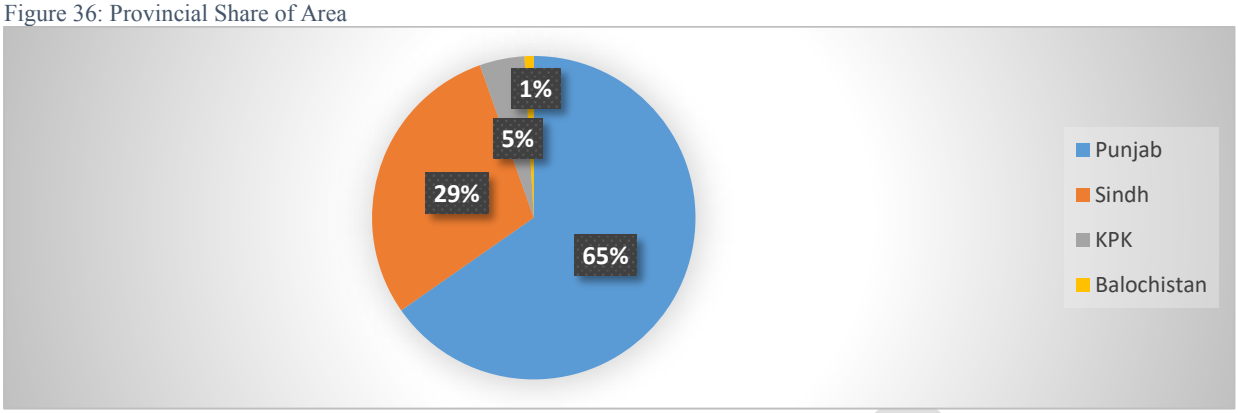


Figure 36: Provincial Share of Area



Source: Author's Calculation from data of AMIS

- The province of Punjab can be divided into two clusters with respect to sugarcane production; Central Punjab and Southern Punjab. Faisalabad and Jhang are the major producing districts in Central Punjab whereas Rahim Yar khan, Muzaffargar and Bahawalpur are the major producing districts of Southern Punjab. Following table presents the major districts of sugarcane production across provinces.

Table 35: Province Wise Major Districts of Sugarcane

Province	Districts
Central Punjab	Faisalabad, Jhang, Chiniot, Sargodha, T.T. Singh
Southern Punjab	Rahim Yar Khan, Muzaffargarh and Bahawalpur, Bhakkar, Rajan pur
Southern Sind	Hyderabad, Nawabshah, Mir Pur khas and Badin
Southern KPK	D.I. Khan and Mardan
Source: Sugarcane Cluster Report, Planning Commission of Pakistan	

- Average yield differs across regions due to climatic conditions and availability of water. The yield is highest in Southern Punjab and Central KP regions with yield reaching over 76 tons per hectare. The yield is highest in Rahim Yar Khan which is a district of Southern Punjab due to availability of irrigation water in district. Following table presents the yield across regions.

Table 36: Average Yield of Sugarcane across Provinces (Tons/Hectare)

Area	Yield
Central Punjab	56.8
Southern Punjab	77.8
Southern Sind	53.6
Central KP	76.8
Total	62.3
Source: Planning Commission of Pakistan, Sugarcane Cluster Report	

Minimum Support Price of Sugarcane

- Government of Pakistan announces support price for sugarcane at the time of sowing. The support price remained stagnant for the period of 2016-17 to 2018-19. But due to the increasing price of sugar in domestic market the government increased the MSP in 2019-20. Table below presents the trend in MSP across provinces.

Table 37: Minimum Support Price of Sugarcane across Provinces (Rs. Per 40 kg)

Year	Punjab	Sindh	KPK
2016-17	180	182	180
2017-18	180	182	180
2018-19	180	182	180
2019-20	190	192	190
2020-21	200	202	200
2021-22	225	250	225
Source: PSMA			

Sowing and Harvesting of sugarcane

- Sugarcane is a **Kharif crop**.[104] Farmers generally opt to plant sugarcane in the **autumn**; with autumn planting providing better results due to the longer growing season.[105] **Punjab** and **KPK** farmers mostly **plant** sugarcane in the **spring** and harvest eight to ten months later. In **Sindh**, most planting is in the **autumn**, allowing growth for up to 16 months, which helps to marginally increase the plant's sucrose contents, thereby potentially netting them a better price from sugar mills. Table 2 presents the planting and harvesting seasons of sugarcane across provinces

Table 38: Planting and Harvesting of Sugarcane across Provinces

Province	Sowing	Harvesting
Punjab	Spring: 15 Feb-31st March Autumn: 1st Sept-15 October	8-10 Months October-November 16 months Feb-May
KPK	Spring: 15 Feb-31st March	8-10 Months October-November
Sindh	Autumn: 1st Sept-15 October Spring: 15 Feb-31st March	16 months Feb-May 8-10 Months October-November
Source: USDA, Sugar Annual 2021		

- The timeframe to crush the sugarcane crop and then process it into refined sugar spans 110 days.[106] With sugar sales spread throughout the year, this makes it challenging for mill owners to manage their finances, when they must pay for sugarcane deliveries before they can sell it.

Domestic Consumption of Sugar

- Consumption continues to grow modestly, largely as a result of a growing population, income groups and a slowly developing domestic food processing sector. MY 2021/22 sugar consumption is projected at 5.9 MMT. Bulk sugar consumers such as bakeries, candy, ice cream, and soft drink manufacturers account for about 60 percent of total sugar demand. Following table presents consumption trend of sugar.

Table 39: Consumption of Sugar in Pakistan (000 M.Tons)

Market Year	Consumption
2016-17	5,100
2017-18	5,400
2018-19	5,700
2019-20	5,600
2020-21	5,750
2021-22	5,900
Source: USDA, Sugar Annual	

[104] http://www.crs.agripunjab.gov.pk/crop_details
[105] https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Sugar%20Annual_Islamabad_Pakistan_04-15-2021.pdf
[106] DownloadReportByFileName (usda.gov)

International Trade of Sugar and Domestic Stocks

Table 40: Trade of Sugar in Pakistan

Year	Exports (000Tons)	Export Value (000 $)	Imports (000Tons)	Import Value (000 $)
2015-16	294	110,069	12	5,185
2016-17	307	198,295	8	4,572
2017-18	1,469	508,337	8.7	5,067
2018-19	692	222,857	7.9	3,920
2019-20	181	70,657	7.6	3,828
2020-21	0	0	281	128,654
2021-22	0	0	312	191,719
Source: PBS, SBP, USDA				

- The per capita sugar availability in Pakistan (after converting all sugarcane production into sugar at 9% recovery rate and deducting from this the sugar export) was 26 kg in 2016-17 which amounts to a total demand of sugar of 5.7 million tonnes. The sugar industry, by crushing about 75.5 million tonnes of sugarcane produced over 7 million tons of sugar at an average recovery of 9.87%.[107] This created a surplus of over one million tonnes. Keeping in view this surplus and the stock from the previous year, the ECC allowed export of 225 thousand tonnes against PSMA demand of 1 million tonnes at a time when the international market price was around US$500/ton and no freight support was required (Pakistan Sugar Mills Association, 2017). Similar situation existed in 2017-18 and 2018-19, when PSMA was able to get further permission of another 1.5 million tonnes with freight support of Rs.10.70/kg for making payments to growers.
- As a result of these exports domestic stocks of sugar declined to 1.7 million tons in 2019-20. The decline in stocks along with a decline in area and production of sugarcane resulted in expectation of shortage in country. Although the stocks were sufficient for domestic consumption but the prices started to increase due to speculations of shortage.108 The government imposed a ban on export of sugar in February 2020.109 The import of sugar was allowed in July 2020 to maintain buffer stocks.[110]
- The production of sugarcane remained high during 2020-21 and 2021-22 which resulted in higher production of sugar. The imports along with higher domestic production resulted in increasing domestic stocks of sugar reaching 3.5 million tons during MY 2021/22. Following table presents the situation of sugar stocks in Pakistan.

Table 41: Stocks of sugar in Pakistan during MY 2015-16 to MY 2021-22

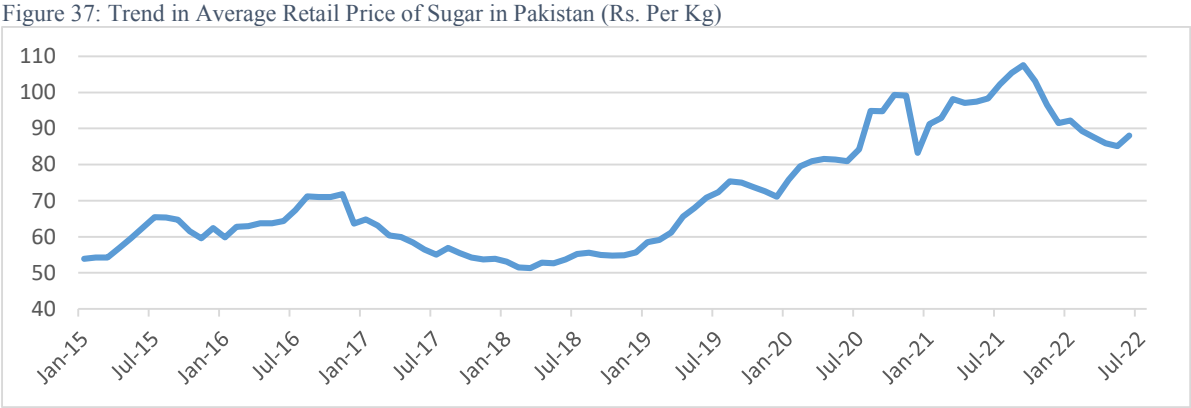
Marketing Year	Stocks (000 Tons)
2015-16	1,570
2016-17	2,805
2017-18	3,840
2018-19	2,690
2019-20	1,685
2020-21	2,245
2021-22	3,512
Source: Sugar Annual, USDA	

[107] SUGARCANE COMMODITY (pc.gov.pk)
[108] Sugar-Inquiry-Committee-Main-Report-dated-24.03.2020.pdf (app.com.pk)
[109] PM approves summary to ban sugar export - Profit by Pakistan Today
[110] Pakistan to import 300,000 tonnes of sugar, finance ministry says | Reuters

Retail Price of Sugar

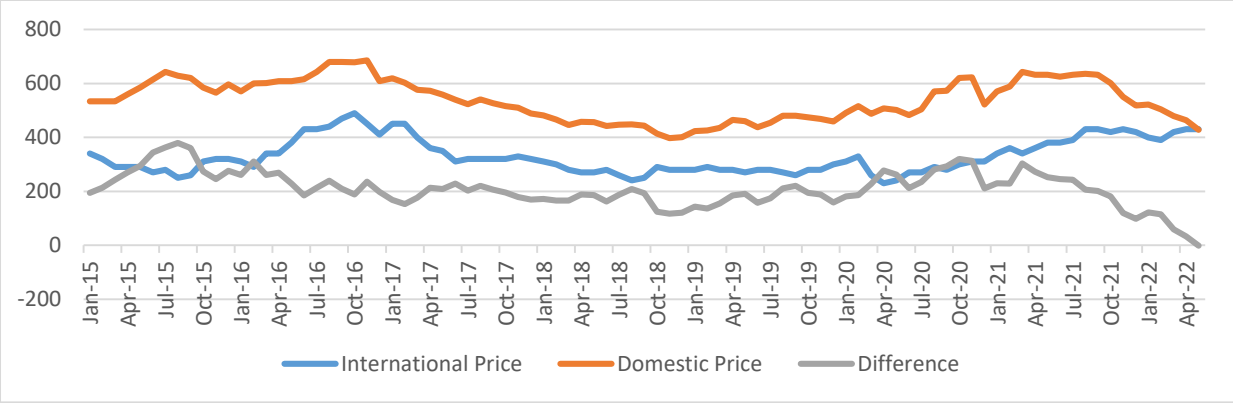
- The Price of sugar has increased by 63% from Rs. 54 per Kg in Jan, 2015 to Rs. 88 per Kg during June 2022. However, the price of sugar declined by 10% from Rs. 98 in June 2021 to Rs. 88 in June 2022 due to bumper crop and higher sugar production during 2021-22. Figure below presents the trend in retail price of sugar in Pakistan.

Figure 37: Trend in Average Retail Price of Sugar in Pakistan (Rs. Per Kg)



Source: PBS

Figure 38: Comparison of International and Domestic Price of Sugar (US$ per Ton)



Source: Indexmundi, PBS, SBP

- The comparison of domestic sugar prices with international sugar price reveals that domestic price of sugar remained over $100 higher than international prices during 2015 till December 2021. The difference between two prices started to decline after April 2021 when on one hand international prices were rising and on the other hand domestic prices were on a decline. However, currently the domestic prices are lower than international prices of sugar indicating a potential for export of commodity. But the decision to export shall be taken very carefully as world commodity markets are disturbed due to the war on Ukraine. Additionally Pakistan is facing an influx of Afghan refugees that can also add to the shortage of commodity in domestic markets.
- There is wide quality gap in sugar produced between Pakistan and major countries. Raw sugar produced and marketed internationally by Brazil, Australia & Thailand have poor quality sugar having high ICUMSA (1000 ppm), whereas Pakistan & India are producing refined sugar with low ICUMSA (50-300 ppm). It is worth mentioning that low ICUMSA sugars are high quality sugars.[111]

[111] SUGARCANE COMMODITY (pc.gov.pk)

Cost of Sugarcane and Sugar Production

- On average it costs Rs. 117,044 to produce sugarcane from one acre of land in province of Punjab. In terms of per kg, it costs Rs. 4.25 to produce sugarcane. Land rent is the major component in production of sugarcane with a share of 34% in total cost. Similarly, seed and sowing, cost of water, harvesting cost and cost of fertilizer are also among major costs components accounting for 55% of total cost. Table below presents the costs associated with different processes in sugarcane production.

Table 42: Cost of Sugarcane Production (Rs/Acre)

	Cost	Share with Land Rent
Total Cost	117,044	
Land Rent	40,000	34%
Seed and Sowing	17,895	15%
Cost of Water	17,751	15%
Cost of Harvesting	15,977	14%
Cost of Fertilizer	12,650	11%
Land Preparation	7,717	7%
Cost of Dung	1,295	1%
Cost of Weedicides	1,103	1%
Other costs	673	1%

Source: CRS Punjab

Table 43: Cost of Sugar Production

	Category	Cost
1	**Support Price (Rs.)**	225
2	**Price of sugarcane (in Rs/kg)**	5.625
3	**National recovery sugar (%)**	10
4	**National recovery molasses %**	4.5
5	**Price of molasses (in Rs/kg)**	14.78
	Calculation (Rs per kg)	
6	**Raw material cost**	56.25
7	**Add: Processing cost @ 30%**	16.875
8	**Less: Byproduct molasses**	10.35
9	**Rs/kg cost of sugar (ex-factory)**	66.475
10	**GST @ 17% of Ex-Mill**	10.67
11	**Total cost:**	77.15
	Assumptions:	
	Support price set by Punjab & KP govt	
	Average sucrose rate 10% & molasses recovery rate 4.5%	
	Average export price of molasses as per PSMA for 2020-21	
	10kg sugarcane produces 1kg sugar & 0.45kg molasses	

Source: Calculations based on methodology of business recorder[112]

- Cost of sugarcane accounts for around 80% of the cost incurred during production of sugar. MSP highly affects the total cost incurred in production of sugar. However, sucrose recovery rate is also a major determinant of cost in sugar production. Following table presents the cost incurred by mills having different sucrose recovery rates.

Table 44: Sucrose recovery rate and cost of sugar production faced by Mills in FY2020

[112] Sugar price: told you so! - BR Research - Business Recorder (brecorder.com)

Factory	Crushing Capacity-metric Tons	Cost of Sugar-PKR/Kg	Recovery	Cost of Cane-PKR/Kg	Component of Cane in Total Cost
JDW Sugar Mills	4,620,000	46.96	11.29%	40.08	85%
Hamza Sugar Mills	2,940,000	49.29	10.82%	41.58	84%
Al Moiz Industries	2,290,000	57.06	10.60%	42.21	74%
Thal Industries	2,208,000	64.86	10.19%	45.14	70%
Macca Sugar Mills	1,485,000	97.27	9.03%	49.84	51%
Noon Sugar Mills	1,400,000	56.95	10.01%	43.95	77%
Sindh Abadghar Sugar Mills	1,280,000	54.32	10.78%	45.71	84%
Shakaranj Sugar Mills	1,268,000	67.76	10.13%	44.42	65%
Khairpur sugar mills	980,000	55	9.81%	46.38	84%
Adam Sugar Mills	826,000	66.41	8.91%	51.62	78%
Chanar Sugar Mills	768,000	65	9.50%	50.29	77%
Pattoki Sugar Mills	68,964	56.95	8.21%	54.81	96%

*Data as per FY20

Source: PACRA

Issues and Recommendations:-

- Fixing minimum support price hampers the competition among crops by providing an incentive to grow sugarcane over other crops. The current system of MSP and allocation of areas for mills is provided by the Sugar Factories Control Act 1950. This Act was enacted in 1950s to ensure regulated supply of sugarcane to sugar factories. However, the current situation has changed and the number of sugar mills has increased to 90 and area under sugarcane has increased to 1.2 million hectare.[113] Therefore, the Government may now leave it to market forces to determine the price of sugarcane and its production. This will also lead to increase the competitiveness of sugar industry in international market.
- In 2021, CCP identified cartel in the sugar industry through an extensive enquiry, which concluded that the Pakistan Sugar Mills Association (PSMA) acted as a front runner for cartelization in the sugar industry since 2010.[114] Sugar mills used PSMA's platform to share business sensitive information with each other. Additionally, the sector was also found to be involved in anticompetitive practices during 2009 when the Commission found that PSMA and its members had engaged in fixing of prices and collusion in the purchase of sugarcane, production of sugar, and sale or trade of sugar.[115] Hence, it is recommended that the PSMA shall not act beyond its mandate.

[113] Analysis of Sugar Industry and Shortfall of Sugar – Khilji & Company
[114] CCP 'unearths' sugar cartel - Business Recorder (brecorder.com)
[115] Competition Commission Of Pakistan - :: 10 November 2020 (cc.gov.pk)

- Misreporting of cost of production of sugar is an important issue and there is a need to amend the Companies Act, 2017 to obviate misreporting of the cost of production because SECP had dispensed with the requirement for the companies to file the cost accounts and its audit with SECP. Amendments in in the Act are required to be reverted for the audit of cost accounts of the companies.
- The decision to export shall be taken by considering the available stocks of sugar in domestic market. In this regard, a cushion for smuggling may also be taken into account to avoid any unseen circumstances. Exports shall only be allowed if the domestic stocks are 1.5 million metric tons in excess of the domestic consumption requirement.
- Bulk based rather than quality based Indicative Price system provides no incentive for planting high sucrose varieties. Although there are varieties developed that provide high sucrose rate but their adoptability is slow. In this regard, the legal framework empowers provincial governments that they can play the role of intermediary between industry and research institutes and may mandate mills to distribute the recommended seed for cultivation (Sugar Factories Control Act 1950 Sec 18 (ii)). Hence, the same powers may be utilized and distribution of good quality seed may be encouraged.
- There used to be delays in payments to farmers. But the Punjab Government has amended the Sec 13 (2) of the Act and has made it compulsory to issue Cane Purchase Receipt (CPR) and shall make payment to the grower before 30th June.[116] The previous legislation was ambiguous in this regard. Similarly, the forced purchase of cane grown in the area of a factory has also been omitted from Act. This has helped in resolving the issues of farmers and helped them in getting better price for their produce.
- Time of crushing sugarcane is inherently economical. The mill owners usually try to delay the crushing of sugarcane. There are many reasons why the mill owners manipulate the situation in such a way. It reduce water content in the sugarcane which affects its weight and hence reduction in price. The other reason is that the farmers tend to operate a rotating crop pattern. Delays in crushing season pressurize the farmers to get rid of sugarcane as early as possible so that they can switch to the next crop (often Wheat). This leads to desperate panic selling and hence reduces the price of sugarcane. Although the Act has declared that the crushing can't be delayed beyond 30th November, but in the case of sugarcane the delay of crushing by one day can lead to huge losses. In this regard, the legislation of Sindh is ideal as no date is defined and the date for the crushing is approved by the Cabinet each year under the Sugar Factories Control Act 1950.
- Sugar in Pakistan's domestic market remained priced at well above the international market till April 2022. The sugar market is insulated from imports by a tariff of 40 percent which is abolished at the times of shortage.[117] This protects the local industry and provides no incentive to invest in higher sucrose content varieties and sucrose recovery technology. Due to low sucrose recovery rate and lower sugarcane yield per hectare the cost of sugar production in Pakistan is higher than its regional counterparts. Additionally, the MSP provided to ensure availability of sugarcane for industry also distorts the market and increases the cost of production. This is the reason that subsidy is required to export any surplus quantity. If the government exits from MSP policy, this will enhance competition among crops and ultimately the farmers will settle down on crops that provide benefit to them.
- Unreliable data on sugarcane production, sugar production and sugar stocks causes shortage in domestic market. FBR has introduced Track and Trace system for tax

[116] A-Brief-on-Sugar-Factories-(Control)-(Amendment)-Ac-2021.pdf (assets.kpmg)
[117] downloadreportbyfilename (usda.gov)

collection purposes.[118] Its implementation shall be expedited for proper monitoring of stocks in country. Additionally, FBR may also do mandatory registration of brokers, dealers, wholesalers with NTN linked to their bank accounts.

- A reason of high production cost of sugar in Pakistan is the less diversified sugar value chain in the country. Molasses as by-product of sugar manufacturing is mostly utilized for production of different grades of industrial ethanol like denatured, rectified and anhydrous and more than 95 percent of total production (3.0 million liters per day from 20 distillation units of sugar industry) is exported to EU, Japan and Korea etc. Domestic use of the ethanol for fuel purposes is limited because of lack of investment in bio fuel based automobile sector.
- The sugarcane is highly water consumptive crop (Mansoor 2020). Therefore, saving of water is very important for the competitiveness of not only sugar crop, but also for the whole agriculture sector. The present flat rate system is allocative neutral leading to misallocation of this scarce resource. Water pricing is imperative for its rational use not only within a crop but also across crops in the cropping system.[119] Sugar beet on the other hand, consumes less water. Therefore, the Government may consider promoting sugar beet production.
- Infield and outfield testing of promising sugarcane varieties for commercial cultivation is inefficient. The varieties are approved through a long, cumbersome and complicated process. Above all there is no proper supply system for the dissemination of improved sugarcane varieties among farmers. Research institutes and farms of sugar mills have limited capacity to multiply and supply the improved variety material to farmers. Thus when a new variety is approved, it takes years to disseminate it to farmer field. Moreover, any campaign of varietal dissemination is normally not coordinated with sugar mills, thus farmers are reluctant to adopt new varieties as they are not sure the response of the sugar mills on the new varietal supplies.
- World sugar industry is now keen to adopt 6 bios for industry sustainability which are bio-sugar, bio-ethanol, bio-electricity, bio-diesel, bio-water and bio-form aimed at achieving zero residues, liquid effluents, odors and minimal emissions. [120] An example, conversion of primary juice of sugarcane into anhydrous (Industrial) alcohol. Pakistan has huge potential for this technology but currently no sugar mill has the facility of converting sugarcane primary juice into anhydrous alcohol.
- In addition, GPS and NIR technologies are being used to synchronize the sugar harvesting and crushing schedules and monitor the sugar processing by the administration as well as by the government for tax purposes. The Pakistani government mays also consider adopting these technologies for better management of crop and industry.

[118] PM launches FBR's Track & Trace System for sugar sector (radio.gov.pk)
[119] Sugar Cluster Report. 2020. Ministry of Planning, Development and Reforms.
[120] Sugar Cluster Report. 2020. Ministry of Planning, Development and Reforms.

7. Milk

Introduction

- Milk covers a wide range of nutrients, including vitamins, minerals, protein, healthy fats and antioxidants that help maintaining health. The dairy industry processes raw milk into an array of products including butter, cheese, cream, yogurt, ghee, condensed milk, dried milk, ice cream, etc. and produces various by-products including buttermilk, whey, ghee, and skim milk.[121]
- During FY 2021-22, the livestock sector in Pakistan grew at a rate of 3% accounting for about 61.9% of agriculture value addition and 14% of GDP. The importance of the sector can be realized from the fact that more than 8 million rural families are engaged in the production of livestock and deriving more than 35-40% of their income from this sector.[122]
- Pakistan has a large livestock population, well adapted to the local conditions and has some of the best tropical breeds. Current livestock population of the country includes 43.7 million buffaloes, 53.4 million cattle, 82.5 million goats, 31.9 million sheep and 1.1 million camels. During 2021-22, the population of cattle and buffaloes has registered an increase of 3.6% and 3% respectively. The table below shows the livestock population for the last three years.

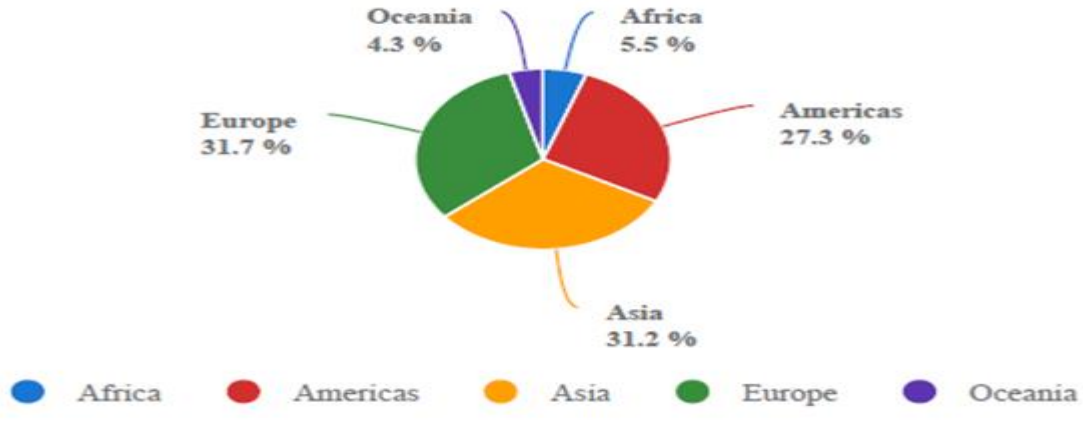
Table 45: Estimated Livestock Population (Million Nos.)

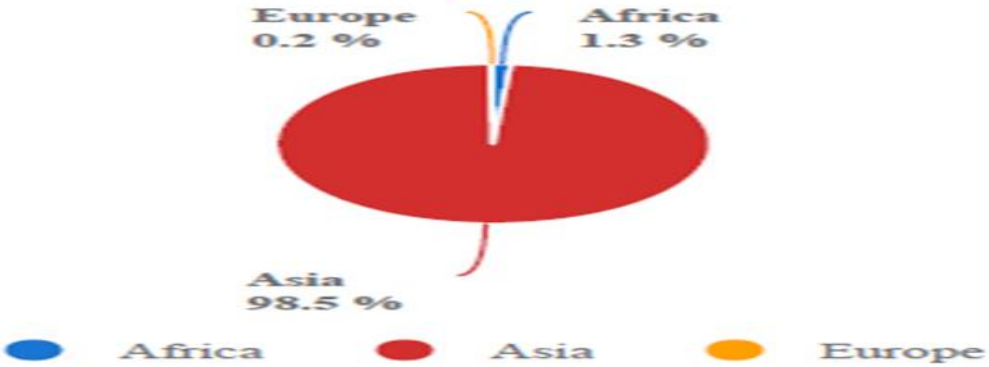
Species	2019-20	2020-21	2021-22
Cattle	49.6	51.5	53.4
Buffalo	41.2	42.4	43.7
Sheep	31.2	31.6	31.9
Goat	78.2	80.3	82.5
Camels	1.1	1.1	1.1
Horses	0.4	0.4	0.4
Asses	5.5	5.6	5.7
Mules	0.2	0.2	0.2
Source: Pakistan Economic Survey 2021-22			

Global Perspective

- India is the world's largest milk producer, with 22 percent of global production, followed by the United States of America, China, Pakistan and Brazil. Milk production in the India has grown at a compound annual growth rate of about 6.2 % to reach 209.96 million tons in 2020-21.[123] In terms of consumption India has consumed around 83 million metric tons of milk followed by European Union with 23.9 million metric tons.[124] The figure above shows the production share of cow milk by regions. It can be observed that Europe is the leading cow milk producer around the world. The production share of buffalo is higher in Asia, i.e., 98.5% which shows that Asia is the leading buffalo milk producer around the world.

[121] Rafiq, S, M &Rafiq, S, I. (2019): *Milk By-Products Utilization*IntechOpen
[122] Pakistan Economic Survey, 2021-22.
[123] https://www.investindia.gov.in/sector/food-processing/dairy#:~:text=India%20is%20the%20largest%20milk,mn%20tonnes%20in%202014%2D15%20.
[124] https://www.statista.com/statistics/272003/global-annual-consumption-of-milk-by-region/





Domestic Production of Milk

- Pakistan is the 4th largest producer of milk. The consumers have a general preference for buffalo milk that accounts for 60% of the total production as shown in the table below. The average annual yield per milking animal in the world is 2.33 tonnes compared to 1.62 tonnes in Pakistan.[125]The table below shows the trend of milk production during the last three years.

Table 46: Estimated Milk Production (000 Tonnes)

Species	2019-20	2020-21	2021-22
Cow	22,508	23,357	24,238
Buffalo	37,256	38,363	39,503
Sheep	41	41	42
Goat	965	991	1,018
Camel	920	932	944
Total	**61,690**	**63,684**	**65,745**
Source: Pakistan Economic Survey 2021-22			

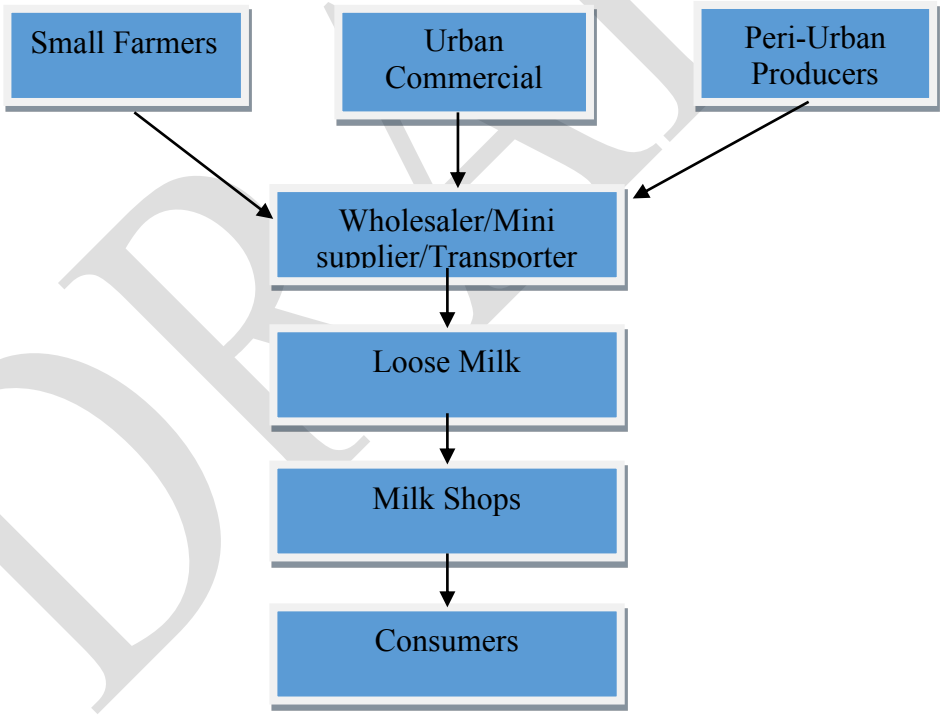
Milk Supply Chain and How it works

- It is learnt that around 95% of the milk produced reaches consumers via the informal sector, an extensive, multi-level distribution system of middlemen. Demand for open raw milk is much higher than for processed milk because consumers dislike heat-treated milk because of its taste. The middlemen collects the milk from producers and pass it on to small local companies, shops, collection points or directly to the consumers,

[125]https://www.pc.gov.pk/uploads/report/Milk_Cluster_Report.pdf

generally having oral agreements concerning supply with the producers as well as with the local companies. Although some middlemen have refrigerated milk storage and transport systems. [126] According to the Panning Commission, following steps shows the working of milk supply chain:

- *Small dhodhi collects the milk at farm gate 1seer or gadvi = 1100 ml i.e. Small dhodhi gets 100 ml extra per lit. 40 gadvi becomes 44 litres.*
- *Large dhodhi rural quality standard has set milk quality standard protocol with 6% fat (a reward and penalty system in place).*
- *Premium = (Litres x actual fat ÷ 6% base fat standard x base price per lit)*
  Assuming Small Dhodhi 44 litres milk had 6.5 % fat
  Premium paid = 44 L x 6.5÷ 6% = 47.7 litres
  Small dhodhi gains another 2.7 litres
- *Large dhodhi urban make his profit by lowering fat for urban retailers to around 4.6 to 4.8% by adding 1kg ice per 7.3 litres of milk in a total volume of 40 litres. The ice was added directly to the milk to avoid spoilage. Thus, after dilution with melted ice each 40 litremaund actually consisted of 46 gadvi of milk.*
- *Retailer sell 1 lit = 900ml (i.e., 100 ml less per lit).*



[126] ibid

Major Milk Producing Areas

- Punjab and Sindh are the main dairy producing provinces contributing 57% and 25% of dairy animals in the country.[127] The table below shows the area wise production of milk in the province of Punjab and Sindh.

Table 47: area wise production of milk in the province of Punjab and Sindh

Area 1				Area 2		Area 3		Area 4		Area 5	
Western Punjab	**% age of Total Milk Produced**	**North Western Sindh**	**% age of Total Milk Produced**	**Southern Western Sindh**	**% age of Total Milk Produced**	**Northern Southern Punjab**	**% age of Total Milk Produced**	**Peri-urban Sindh**	**% age of Total Milk Produced**	**Peri-urban Punjab**	**% age of Total Milk Produced**
Sahiwal	19%	Ghotki	24%	Tharparkar	10%	Chakwal	13%	Karachi	17%	Lahore	10%
Pakpattan		Sukkur		Umarkot		Attock		Hyderabad		Kasur	
Vehari		Khairpur		Sanghar		Mianwali		Thatta		Okara	
Bahawalpur		Larkana				Bhakkar					
Rahim Yar Khan		Shikarpur				Layyah					
						Rajanpur					
						D.G Khan					

Source: CLUSTER DEVELOPMENT BASED AGRICULTURE TRANSFORMATION PLAN VISION2025, Planning Commission of Pakistan.

- Around 61% of the dairy farming is being carried out by farmers with a herd size of 1 to 4 animals whereas the proportion of large scale commercial farming is very limited. The table below shows the size of dairy farm owned by each household:

Table 48: size of dairy farm owned by each household

Number of Animals	Ownership by Household (%)
1-2	27.32
3-4	23.73
5-6	14.32
7-10	13.68
11-15	6.29
16-20	2.65
21-30	2.58
31-50	2.71
51 or more	6.72
Source: Pakistan Livestock Census 2006	

[127] https://www.pc.gov.pk/uploads/report/Milk_Cluster_Report.pdf

Consumption of Milk

- The consumption of milk for the last three years is shown in the table below. It can be observed that the buffalo milk has higher consumption i.e. 60% of the total milk consumption.

Table 49: Estimated Milk Consumption (000 Tonnes)

Species	2019-20	2020-21	2021-22
Cow	18,007	18,686	19,390
Buffalo	29,805	30,691	31,603
Sheep	41	41	42
Goat	965	991	1,018
Camel	920	932	944
Total	**49,737**	**51,340**	**52,996**
Source: Pakistan Economic Survey 2021-22			

Milk Production Seasonality and Prices

- In Pakistan, milk production and consumption are affected by seasonal fluctuations that are inconsistent with each other. Milk production is related to the availability of green fodder, it is available in abundant quantity between January and April and low from May to August. Fodder crops cover about 16-19% of the country's total cropped area. Green fodder shortages occur between (May-June and December-January), encouraging recent small-scale efforts to grow multi-cut fodder crops such as sorghum-Sudan grass hybrids, Lucerne, mixtures of cereals and legumes, and Rhode grass. Preservation of fodder can play an important role in nutrition. Silage and Hay making are common techniques to preserve fodder. The preserved fodder has more nutritional value and can be used by animals during this fodder shortage period. The table below shows the contribution of feed resources for dairy animals in Pakistan.[128]

Table 50: contribution of feed resources for dairy animals in Pakistan

Source	Contribution (%)
Fodder and crop residues	51
Forage/grazing	38
Cereal by product	06
Post-harvest grazing	03
Oil cakes, meals, animal protein	02

- Alternatively, milk consumption declines during winters and peaks in summer due to consumers' higher preference for products like lassi, yogurt and ice cream. The table below shows the pricing trend of fresh milk (un-boiled) from January 2020 to July, 2022. It can be observed that prices of milk are fluctuating throughout. The inflationary impacts i.e. rising cost of fuel and electricity impacted the prices of fresh milk to the tune of 20.79 rupees during the last six months.

[128] https://www.pc.gov.pk/uploads/report/Milk_Cluster_Report.pdf

Table 51: Retail Price of Milk

Period	Price (Per Kg)	% Δ	Period	Price (Per Kg)	% Δ	Period	Price (Per Kg)	% Δ
Jan,2020	93.76	-	**Jan,2021**	105.18	-	**Jan,2022**	115.23	-
Feb,2020	93.87	0%	**Feb,2021**	105.24	0%	**Feb,2022**	115.6	0%
March,2020	94.75	1%	**March,2021**	106.9	2%	**March,2022**	116.63	1%
April,2020	92.07	-3%	**April,2021**	107.47	1%	**April,2022**	117.98	1%
May,2020	95.56	4%	**May,2021**	108.07	1%	**May,2022**	120.38	2%
June,2020	97.28	2%	**June,2021**	109.96	2%	**June,2022**	129.47	8%
July,2020	99.16	2%	**July,2021**	110.75	1%	**July,2022**	136.02	5%
Aug,2020	102.76	4%	**Aug,2021**	111.43	1%			
Sept,2020	103.41	1%	**Sept,2021**	111.83	0%			
Oct,2020	104.32	1%	**Oct,2021**	112.25	0%			
Nov,2020	104.61	0%	**Nov,2021**	112.9	1%			
Dec,2020	104.84	0%	**Dec,2021**	114.13	1%			
Net Δ	11.08	11%	**Net Δ**	8.95	8%	**Net Δ**	20.79	17%
Source: PBS								

Industrial Processing of Milk

- It is learnt that less than 5% of loose milk reach the dairy plants for processing into variety of dairy products such as UHT milk, pasteurized milk, dry milk powder, and condensed milk. Other major milk products produced by the dairy industry include butter, yogurt, ice cream, cheese, cream and some butter oil. The total supply of milk i.e. 5 % of the total milk production is available for the processing industry in which approximately 50% is used in processing UHT milk, 40% into powdered milk, and the remaining 10% into pasteurized milk, yogurt, cheese and butter etc. There are about 38 major dairy plants established in the country having a daily capacity of 2.18 million liters, however, only 13 plants are currently in operation. The milk processing capacity of these 13 plants in operation is estimated at a little over one million litres per day. The major processors are Nestle, Engro, Haleeb, Fauji, Shakarganj and Millac (pvt) Ltd. [129]

Issues and Recommendations

- In most parts of the country the loose milk sold is a combination of buffalo and cow milk. Since majority of the milk is being produced by small farmers who have small quantity of milk to sold in the market and they are unable to bargain the price of milk to get the fair price because of the highly perishable nature (4 to 6 hours) of the commodity. The adulteration in milk is due to the large number of intermediaries involved in entire milk marketing chain. The cost of production is high in peri-urban areas as compared to urban areas because fodder in mainly procured from urban areas and the rising prices of fuel and electricity impacted the fodder prices as well.
- In order to prevent heat spoilage Dhodhi or intermediaries adds ice to the milk during the summers. Further, to prevent spoilage during transit, intermediaries are also known to add bacterial inhibitors, such as penicillin and other adulterants like washing powder and maize flour, to enhance volume and whiteness. Agents in the marketing chain rarely have access to cold storage facilities, and a major portion of milk is lost. According to the Economic Survey of Pakistan 2021-22 consumption of milk is derived by subtracting 20 percent wastage (15 percent faulty transportation and lack of chilling

[129] https://www.pc.gov.pk/uploads/report/Milk_Cluster_Report.pdf

facilities and 5 percent in suckling calf nourishment) of the gross milk production of cows and buffalo.

- Since prices of milk are being regulated by district governments under the Profiteering and Hoarding Act, 1977 despite of the fact that there is no price control mechanism for the inputs that are being supplied to farmers. This capping of price triggers adulteration and supply shortage and hence consumers are forced to buy the inferior quality milk and at the same time consumers are charged higher prices in the name of superior quality of the milk.
- Value chain infrastructure such as collection centers equipped with chillers and pasteurizers and proper milking places for animals are missing at the village level to maintain the quality of milk.
- Small farmers do not have access to market and unaware of the demand, resultantly they have to rely on middlemen to market their produce.
- Diseases affecting livestock can have a devastating impact on milk production, meat, human health and, consequently, on the overall process of economic development. A recent spread of rare Lumpy Skin Disease (LSD) has affected nearly five million dairy farmers and meat sellers in the country.[130]
- A major problem is the lack of knowledge and awareness about the productive benefits of disease control. Vaccination and treatment for the animals was generally ignored by the smallholder farmers which results huge losses. It significantly decreases the milk production. Farmers have limited knowledge about the sub-clinical diagnosis and treatment of diseases.
- **Deregulation of milk prices by the government** because this measure will lead short term price increase but in the long run it will invite more investments in dairy business i.e. increase in the demand of quality milk and dairy products and eventually prices will be rationalized.
- To provide technical, financial, and capacity building support to develop milk value chain infrastructure in rural areas, which include providing support for milk collection centers, storage and transportation facilities, milk adulteration measurement facilities, etc.
- In order to encourage diversity of milk products in the country, recognition of small scale processing industry at the village level is required.
- Vaccines and medicines may be provided to small scale farmers free of cost to keep their animals safe from viral diseases.

[130] https://www.gavi.org/vaccineswork/lumpy-skin-disease-spreading-fast-pakistan

8. Rice

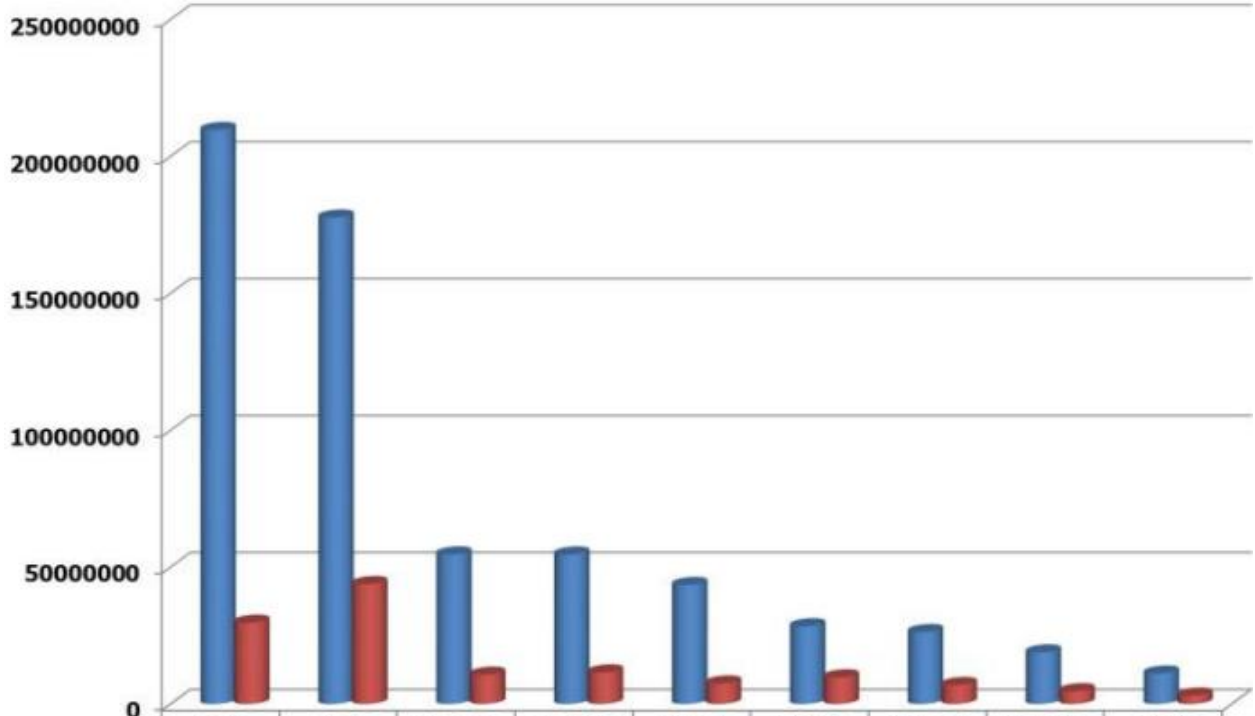
Introduction

- Rice is Pakistan's third largest crop, after wheat and cotton, in terms of area sown. Rice is one of the major source of foreign exchange earnings. There are two varieties: Basmati and non- Basmati. Pakistan is 11th largest producer and 4th largest Exporter of Rice in the world. Its production comprises of 34 percent of basmati (fine) types and 66 percent of coarse types. During the last few years, production of coarse types is increasing as the farmers are bringing more areas under coarse hybrid types. During 2021-22(P), it contributed 2.4 percent of value added in agriculture and 0.5 percent in GDP. [131]

Global Perspective

- In 2019, China was ranked the largest rice producer in the world with 209,614,000 tonnes production. India comes second with 177,645,000 tonnes yearly production. China and India produce together more than 50 % of world's total rice. With 54,604,033 tonnes of production per year, Indonesia is the third largest producer of rice. Ten countries are responsible for almost 85% of the world's rice production and all the top ten producers are located in Asia, except for Brazil. Below the figure 5 shows the top countries production and area of rice in 2019.
- Average yield ton/hectare for China is 7.05, India (4.05), Indonesia (5.1), Bangladesh (4.7), Vietnam (5.8), Thailand (2.9), Myanmar (3.8), Philippines (4.04), and Pakistan (3.67).

Figure 39: Country Wise Production and Area in 2019



	China	India	Indonesia	Bangladesh	Viet Nam	Thailand	Myanmar	Philippines	Pakistan
Production (Tons)	209614000	177645000	54604033	54586344	43448504	28356869	26269814	18814827	11115428
Area (Hectares)	29690000	43780000	10677887	11516553	7469890	9715358	6920875	4651490	3033965

- The table below shows the top average rice per capita-kg consuming countries in the world.

[131] https://www.finance.gov.pk/survey/chapter_22/PES02-AGRICULTURE.pdf

Table 52: Top average rice per capita-Kg consuming countries

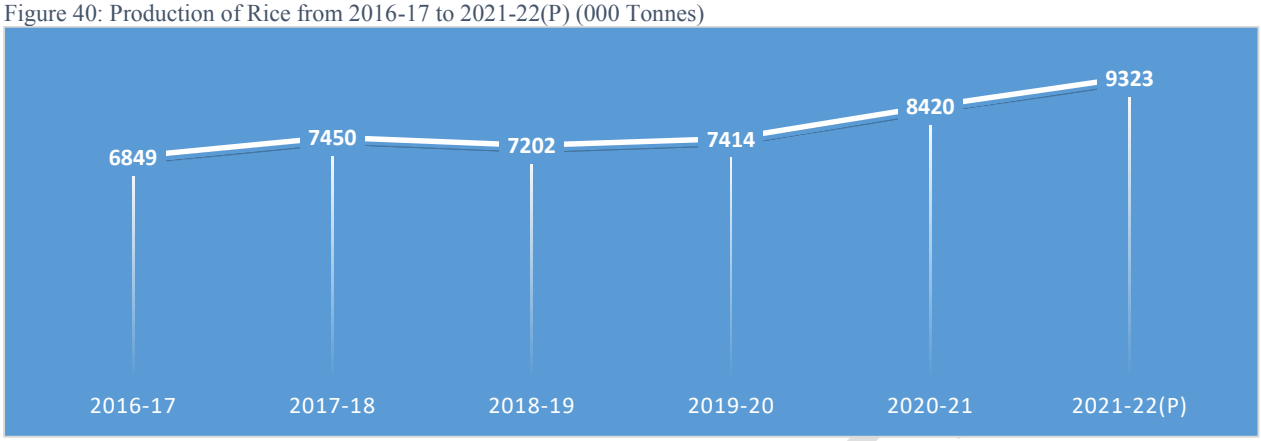
Country	Average rice consumption per capita-kg
Laos	259
Bangladesh	257
Cambodia	240
Vietnam	217
Indonesia	211
Myanmar	185
Sierra Leone	182
Thailand	176
Philippines	170
Sri Lanka	163
Pakistan	18
World	78
Source: https://www.pacra.com/sector_research/Rice%20Sector%20PACRA_1604759631.pdf	

Domestic Production, Area and Yield of Rice

- During 2021-22, production of rice rose by 10.8 percent to 9,323 thousand tonnes from 8,420 thousand tonnes in the previous year, which indicated considerable improvement compared to last year and surpassed the production targets.[132] From 2016-17 to 2021-22(P), production of rice increased by 36.12% from 6,849 to 9,323 thousand tonnes which also shows an improved production during the period.[133]
- During 2021-22(P), the crop was cultivated on area of 3,537 thousand hectares, reflecting an increase of 6.05 percent as compared to last year's sown area of 3,335 thousand hectares. From 2017-18 to 2021-22(P), area in production have been increased by 22%. Also, yield par Kgs/Hec during 2021-22(P) was estimated at 2,635 and it was increased by 4.3% compare to last year of 2,525.[134]
- The production of Basmati rice during 2020-21 remains at 4,800 thousand tonnes. Similarly the area under production of Basmati rice in the year 2020-21 was 2133.1 thousand hectares. Whereas the production of IRRI rice for the year 2020-21 was 1885.0 thousand tonnes and the area in production was 750 thousand hectares.[135]
- This was essentially due to rising unit prices and higher demand for the country's rice in export markets, new higher-yielding hybrid rice varieties, improved agronomic practices and increased planting area, as farmers shift out of cotton, are factors driving the increased production.[136]

[132] Ibid
[133] Ibid
[134] Ibid
[135] Supply and Price Situation Report May 2022, Agriculture Department (Marketing Wing) Government of the Punjab
[136] https://www.world-grain.com/articles/16322-pakistan-posts-record-rice-production

Figure 40: Production of Rice from 2016-17 to 2021-22(P) (000 Tonnes)



P: Provisional Source: https://www.finance.gov.pk/survey/chapters_21/02-Agriculture.pdf

Figure 41: Area in Production from 2016-17 to 2021-22(P)

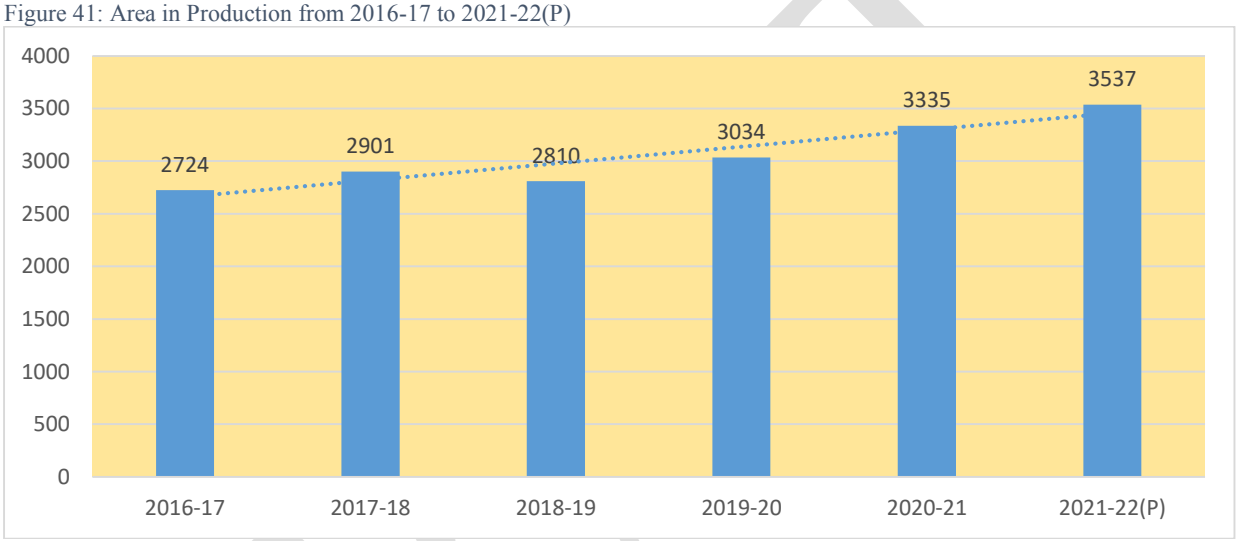
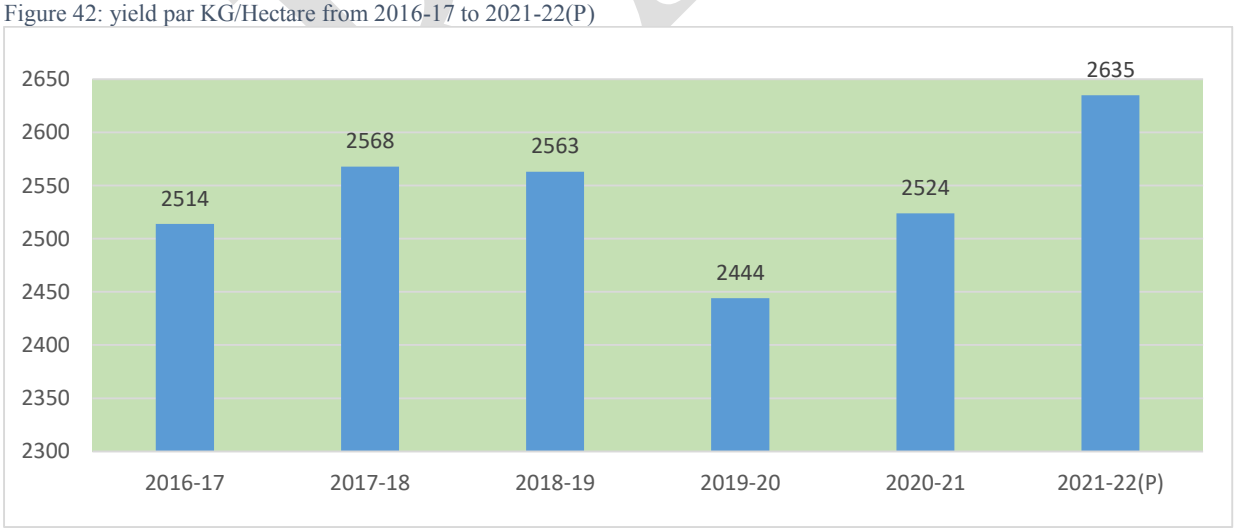
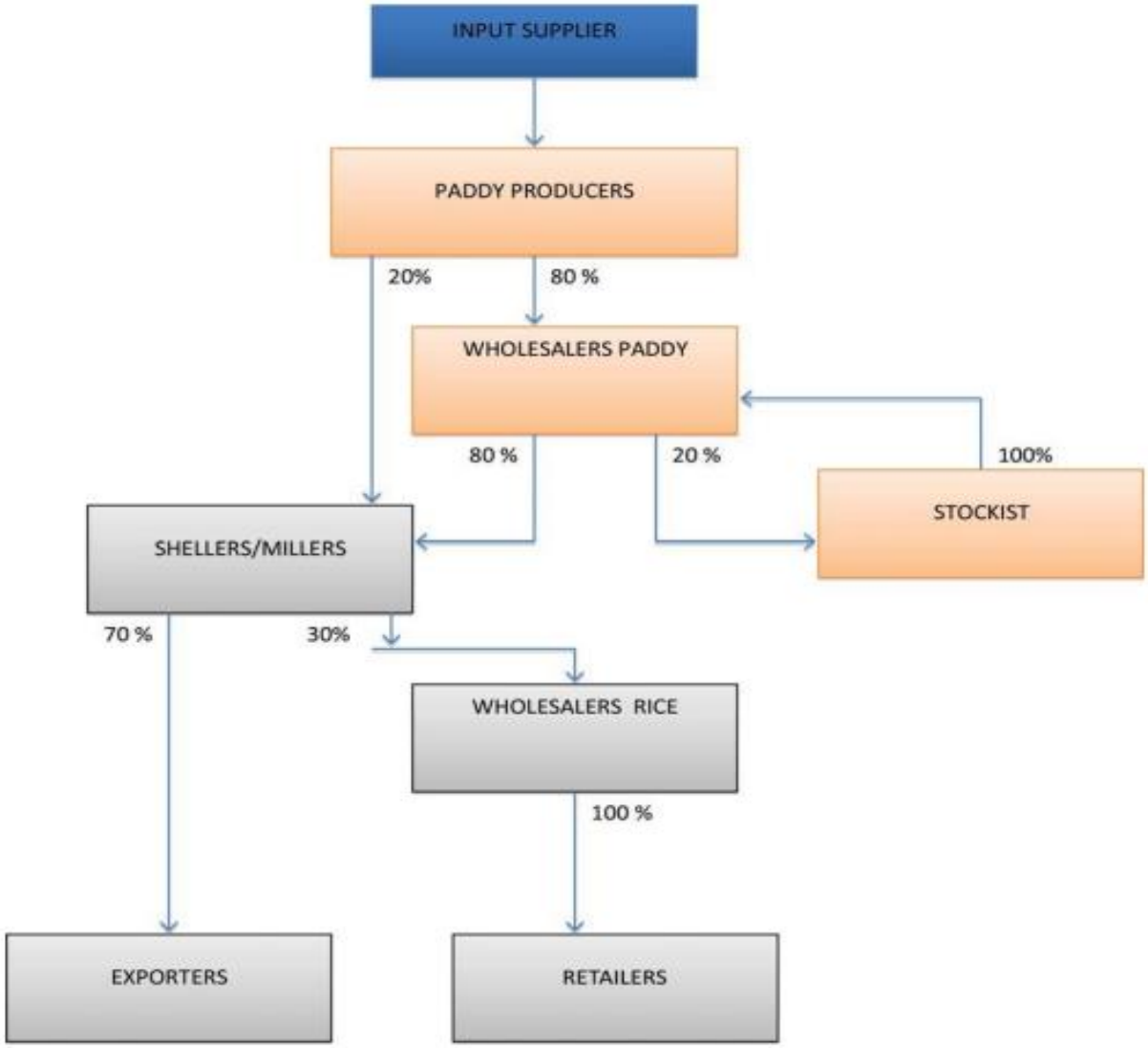


Figure 42: yield par KG/Hectare from 2016-17 to 2021-22(P)



Supply Chain of Rice



Source:
https://www.sbp.org.pk/publications/ChainReport/2015/Report%20on%20Basmati%20Rice%20Value%20Chain%20in%20Pakistan.pdf

Sowing and Harvesting Season

- The national rice crop is planted from May-June during the Kharif season. The annual rice harvest generally occurs from October-December.[137] About 10 percent of Pakistan's total agricultural area is under rice production during the summer or "Kharif" season.
- Also, Pakistan is a leading producer and exporter of Basmati and IRRI rice (white long grain rice).[138] Below the table shows the sowing and harvesting time of rice in Pakistan.

Table 53: Sowing and harvesting season of Rice

Provinces	Variety Type	Sowing Time	Harvesting time

[137] https://ipad.fas.usda.gov/pdfs/Pakistan/Pakistan_December2009_MonthlyReport.pdf
[138] https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Grain%20and%20Feed%20Annual_Islamabad_Pakistan_04-01-2020

Punjab	IRRI type Basmati type	May 20-June 7 June 1- June 20	October-December
Lower Sindh **Upper Sindh**	All varieties All varieties	April 25-June 10 May 15-June 30	October-December
KPK (plains) **KPK (Swat etc)**	All varieties All varieties	May 1- May 30 May 1- May 20	October-December
Baluchistan	All varieties	May 15-June 30	October-December
Source: http://www.parc.gov.pk/index.php/en/faq-s/60-faqs/73-rice			

Major Rice Growing Areas of Pakistan

- Pakistan has two major rice-producing provinces, namely Punjab and Sindh. Both provinces account for nearly 90 percent of total rice production. Punjab, due to its agro climatic and soil conditions, produces 100 percent of the Basmati rice in the country. Pakistan's "Kalar" bowl area, a local term that refers to a type of soil suitable for Basmati production, is famous for producing Basmati rice and is located between the Ravi and Chenab rivers in Punjab. IRRI rice is grown in both Punjab and Sindh.
- During 2020-21, Punjab have the highest share of 63% in the production of rice followed by Sindh (29%), Baluchistan (6%), and KP (2%).[139]
- In Basmati rice production, the highest share belongs to Punjab (84%), followed by Sindh (14%), and Baluchistan (2%). Similarly, in IRRI rice production, Punjab (68%) share is highest followed by Baluchistan (23%), and Sindh (6%).[140]

Figure 43: Provincial Share in production of Rice during 2020-21

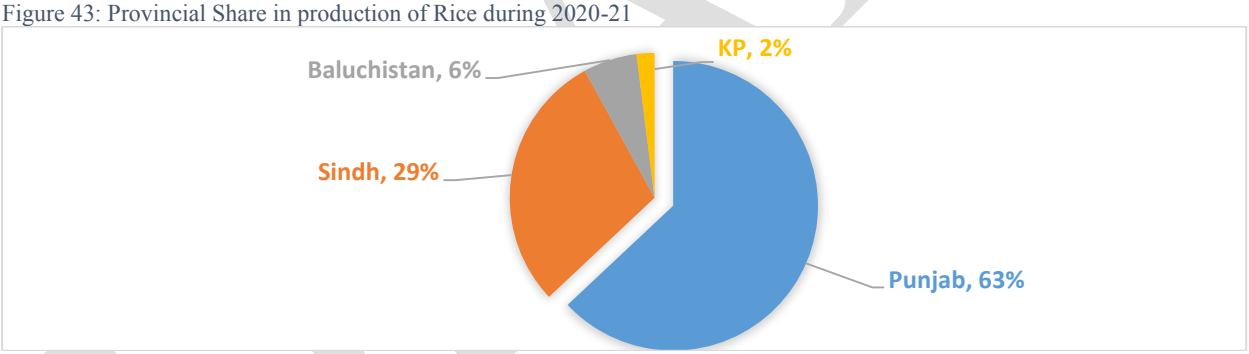


Table 54: Major Rice producing areas and their shares

Zone I (10 % of total rice production)	Northern high mountainous areas of Khyber Pakhtunkhwa (Swat and Khagan) with sub-humid climate, average rainfall of 750-1000 millimeters (mm).
Zone II (55%)	Lies between the Ravi and Chenab rivers in the central Punjab. Sub-humid, subtropical climate with average rainfall of 400-700 mm. This is the famous premium zone and Basmati rice is exclusively produced in this zone along the Kalar tract consisting of Sailkot, Sheikhupura, Narowal, Gujranwala, Hafizabad, and Lahore Districts
Zone III (25%)	West bank of Indus river in upper Sindh and Balochistan. Larkana, Jacobabad (Sindh), Nasirabad and Jaffarabad (Balochistan). High temperature and sub-tropical climate with average rainfall of 100 mm make it best suited for long grain rice.
Zone IV (10 %)	Indus delta basin in Lower Sindh (Badin and Thatta Districts). Climate is arid tropical and is suited for coarse varieties.

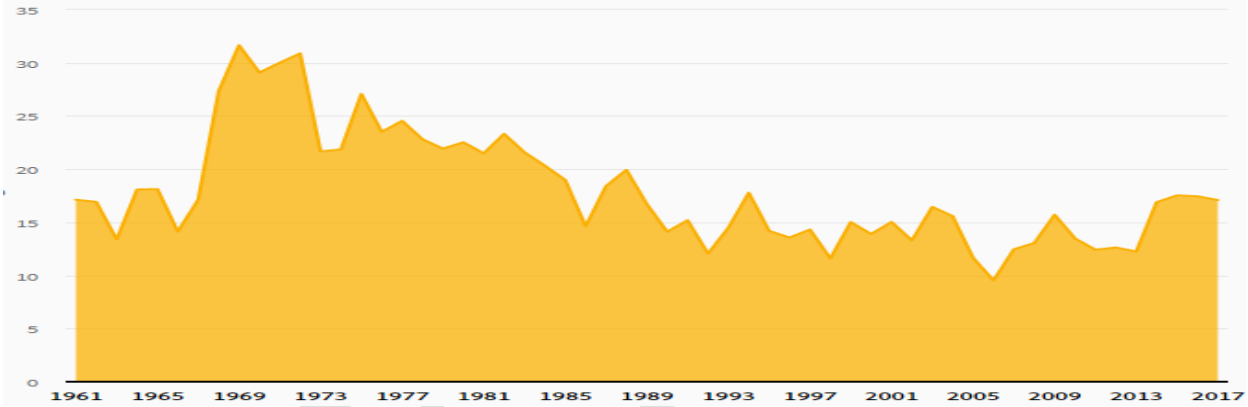
[139] http://www.amis.pk/pdf/Supply%20and%20Price%20Situation%20Report%20May%202022.pdf
[140] http://www.amis.pk/pdf/Supply%20and%20Price%20Situation%20Report%20May%202022.pdf

Source: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Grain%20and%20Feed%20Annual_Islamabad_Pakistan_04-01-2021

Domestic Consumption Per Capita

- According to Faostat, Rice consumption per capita reached 18 kg in 2017 in Pakistan. Historically, rice consumption per capita in Pakistan reached an all-time high of 31.7 kg in 1969 and an all-time low of 9.54 kg in 2006.[141]
- Traditionally, 40 to 45 percent of the crop is used for local consumption, with the balance exported. Pakistanis, in general, prefer Basmati rice than long grain IRRI rice.[142]
- Pakistan has been ranked 77th within the group of 155 countries in per capita consumption. Compared to Pakistan, the average rice consumption per capita of the main peers is; Afghanistan = 20.2 kg, China = 126 kg, India = 103 kg, Iran = 42.3 kg.[143]

Figure 44: Rice Consumption in Pakistan Per capita from 1961 to 2017 (Kg)



Source: https://www.helgilibrary.com/indicators/rice-consumption-per-capita/pakistan/#:~:text=Rice%20consumption%20per%20capita%20reached,of%209.54%20kg%20in%202006.

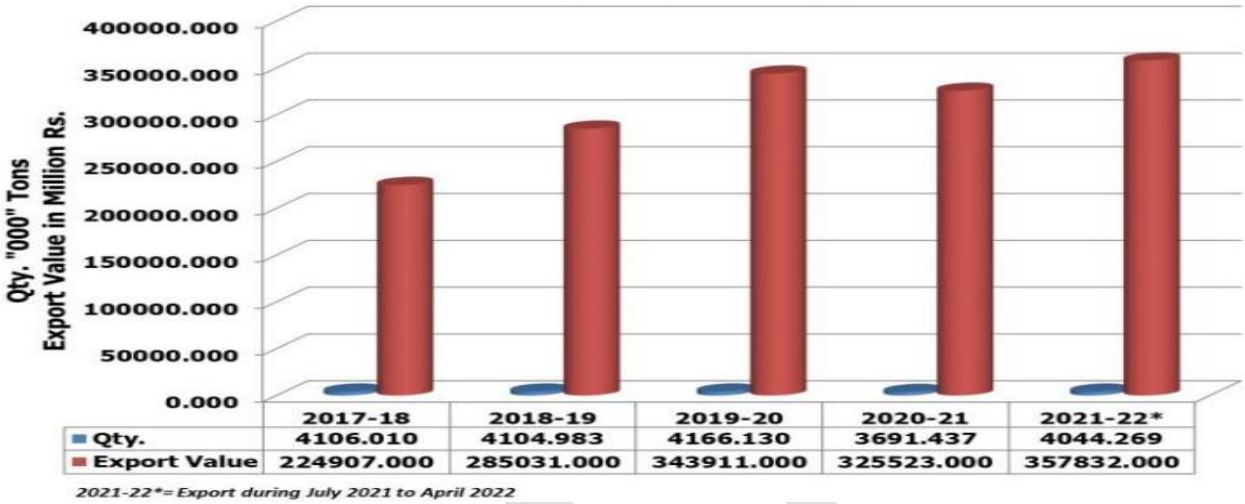
Export of Rice

- During 2021-22, total quantity of rice export was 4,004 thousand tonnes in which 3,411 thousand tonnes was non-basmati rice while 632 thousand tonnes was basmati rice.
- Overall the exporting earning of rice during 2021-22 totaled PRs. 357 billion in which PRs. 99 billion earning was for Basmati rice while PRs. 258 billion was for non-Basmati rice. Below the figure shows the quantity exported and earnings from 2017-18 to 2021-22.
- Pakistan's rice exports benefited from devaluation of its currency during the last two years. Although production increases resulted in more volume available for export and currency devaluation stimulated exports, the industry has not been able to fully capitalize on these export opportunities, which has resulted in higher stocks.
- The top ten Basmati rice importing countries are U.A.E, U.K. Oman, KSA, Belgium, Yemen, Spain, Azerbaijan, Italy and Qatar whereas top ten non-basmati importing countries are China, Kenya, Ivory Coast, Mozambique, Malaysia, Tanzania, Indonesia, Madagascar, Senegal, and Azerbaijan.[144]

[141] https://www.helgilibrary.com/indicators/rice-consumption-per-capita/pakistan/#:~:text=Rice%20consumption%20per%20capita%20reached,of%209.54%20kg%20in%202006.
[142] https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Grain%20and%20Feed%20Annual_Islamabad_Pakistan_04-01-2020
[143] https://www.pacra.com/sector_research/Rice%20Sector%20PACRA_1604759631.pdf
[144] https://kig.pl/wp-content/uploads/2020/12/Export-Market-of-Pakistani-Rice-REAP-role.pdf

- Pakistan's exports make up more than 8 percent of world's total rice trade.[145] Pakistan is shipping more than 4 MMT annually to East Africa, Europe, the Middle East, and China.
- The country's non-basmati long grain crop is generally the first from the major Asian countries to enter the international market, which provides exporters the opportunity to conclude business at better prices.

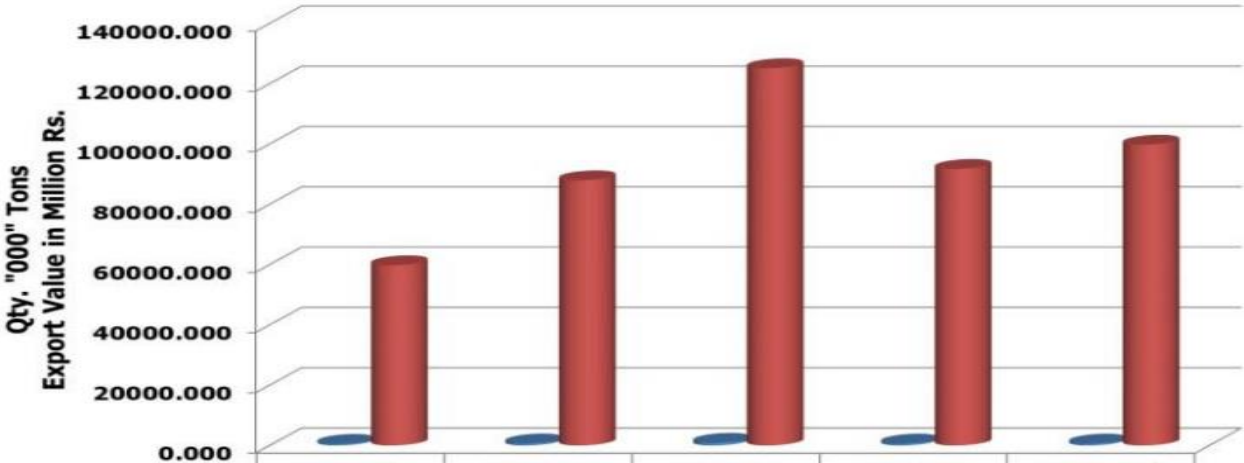
Figure 45: Export of rice from Pakistan 2017-18 to 2021-22



	2017-18	2018-19	2019-20	2020-21	2021-22*
Qty.	4106.010	4104.983	4166.130	3691.437	4044.269
Export Value	224907.000	285031.000	343911.000	325523.000	357832.000

2021-22= Export during July 2021 to April 2022*

Figure 46: Export of Basmati rice from Pakistan 2017-18 to 2021-22

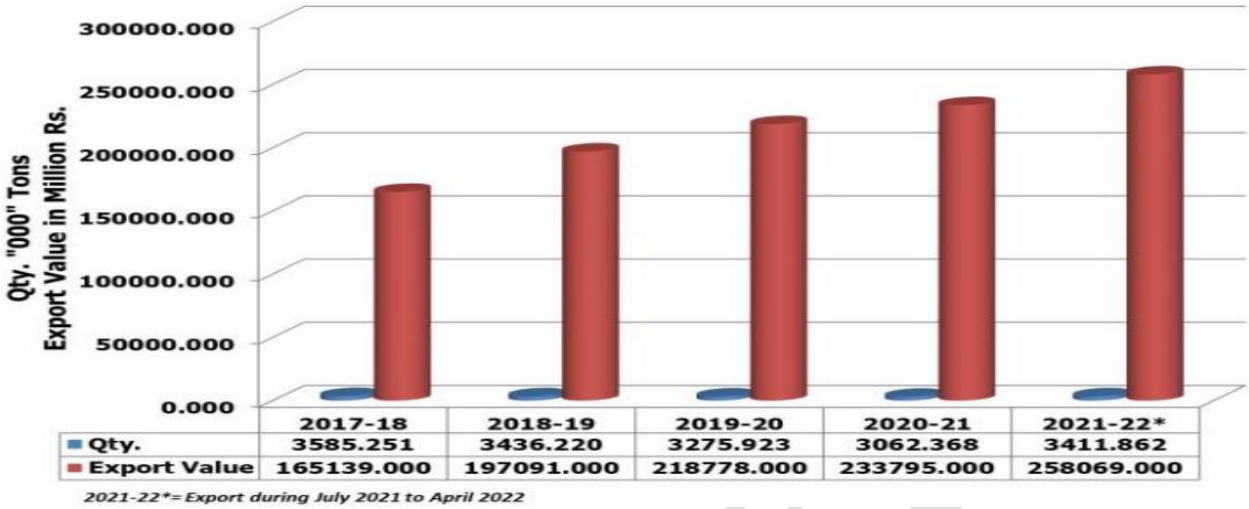


	2017-18	2018-19	2019-20	2020-21	2021-22*
Qty.	520.759	668.763	890.207	629.069	632.407
Export Value	59768.000	87940.000	125133.000	91728.000	99762.000

2021-22= Export during July 2021 to April 2022*

Figure 47: Export of Non-Basmati rice from Pakistan 2017-18 to 2021-22

[145] https://www.pacra.com/sector_research/Rice%20Sector%20PACRA_1604759631.pdf

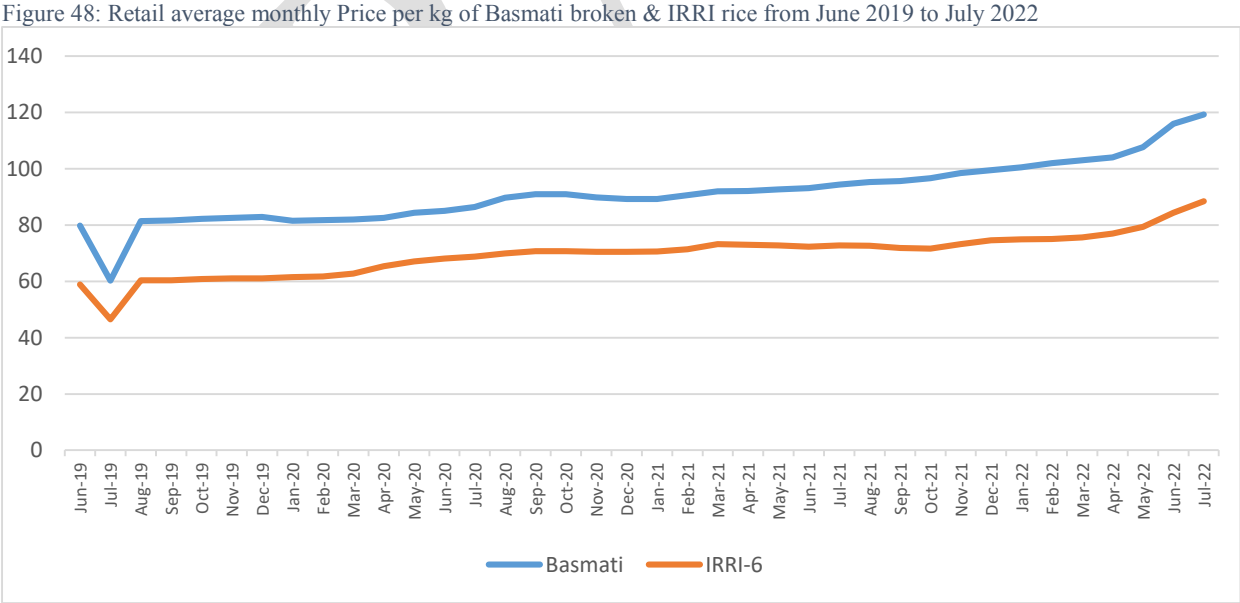


Source: http://www.amis.pk/pdf/Supply%20and%20Price%20Situation%20Report%20May%202022.pdf

Retail Price of Basmati and IRRI rice

- Retail price per Kg of Basmati and IRRI-6 has been shown in the figure 10. The period is from June, 2019 to July, 2022. Retail data have been collected from Pakistan Bureau of Statistics. The figure shows the steady increase in price over the period. Price of Basmati rice have been increased by 49.13% from PKR 79.97 in June 2019 to 119.26 in July 2022. Similarly, price of IRRI-6 rice have been increased by 50.18 % for the same period from PKR 58.92 to 88.49 per kg. The price increase didn't show any untoward increase/decrease in that period, that shows the price increase is a result of general inflation in the country.

Figure 48: Retail average monthly Price per kg of Basmati broken & IRRI rice from June 2019 to July 2022



Cost of Production of Rice (Basmati & Non-Basmati) 2021-22, Weighted Average Cost of Production (PKR. /acre)

- During 2021-22, Weighted Average Cost of Production (PKR. /acre) of Basmati rice including land rent is PKR. 66,773 and without land rent PKR. 46,773.[146] Weighted

[146] https://crs-agripunjab.punjab.gov.pk/system/files/COP%20Rice%20Paddy%20%28Basmati%29%202021-22.pdf#overlay-context=node/204

Average Cost of Production (PKR. /acre) of non-Basmati rice including land rent is PKR. 60,332 and without land rent PKR. 40,332.[147] The major component of cost in production of rice includes cost of water, fertilizer, land and land preparation.

- About 90% food production in Pakistan comes from irrigated agriculture, whereas dryland (rain-fed) agriculture contributes only 10% due to scanty and low rainfall. 2025 has been marked as the year when Pakistan doesn't mend its ways to save water will turn from a "water-stressed" country to a "water-scarce" country.[148] Water productivity is defined as the physical or economic output per unit of water application. The average yield of crops per unit water is much lower than the international levels, and the yields obtained at the research farms and by the progressive farmers within the country. Flood irrigation, a lack of hybrid seeding and poor water management are putting a heavy burden on water resources.[149]

Table 55: Share of cost in % for Basmati rice during 2021-22

	Cost in Pak Rupees.	**Share of Cost in % without cost of land (per/acre)**	**Share of Cost in % with cost of land (per/acre)**
Cost of Land Prep	6,937	15%	10%
Cost of Seed & Sowing	5,990	13%	9%
Cost of Water	**14,955**	**32%**	**22%**
Cost of Fertilizer	**9,542**	**20%**	**14%**
Cost of Dung	250	1%	0
Cost of Pesticides	2,113	5%	3%
Cost of Weedicides	851	2%	1%
Cost of Harvesting	5,835	12%	9%
Cost of Transport	1,287	3%	2%
Other expense	300	1%	0%
Cost of Land	**20,000**		**30%**

Source:https://crs-agripunjab.punjab.gov.pk/system/files/COP%20Rice%20Paddy%20%28Basmati%29%202021-22.pdf#overlay-context=node/204

Table 56: share of cost in % in Non-Basmati rice during 2021-22

	Cost in Pak Rupees.	**Share of Cost in % without cost of land (per/acre)**	**Share of Cost in % without cost of land (per/acre)**
Cost of Land Prep	6,430	16%	11%
Cost of Seed & Sowing	5,274	13%	9%
Cost of Water	**8,552**	**21%**	**14%**
Cost of Fertilizer	**11,509**	**29%**	**19%**
Cost of Dung	384	1%	1%

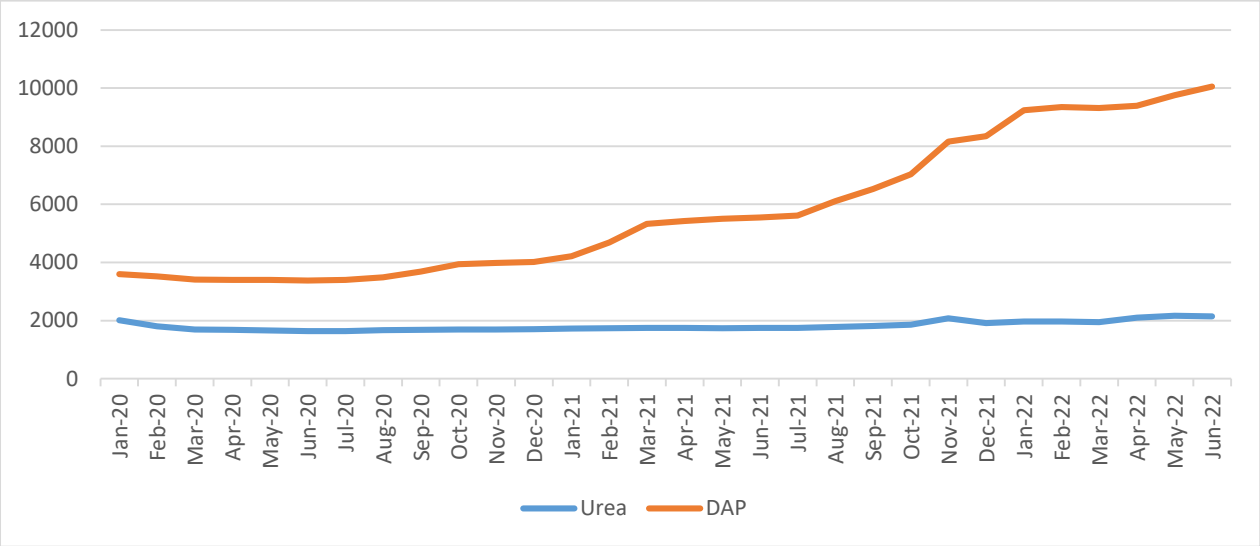
[147] https://crs-agripunjab.punjab.gov.pk/system/files/COP%20Rice%20Paddy%20%28Non-Basmati%29%202021-22.pdf#overlay-context=node/204
[148] https://www.dawn.com/news/1428966
[149] https://www.paspk.org/wp-content/uploads/2019/06/PAS-Water-Security-Issues.pdf

Cost of Pesticides	1,846	5%	3%
Cost of Weedicides	881	2%	1%
Cost of Harvesting	5,226	13%	9%
Cost of Transport	1,881	5%	3%
Other expense	230	1%	0%
Cost of Land	**20,000**		**33%**
Source: https://crs-agripunjab.punjab.gov.pk/system/files/COP%20Rice%20Paddy%20%28Non-Basmati%29%202021-22.pdf#overlay-context=node/204			

Fertilizer (Urea & DAP) Pricing trend from January 2020 to June 2022

- As a major component of cost in producing the agriculture commodities especially the rice, the pricing trend of two major fertilizer i.e., Urea and DAP is drawn. Below the figure 10 shows monthly price of 50kg bag of Urea and DAP from January 2020 to June 2022. In case of Urea, the price trend shows straight line with no major fluctuation during the period due to subsidy given by the government in the form of gas. However, in case of DAP, the price trend shows an increasing trend starting from PKR. 4,000 in January 2020 to 10,000 in June 2022. This shows the significant increase in farmer cost of production due to the core role of fertilizer as input in production of rice.

Figure 49: Fertilizer (Urea & DAP) monthly Prices Per 50kg bag from January 2020 to June 2022



India and Pakistan's war over Geographical Indication (GI) tag for Basmati rice

- In July 2018, India applied to the European Commission (Article 50(2) (a) of Regulation (EU) No 1151/2012 of the European Parliament and of the Council on quality schemes for agricultural products and foodstuffs) for Basmati rice to be designated as a Protected Geographical Indicator (PGI). This registration application was published in the Official Journal of European Commission on September 11th, 2020, that can be challenged within three months after publication, with a reasoned statement of opposition due within two months following the notice.[150]
- A geographical indication (GI) is a label applied to items that have a specific geographical origin and have attributes or a reputation related to that origin. A sign must identify a product as coming from a certain location to serve as a GI. Furthermore,

[150] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2020:301:FULL&from=EN

the product's features, attributes, or reputation should be primarily owing to its origin. There is an obvious relationship between the product and its original site of production since the characteristics are dependent on the geographical location of production.[151]

- Responding to the India application, Rice Exporters Association of Pakistan (REAP) submitted a Notice of Opposition on December 7, 2020 and filed a Reasoned Statement in opposition to India's claim of GI of basmati rice on February 5, 2021 which was accepted by the EU on March 5, 2021 thereby making REAP party to the case. Negotiations are to be held and in the absence of any settlement, the matter will be taken to the tribunal of the directorate-general for agriculture and rural developments at the European Commission.[152]
- The EU is a very important market for Pakistan's rice industry. It exported 120,000 metric tons of rice to the EU in 2017 whereas, in 2019, it increased to 300,000 metric tons filling two thirds of the region's demand. On the other hand, India's exports of Basmati rice has been on decline due to failure of its producers to meet stringent EU standards on the use of pesticides and lately, it has been exporting more rice towards comparatively less beneficial markets.
- The EU had given both countries an additional three months until May 2021 to settle the matter between themselves. The period expired, and India sought another three months for reaching a bilateral settlement of the issue.[153]

Issues & Recommendations

- During the last few years, long grain hybrids have gained increasing acceptance among farmers. Hybrids have done especially well in Sindh where they now account for 75 percent of planting, up from 35 percent just a few years ago. Better agronomic practices, more aggressive spraying, and disease-resistant seed varieties have helped reduce the incidence of bacterial leaf blight in recent years.
- Amid Covid-19 pandemic, many countries, including Thailand, suspended their rice exports in anticipation of securing domestic supply in uncertain times. The decision indirectly benefitted Pakistan and India, whose rice exports were not majorly hindered, except for the slowdown in operational and port activities. Prices in the export market, therefore, remained less vulnerable.[154]

The potential for the Sector growth has always been undermined owing to the following factors: -

- Production of Rice is confined to irrigated fields, while no sustainable solutions to guarantee water security have been developed. Lack of technological innovations, research & development and low quality seeds result in lower yield of the crop compare to the other regional countries.
- High cost of inputs (e.g., fertilizers) discourage small farmers to grow. Additionally, no policy framework has been developed to expand the area under cultivation for rice.
- Water shortage during the rice-growing season in the province of Sindh is forcing some rice farmers to sell their land to real estate developers below market prices. Not a single acre of rice could be sown in Badin, Thatta, Sujawal, and Tando Muhammad Khan according to the provincial Environment Ministry of Sindh. Climate change and the

151 https://www.wipo.int/geo_indications/en/#:~:text=What%20is%20a%20geographical%20indication,originating%20in%20a%20given%20place.

152 https://issi.org.pk/wp-content/uploads/2021/09/IB_Mahwish_Sept_28_2021.pdf

153 Ibid

154 https://www.pacra.com/sector_research/Rice%20Sector%20PACRA_1604759631.pdf

inequitable distribution of irrigation water for the situation could lead to a rice crisis in Sindh.[155]

- Stiff competition from the Indian basmati exports in the EU and Middle East region. Despite significant improvement in yield during the 2000s, Pakistan has lost the competitiveness edge in basmati as indicated by its declining shares in total basmati export from 46% in 2006 to less than 10% in 2017, which was conveniently picked up by competitor India. This declining competitiveness is due to number of factors that favored India than Pakistan during the period including stronger technological innovations which gave higher productivity growth in basmati that have more elongated kernel size without aroma, lower production costs due to high input subsidies, aggressive marketing tactics which enabled to earn high prices to Indian basmati.[156]

[155] https://ricetoday.irri.org/water-shortage-forces-some-rice-farmers-in-pakistan-to-sell-lands-below-market-value/
[156] https://www.pc.gov.pk/uploads/report/Basmati_Rice_Cluster_Report.pdf

9. Tomato

Introduction

- Tomato belongs to solanaceae family. It is one of the very popular vegetables in Pakistan. It is widely used in salad as well as for culinary purposes. The popularity of tomato and its products continue to rise as it contains significant amount of vitamin A and C.
- Tomato is mainly produced by small farmers in Pakistan. Due to wide seasonality in production, tomato availability and its price fluctuate widely through the year. Pakistan produces two crops annually first in spring and 2nd in autumn; however, in Sindh, tomato can be grown throughout the year. Tunnel farming is famous in colder areas of Baluchistan, KP and Punjab.[157]

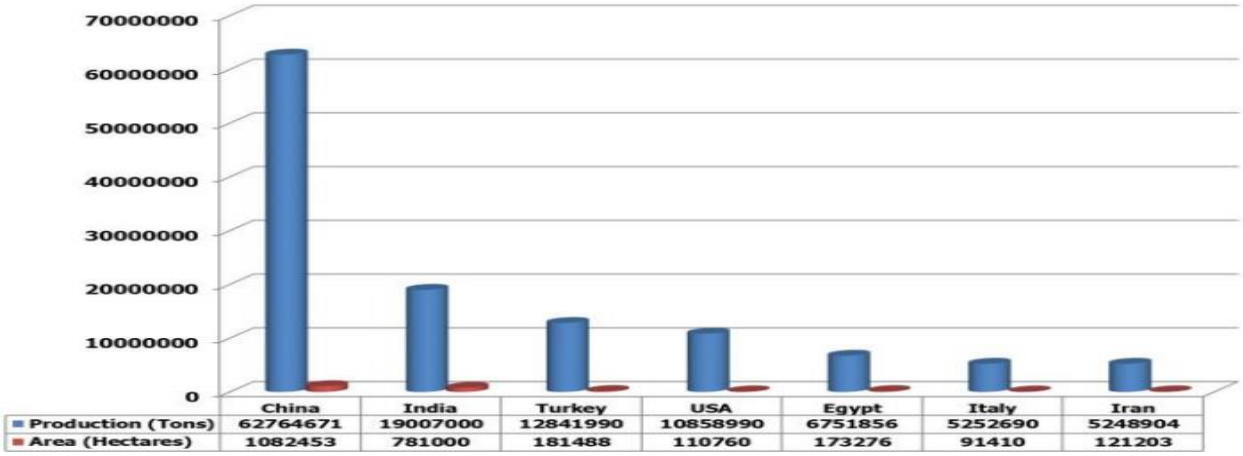
Global Perspective

- The biggest producer of tomatoes in 2019 was China by far with more than 60 million tons harvested, followed by India, Turkey, USA and Egypt. Italy, Iran, Spain, Mexico and Brazil complete the top ten. Pakistan Stands at 36th position out of 166 countries in tomato production in the world.[158]
- The top ranked country, China, accounted for 28.4 % of tomato consumption in the world. The top 3 countries (China, India & USA) hold a 46.3 % share while the ten largest countries some 68.3 %.[159] Average yield ton/hectare for the largest producers are given in the table below;

Table 57: Biggest producers of Tomato and their Average yield ton/hectare

Countries	Average Yield ton/hectare
China	58
India	24.33
Turkey	70.8
USA	98.04
Egypt	39
Italy	57.46
Iran	43.3
Pakistan	11.78

Figure 50: Country-wise Area & Production of Tomato in 2019



[157] https://www.pc.gov.pk/uploads/report/Tomato_Cluster_Report.pdf
[158] http://www.amis.pk/pdf/Supply%20and%20Price%20Situation%20Report%20May%202022.pdf
[159] https://www.helgilibrary.com/charts/which-country-eats-the-most-tomatoes/#:~:text=The%20top%20ranked%20country%2C%20China,Consumption%20(Total)%20indicator%20page.

Domestic Production, area and average yield

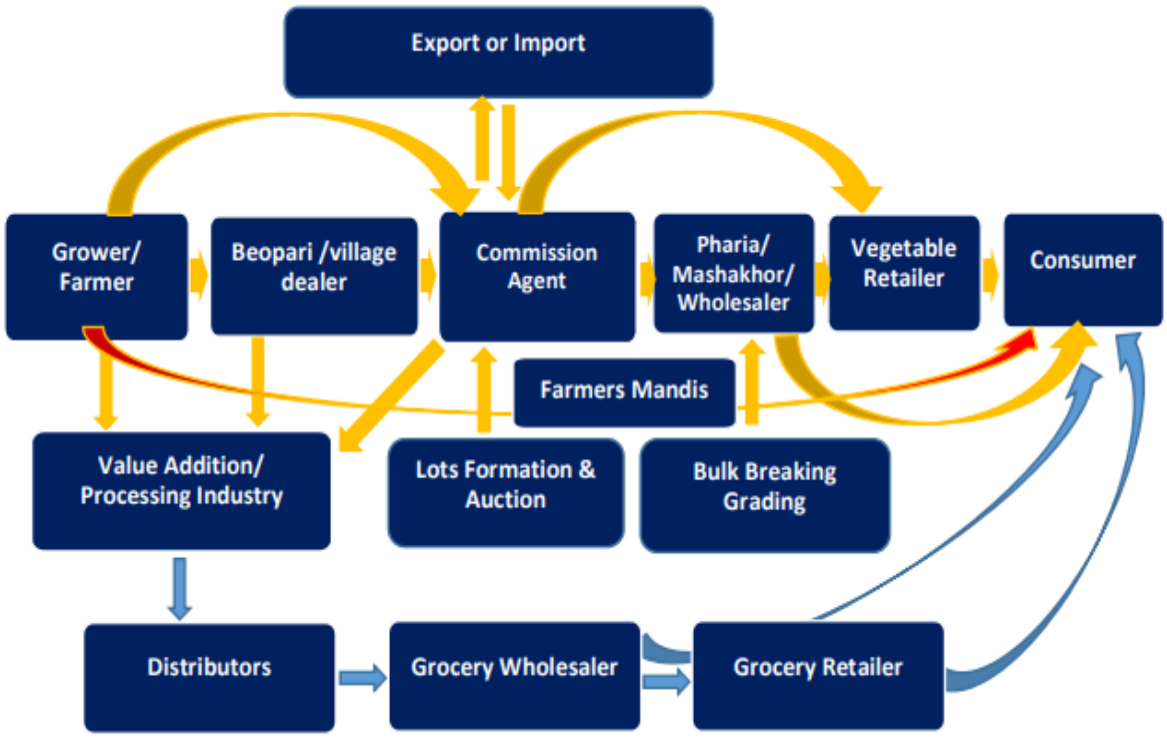
- The overall production and area of tomato based on the data of five years (2017-21) is given in Table 9. During 2020-21, total production was 818.7 thousand tonnes. Compare to the previous year, production has been increased by 36 percent from 602 to 818.7 thousand tonnes.
- During 2020-21, tomato was grown on the area 69.5 thousand hectares. The area has been increased by 19.6% compare to the 2019-20. However, Average yield 40 Kg. per Acre. in 2019-20 was 109.30 that was increased by 6.3% compare to the yield of 2018-19.

Table 58: Total production, area and average yield from 2015-16 to 2019-20

Years	Area (000 hectare)	Production (000 Tonnes)	Average yield ton/hectare.
2016-17	60.5	569.00	9.4
2017-18	60.6	620.10	10.2
2018-19	55.4	561.29	10.13
2019-20	58.1	602	10.37
2020-21	69.5	818.7	11.78

Source: http://amis.pk/Agristatistics/Data/HTML%20Final/Tomato/Area.html , http://www.amis.pk/Agristatistics/Data/HTML%20Final/Tomato/Production.html

Supply Chain of Tomato

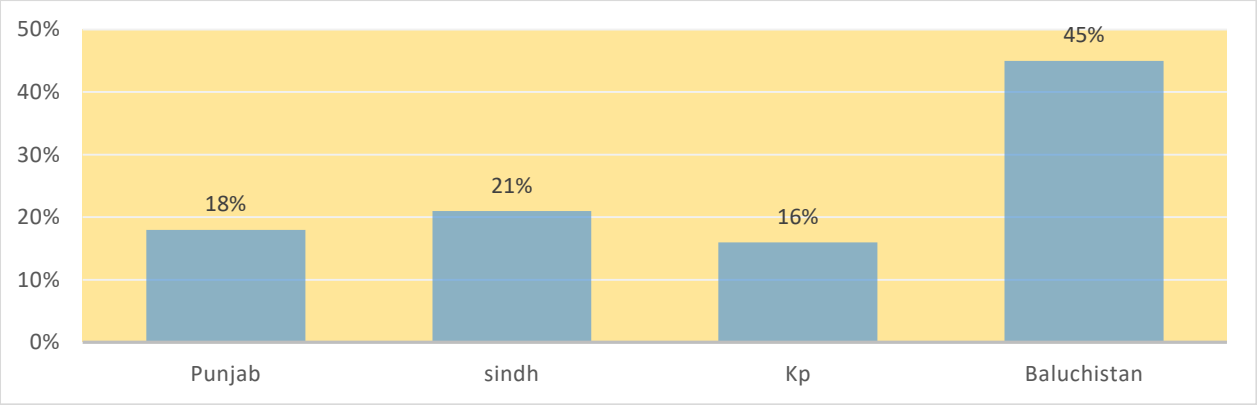


Source: https://www.cc.gov.pk/images/Downloads/research_and_publications/Pilot_Study_Assessment_of_SupplyChain_From_FarmGate_To_Retail.pdf

Provincial Share in Production, Area and Average yield

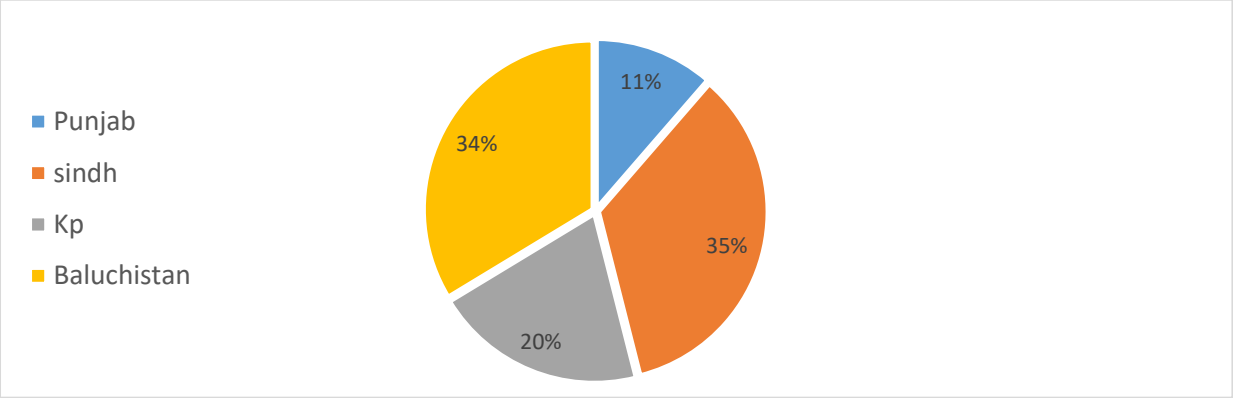
- **During 2020-21, the highest share in production** of tomato belongs to Baluchistan (45%), followed by Sindh (21%), Punjab (18%) and KP (16%).
- Sindh (35%) have **the highest share of area in production** followed by Baluchistan (34%), KP (20%) and Punjab (11%).
- Punjab have the highest Average Yield 40 Kg. per Acre. i.e., 184.76, followed by Baluchistan (113.55), KP (95.57), and Sindh (81.27).[160]

Figure 51: Province-wise production share of Tomato in 2020-21



Source: http://www.amis.pk/pdf/Supply%20and%20Price%20Situation%20Report%20May%202022.pdf

Figure 52: Province-wise share of Area in production of Tomatoes in 202-21



Source: http://www.amis.pk/pdf/Supply%20and%20Price%20Situation%20Report%20May%202022.pdf

Sowing, Harvesting, and Availability of Tomato

- Tomato is grown most of the year in some parts of the county. However, the supplies are substantially reduced during intense heat and rains of summer and monsoon season. In the hot-wet season, production shifts from lowlands to the relatively cooler and dryer highlands. Below the table 10 shows the availability calendar of tomato crop in Pakistan.

[160] http://www.amis.pk/Agristatistics/Data/HTML%20Final/Tomato/Yeild.html

Table 59: Availability calendar of Tomato in Pakistan

Province	Top Production Districts	Availability of Tomato Crop in Markets
Punjab	Khushab, Sheikhupura, Muzaffargarh, Kasur, Multan, Bahawalpur, Okara etc.	April – June
Sindh	Thatta, Badin, Mirpurkhas, Tando M. Khan, Karachi, Umerkot & Sanghar etc.	December – April
KPK	Swat, Charsadda, Malakand, D.I.Khan, Muhammad Agency, Tank & Dir Lower etc.	June – November
Balochistan	Barkhan, Qilla Saifullah, Nasirabad, Loralai, Jaffarabad, Kalat & Lasbela etc.	End June – Mid November

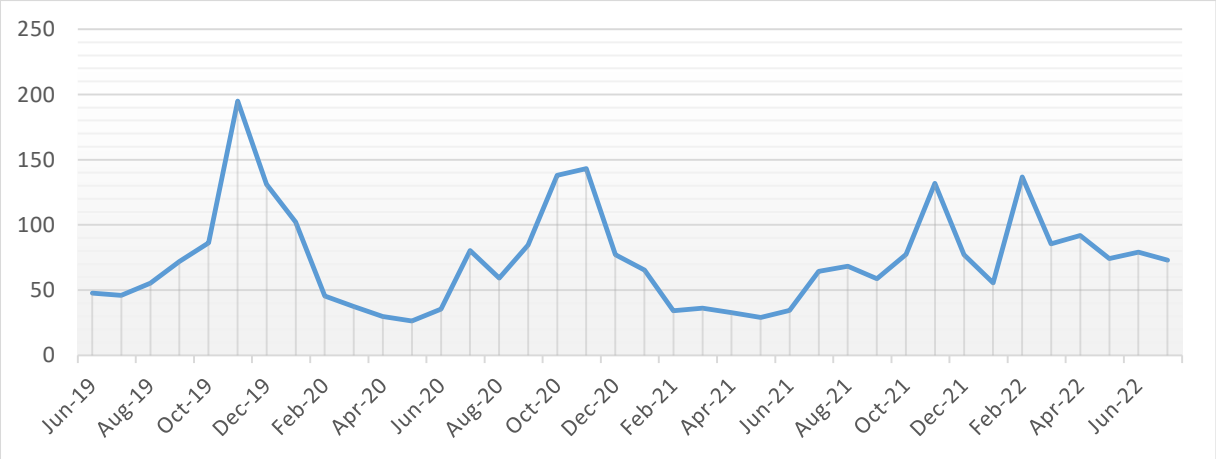
Tomato Consumption per capita

- According to the FAO Balance Sheet data, per capita per annum consumption of tomato in Pakistan during **2013** was **4.8 kg**, which is one of the lowest in the world (Faostat, 2014). However, the growth in per capita consumption of tomato in Pakistan is quite high. It has increased from 1.86 kg in 2001 with an average growth rate of 7.5% per annum.[161]
- Pakistan ranks at 128th position with respect to the tomato consumption in the world. The world average annual tomato consumption in 2013 was 20.46 kg per capita.

Retail Price of Tomato

- Below the figure 14 shows the retail pricing of 1kg tomato from June 2019 to July 2022. Data has been accessed from the Pakistan Bureau of Statistics. The figure shows the same fluctuation over the years. As shown in the figure, the prices are lower during the first 8 months of the year, however, after August, the prices started to increase till January of the next year. The same increase and decrease of prices over the period can be termed as the seasonality of the product in which supply demand gap increased. During the last four months of the year, the tomato production in the country ended except for Baluchistan that alone cannot carter the demand of country which then leads to the rise in price of tomato.

Figure 53: Tomato retail monthly price per kg from June 2019 to July 2022



Exports of Tomato

- The value of exports of Tomatoes from Pakistan totaled PKR 1,465 million in 2020-21. The total quantity exported during the year was 37 thousand tonnes. Top export

[161] https://www.pc.gov.pk/uploads/report/Tomato_Cluster_Report.pdf

destinations of Tomatoes from Pakistan in 2020-21 was Afghanistan with a share of 100%. Tomatoes are mainly exported to Afghanistan, Iran, and U.A.E, and has the potential to increase share in these markets.

Figure 54: Export of Tomato from Pakistan from 2017-18 to 2021-22*

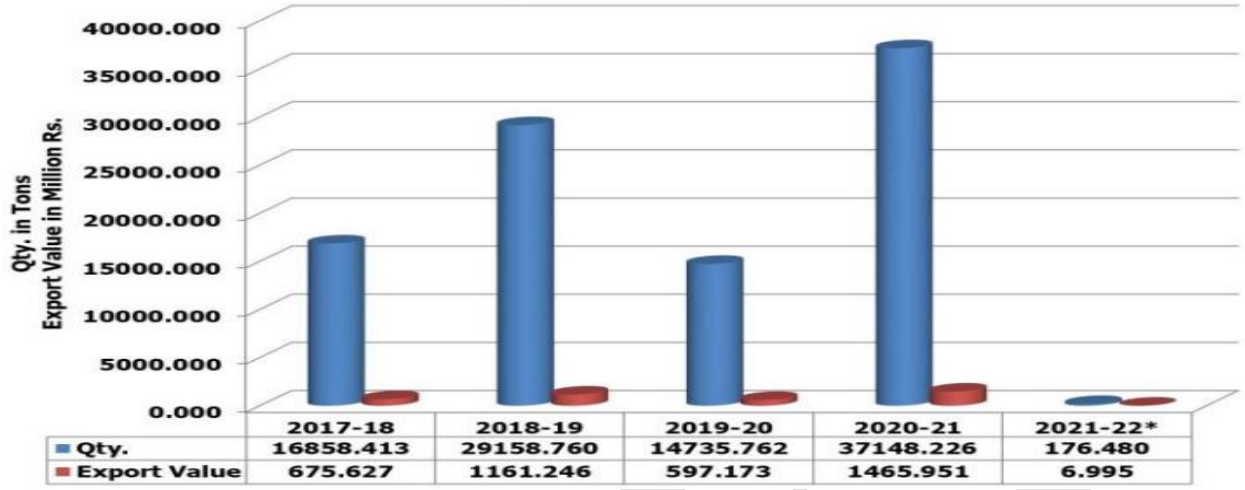
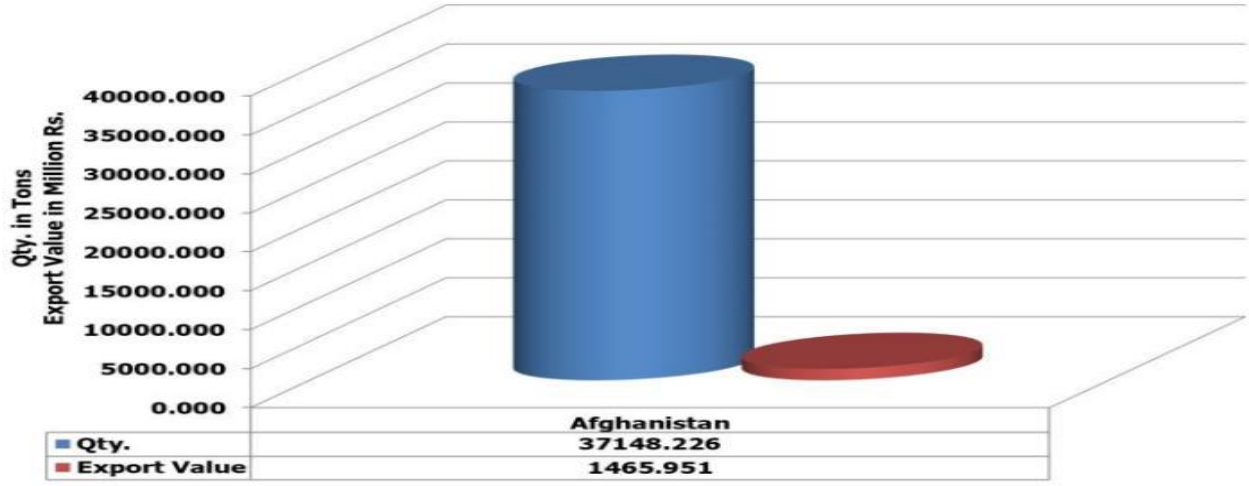


Figure 55: Country-Wise export of Tomato from Pakistan 2020-21



Import of Tomato

The value of imports of Tomatoes to Pakistan totaled PKR 10,614 million and the quantity was 371 thousand tonnes in 2020-21. Top trading partners import of Tomatoes of Pakistan in 2020-21 was Afghanistan, Iran, Algeria, and Uzbekistan. In the last five years, import of tomato is increasing from 55,176 tonnes in 2017-18 to 424,180.678 tonnes in 2021-22. The increase in the import is 669%.

Figure 56: Import of Tomato from 2017-18 to 2021-22*

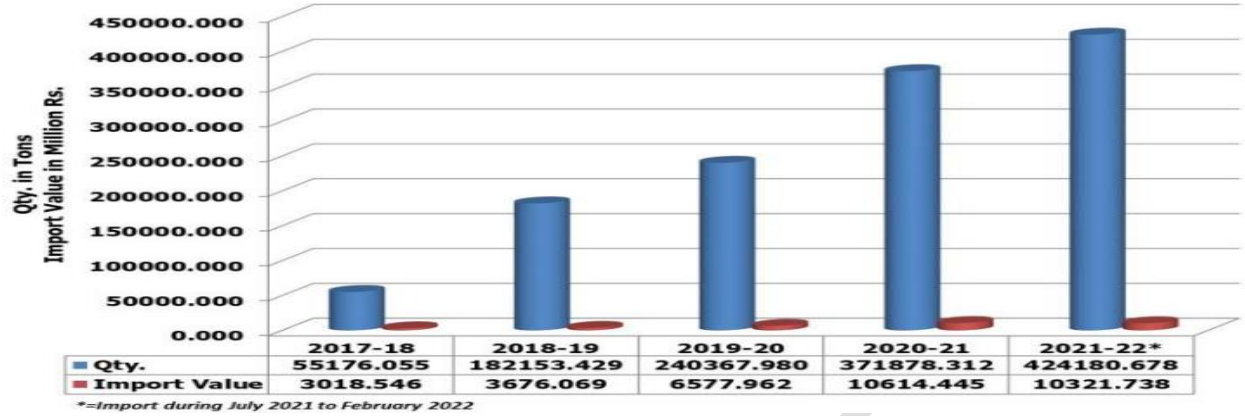
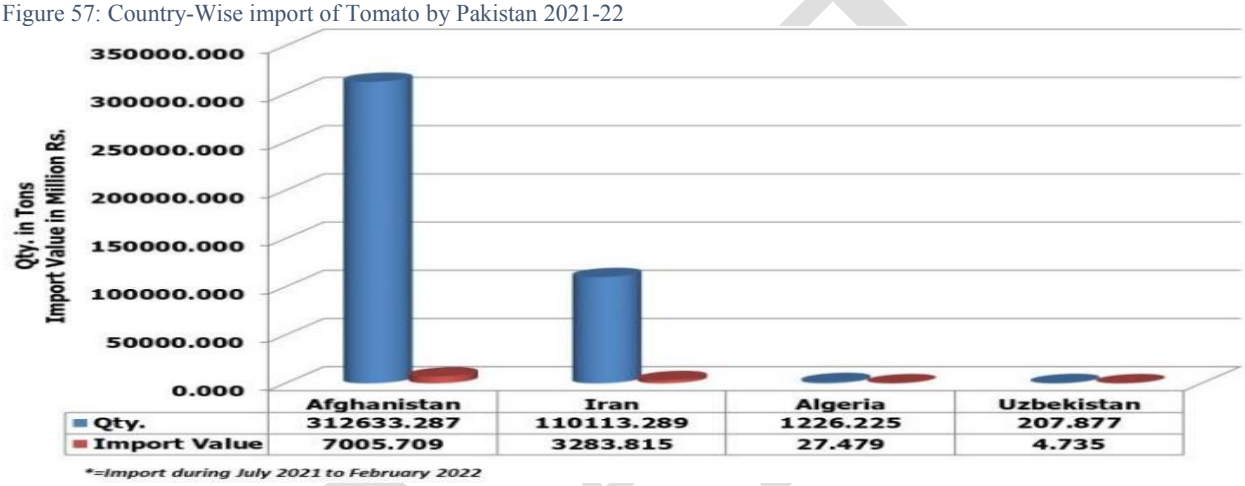


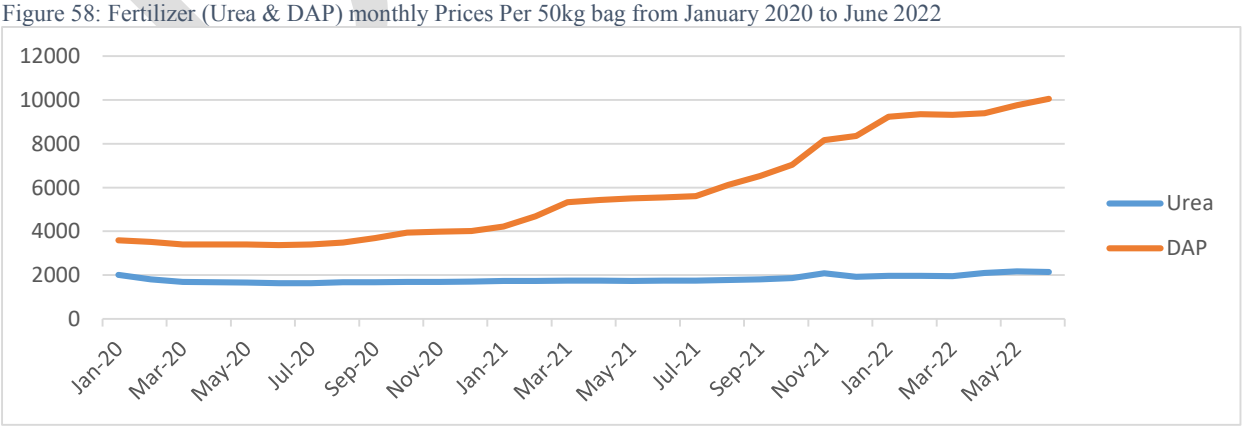
Figure 57: Country-Wise import of Tomato by Pakistan 2021-22



Fertilizer prices from January 2020 to June 2022

- Below the figure shows monthly price of 50kg bag of Urea and DAP from January 2020 to June 2022. In case of Urea, the price trend shows straight line with no major fluctuation during the period due to subsidy given by the government. However, in case of DAP, the price trend shows the increasing trend starting from PKR. 4,000 in January 2020 to 10,000 in June 2022. This shows the significant increase in farmer cost of production due to the core role of fertilizer as input in production of tomato.

Figure 58: Fertilizer (Urea & DAP) monthly Prices Per 50kg bag from January 2020 to June 2022



Cost of Production

- In 2021-22, Weighted Average Cost of Production (PKR. /acre) of Tomato including land rent at farm gate is PKR. 89,699 and without land rent PKR. 74,699. The major component of cost in production of tomato includes cost of fertilizer, land, harvesting, transport and seed & sowing.[162]

Table 60: Cost of production of Tomato per/Acre for 2021-22

Operation/Inputs	Share of Cost in % without cost of land (per/Acre)	Share of Cost in % with cost of land (per/Acre)
Cost of Land Prep	7%	6%
Cost of Seed & Sowing	12%	10%
Cost of Water	7%	5%
Cost of Fertilizer	**19%**	**16%**
Cost of Dung	0%	0%
Cost of Pesticides	9%	7%
Cost of Weedicides	1%	1%
Cost of Harvesting	**32%**	**26%**
Cost of Transport	**13%**	**11%**
Cost of Land		**17%**

Issues & recommendation

The major factors which influence availability and pricing include

Supply gaps i.e., seasonality of tomato

- The primary factor that influences pricing is the inconsistent supply of the tomato throughout the year. Supply exceeds than the demand starting mid of the April and till end of June. This leads to the decrease in the prices and exploitation of the farmers and end consumers by players in the supply chain. Similarly, the supply shrinks during September, October and November, which leads to an increase in the price of tomatoes.

Perishability and shorter shelf life

- Tomatoes are perishable and cannot be stored in a warehouse without being kept at a constant temperature. Consequently, farmers must sell their crops as soon as possible because any delay may result in greater postharvest losses. The perishable nature of these commodities, often deprives farmers of their due profits.

Lack of grading and packaging

- Farmers generally do not grade their produce, increasing their chances of getting lower prices. Proper grading, packing, and branding of tomato will not only help farmers get better prices but also enable them to compete with other farmers in other markets. Moreover, it can also boost export of these commodities.

Manipulation by commission agent

- The commission agents are a source of distortion in the market for fruits and vegetables. When farmers bring their crops to the Mandi, they may be ignored, or fewer individuals may participate in the auction as the commission agents want to complete the auction as quickly as possible. The auction process is driven entirely by the commission agent, and there have been reports of transparency issues in the auctions. The farmer is unaware of the true price, and the commission agent therefore dictates the pricing of their commodities

[162] https://crs-agripunjab.punjab.gov.pk/system/files/COP%20Tomato%202021-22.pdf#overlay-context=node/204

Level of enforcement of price regulations and inadequate awareness about prices of tomato and availability

- The level of enforcement of price control regulations also have impact on the price variations from one area to other. However, the retailers at large have shown their concerns on the price control enforcement actions. They are of the opinion that holistic reforms are required in the entire supply chain instead of enforcing price control regulations at retail level.

The non-institutional financing by the commission agents exploit farmers and is one of the barrier to entry in other markets.

- The institutional financing in Pakistan is complex and lengthy due to many processing requirements. This has resulted in creation of a parallel non-institutional and unregulated financing sector. The village beoparis and commission agents are the major financiers for farmers. They provide loans in form of cash or in form of inputs for the crop like seeds, fertilizers, and pesticides etc. As a result of such non institutional financing, additional conditions are applied on the farmers which include higher commission rates, exclusive auctions at Mandi through the selected commission agent, and low purchase prices paid to farmers while circumventing auctions in the process.

High post-harvest losses and absence of grading, packaging, and branding regulations also limit ability of the farmers and market players to compete.

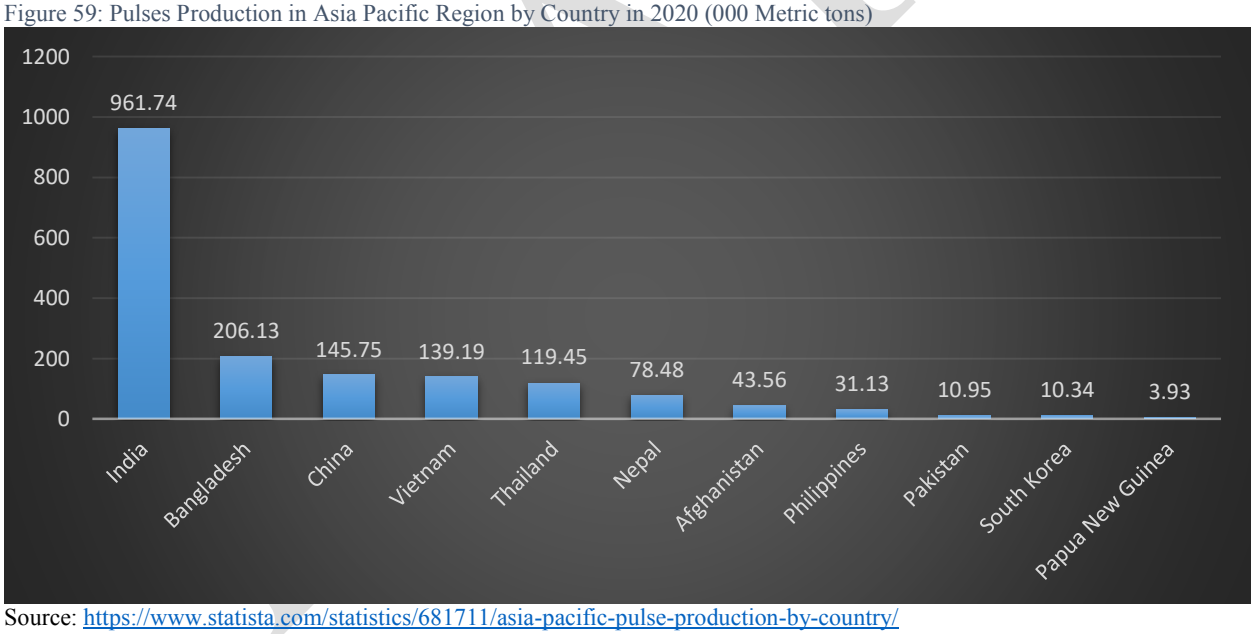
- At farm level, grading of crop and or standardization practices are not in place. There are transportation issues particularly when they have to transport their produce to other districts or bigger mandis. The shelf life of tomato crop is low and there is elevated risk of high post-harvest losses.

10. Pulses

Introduction

- Pulses also called grain legumes are an important source of vegetable protein and constitute about 33% of the global dietary protein.[163] Pulses provide nitrogen to the soil which is one of the important characteristics of pulses. Pulses fix the nitrogen in soil and improve the soil fertility. As nitrogen is a primary component of fertilizers, pulses produce their own nitrogen required for growth.[164] Pulses are grown as secondary crops and the global area under cereal production is about 10 times higher than that of pulses. The main pulses include chickpea, mung bean, mash bean and lentil. According to FAOSTAT in Pakistan, of **the total pulses supply 77% are used for edible purposes, 16% is used as fodder and 5% is stored by the farmers for cultivation.**
- In 2020, approximately 89.8 MMT of pulses were produced globally, an increase of over 5MMT from 2019.[165] India is the world's largest pulse producer and consumer, and its pulse production accounts for around 25% of the global pulse production. In Asia Pacific region India is the largest producer of pulses followed by Bangladesh and China. Pakistan is ranked 9th in the region. The world per capita consumption of pulses is 7kg/annum and in Pakistan the per capita consumption is 4.18kg/annum.[166] Figure below gives a comparison of pulses production in the region by country.

Figure 59: Pulses Production in Asia Pacific Region by Country in 2020 (000 Metric tons)



Source: https://www.statista.com/statistics/681711/asia-pacific-pulse-production-by-country/

- The protein content in grains of pulses ranges between 15-30%. More specifically, in chickpea the protein content ranges between 17–19%, in lentil it ranges between 23-31%, in mung it is between 21-31% and in mash bean between 21–28%.
- According to Pakistan Economic Survey, 2021-22, Pakistan's total area is 79.90 million hectares out of which the total cropped area is 24.10 million ha i.e 30%. Pulses are a minor crop and grown on around 6% of the total cropped area (1.2 million ha).[167]

[163] https://www.researchgate.net/publication/342626740_Pulses_Production_in_Pakistan_Status_Constraints_and_Opportunities

[164] https://www.azolifesciences.com/article/How-is-Pulse-Farming-Beneficial-to-the-Environment.aspx

[165] https://www.statista.com/statistics/721945/pulses-production-volume-worldwide/

[166] ibid

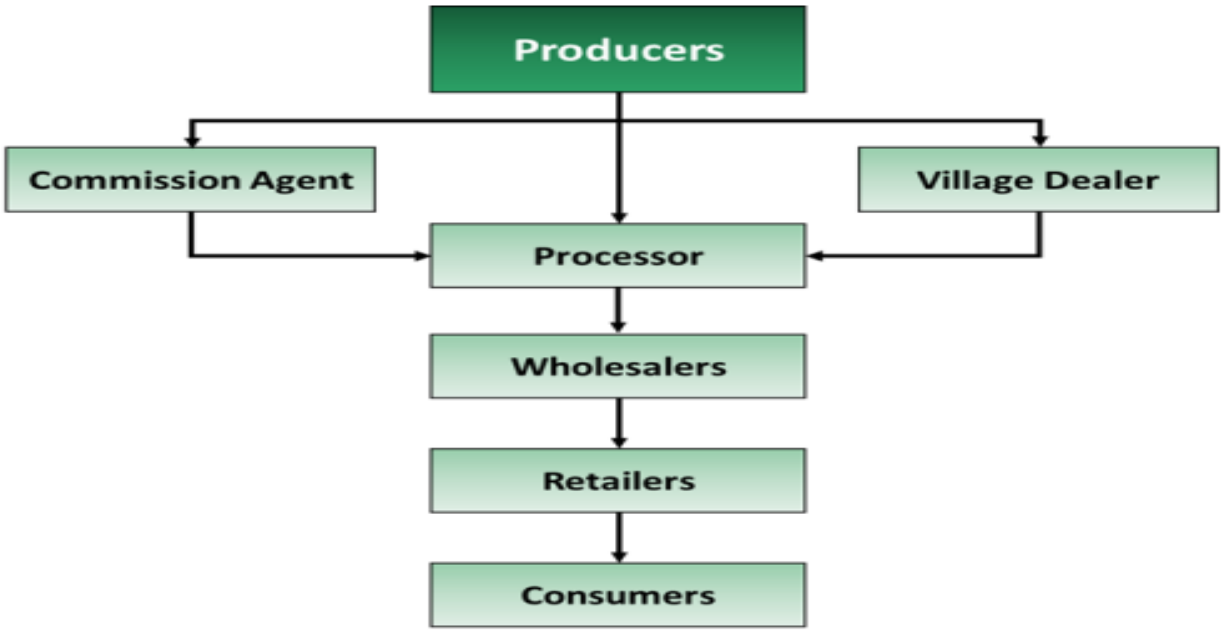
[167] Pakistan *Economic Survey 2021-22,* Agriculture

Chickpeas and Lentils (masoor) are winter crops (sowing in Oct-Dec) whereas mung and mash are summer crops (sowing in Apr-Jun).

Supply Chain of Pulses

- Pulses are either domestically produced or imported. In both cases the pulses are processed in mills by splitting and polishing. These processing mills are located in Faisalabad, Sargodha and Hyderabad. Wholesalers purchase from the mills and the retailers purchase from wholesalers. There are four major wholesale mandis for pulses in Pakistan; Akbari Mandi Lahore, Ghalla mandi Faisalabad, Joria Bazar Karachi and Hyderabad market.

Figure 60: Supply Chain of Pulses in Pakistan



*The 'Producer' in the values chain is the local farmer/importer.

10.1. Gram

Introduction

- Chickpea is a good source of vegetable protein. It contains 22% protein, 63% carbohydrates, 46% starch, 5% fat, 7% fiber, and 6% sugar. It is highly consumed by the poor section of the people as it is a cheaper substitute for animal protein.

Global Overview

- The total world production of gram in 2020 was 15083871 tons. The table below shows the list of top 10 world chickpea/gram producers, the area under production and their percentage share in the total world production.

Table 61: Top Chickpea Producing Countries (2020)

Rank	Country	Production (Tons)	Area (Hectare)	Percentage Share
1	India	11080000	10948882	73.46
2	Turkey	630000	511493	4.18
3	Pakistan	497608	943860	3.30
4	Myanmar	481668	371505	3.19
5	Ethiopia	457319	220719	3.03
6	Russia	291133	335261	1.93
7	Australia	281200	263000	1.86
8	Iran	226595	514284	1.50
9	Canada	214400	119900	1.42
10	USA	193820	106390	1.28
Source: AMIS				

- In 2020, India was the world's largest chickpea producer, with the total production of over 11 million tons of chickpeas, and an area of 10 million hectares and a percentage share of 73% in the total production (India's yield is 1012 kg/ha). Pakistan ranked 3rd in the chickpea production in the world with a total production of 497 thousand tons, an area of 943 thousand hectares and a percentage share of 3.3% (yield is 527 kg/ha). Comparing the area under production and the total production of Turkey and Pakistan, Turkey's share in the total production of chickpea is 4.18%, higher than Pakistan whereas the area under cultivation is much lower. Tukey's yield per hectare is 1231kg which is higher than India.

Table 62: Top 10 Chickpea producers by yield 2020

Rank	Country	Yield kg/hectare
1	China	5356
2	Jordan	4162
3	Sudan	4048
4	Moldova	3655
5	Bosnia and Herzegovina	3024
6	Israel	2703
7	Uzbekistan	2582
8	Egypt	2312
9	Yemen	2084
10	Ethiopia	2072
Source: AMIS		

- The above table shows the list of top chickpea producing countries of the world by yield in 2020. China has the world's highest yield of 5356 kg/ha, followed by Jordon, Sudan and Moldova. Regionally, the average yield of Africa is highest in the world followed by Asia.

Table 63: Top Chickpea Exporting Countries Globally (2021)

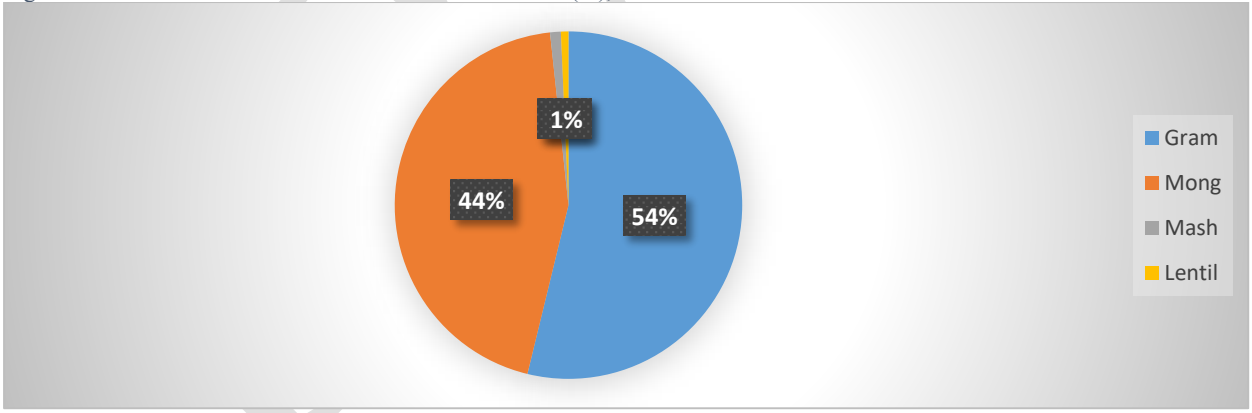
Rank	Country	% Share in Export Value	Export Value (million $)
1	Australia	31.43	$460.91
2	Turkey	13.65	$200.18
3	Mexico	9.55	$140.08
4	Canada	8.64	$126.67
5	India	6.08	$89.16
6	United States	5.87	$86.14
7	Russia	5.68	$83.32
Source: https://www.tridge.com/intelligences/chickpea/PK			

- Australia is the world's largest exporter of chickpea followed by Turkey and Mexico, with a global share in export of 31%.

Chickpea Crop in Pakistan

- Chickpea is the Rabi crop and source of dietary protein in Pakistan[168] it is grown in subtropical, tropical and temperate zones in the country. It is a short duration crop and can be grown between September and November. The best time however for sowing is the second week of October. The crop is well suited in dry tracks, and requires winter climate but sensitive to frost. The crop matures in four months and after maturity the gram plant cannot sustain heavy rains or hail storm. The crop is grown in barani area, is heat resistant and flourishes in good moisture conditions.[169]
- Gram is the major pulse produced in Pakistan. Its share in the total pulse production is 54% followed by mong 44%. Mash and masoor have both a share of less than 1% in the total pulse production in the country.

Figure 61: Share of Main Pulses in Total Pulse Production (%), FY2021-22

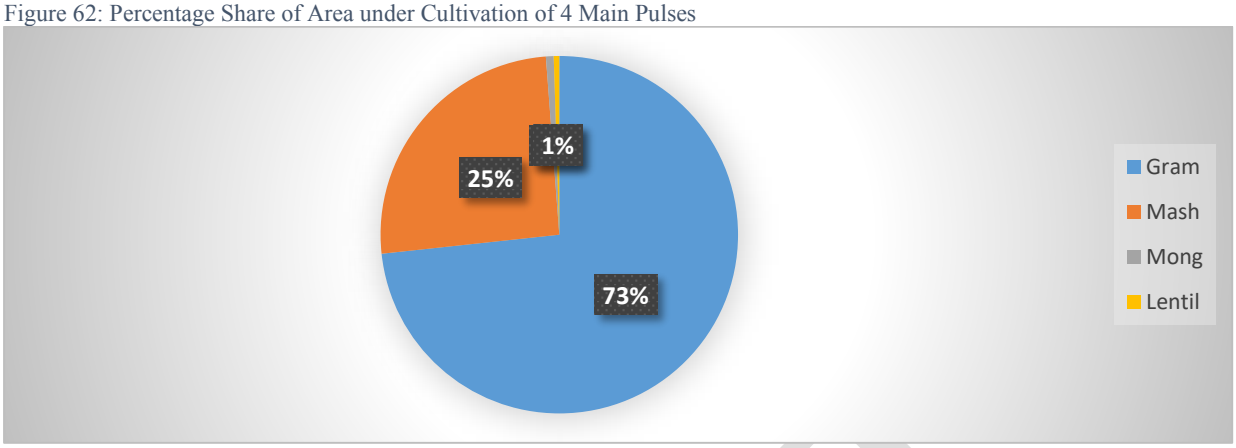


Source: Pakistan Economic Survey, 2021-22

- In Pakistan there are two varieties of gram crops, desi (black varieties) and Kabuli. Desi chickpea is cultivated mainly in the Indo-Pakistan subcontinent. Chickpea is either grown as one crop or combined with barley, linseed, corn, peas, potato and wheat. Out of the total area under cultivation of pulses, 73% of the area is under chickpea cultivation, 26% under mong, 0.7% under mash and 0.5% under masoor. During FY22, the production of pulses increased by 29.82%.

[168] https://bakhabarkissan.com/gram/
[169] https://www.pakissan.com/english/allabout/crop/gram.shtml

Figure 62: Percentage Share of Area under Cultivation of 4 Main Pulses



Source: Pakistan Economic Survey, 2021-22

Table 64: Provincial Season of Sowing and Harvesting of Gram

Province	Sowing	Harvesting
Punjab[170]	15th Oct to 15th November	March-April
Sindh[171]	15th October-30th November	15th March-15th April
KPK	September-November	March-April
Balochistan	September-November	March-April

Domestic Production

- During 2021-22, Gram production increased by 36% percent to 319 thousand tonnes whereas the area under cultivation declined by 1.8%. The yield therefore increased compared to FY21 to 368 kg/ha.. The table below presents the trend in area, production and yield of gram in Pakistan from 2016-17 to 2021-22.

Table 65: Area, Production and Yield of Gram in Pakistan

Year	Area (000 Hectares)	Production (000 Tons)	Yield (kg/Hectare)
2016-17	971	330	340
2017-18	977	323	331
2018-19	943	447	474
2019-20	944	498	528
2020-21	883	234	265
2021-22	867	319	368
Source: Pakistan Economic Survey, 2021-22			

- The major chickpea producing area in Pakistan is Thal region which contributes about 80% to its production and is considered the home of chickpea in Pakistan.[172] The major chickpea producing districts in the provinces is given in the table below.

[170] https://aari.punjab.gov.pk/faqs_pri_fsd#PRI1
[171] https://agri.sindh.gov.pk/showing-period
[172] https://aari.punjab.gov.pk/faqs_pri_fsd

Table 66: Major Districts of Chickpea in Provinces

Province	Districts
Punjab[173]	Khushab, Mianwali, Chakwal, Bhakkar, Layyah and Jhang
Sindh[174]	Dubari crop in rice tract (Larkana, Shikarpur, Dadu, Jacobabad, Kashmore, Thatta, Badin, Tando Muhammad Khan)
KPK[175]	Karak, Lakki Marwat, Tank, Bannu and D.I. Khan
Balochistan[176]	Nasirabad, Jaffarabad and Dera Bugti

Table 67: Balance Sheet of Gram (2011-12- 2019-20) 000 tons

Year	Production	Wastage	Net Production	Consumption	Official Imports	Calculated Shortage	Calculated Imports
	P	**W**	**NP=P-W**	**C**	**I**	**S=NP+I-C**	**CI=C-NP**
2011-12	284.4	88.2	196.2	337.1	36.2	-104.70	140.9
2012-13	751.3	232.9	518.4	436.1	70.2	152.54	0.0
2013-14	399.0	123.7	275.3	421.9	51.4	-95.14	146.5
2014-15	399.0	123.7	275.3	382.9	55.7	-51.87	107.6
2015-16	286.2	88.7	197.5	391.0	36.4	-157.08	193.5
2016-17	329.7	102.2	227.5	374.2	46.1	-100.68	146.7
2017-18	324.3	100.5	223.8	382.0	12.3	-145.98	158.2
2018-19	441.4	136.8	304.6	389.8	10.2	-75.07	85.2
2019-20	503.6	156.1	347.5	344.6	29.8	32.72	0.0
Source: IFPRI, https://pdf.usaid.gov/pdf_docs/PA00ZDXG.pdf							

- The production of gram pulse showed a rapid increase in 2012-13 compared to 2011-12. The production rose from 284.4 thousand tonnes to 751.3 thousand tonnes, showing an increase of almost 164%. The official import during this year also increased by almost 93%. To balance the sheet, calculated import is generated by subtracting consumption from net production estimates in the country. The results shows that maximum demand of gram is fulfilled by imports and the official import estimates may be understatement.

Provincial Share in Production, area, and yield

- Chickpea (gram) crop is mostly grown in Punjab (850 thousand hectare), followed by Balochistan (40 thousand ha) and KPK (34 thousand ha) in cultivated area. In total gram production, Punjab contributes about 85% toward total production, followed by Balochistan and KPK.

[173] http://www.valleyirrigationpakistan.com/wp-content/uploads/2012/09/CHICK-PEAS-CULTIVATION-IN-PAKISTAN.pdf
[174] http://www.valleyirrigationpakistan.com/wp-content/uploads/2012/09/CHICK-PEAS-CULTIVATION-IN-PAKISTAN.pdf
[175] https://pdf.usaid.gov/pdf_docs/PA00ZDXG.pdf
[176] https://balochistan.gov.pk/wp-content/uploads/2021/05/Agriculture-Statistics-Balochistan-2019-20.pdf

Figure 63: Provincial Production of Gram in 2019-20

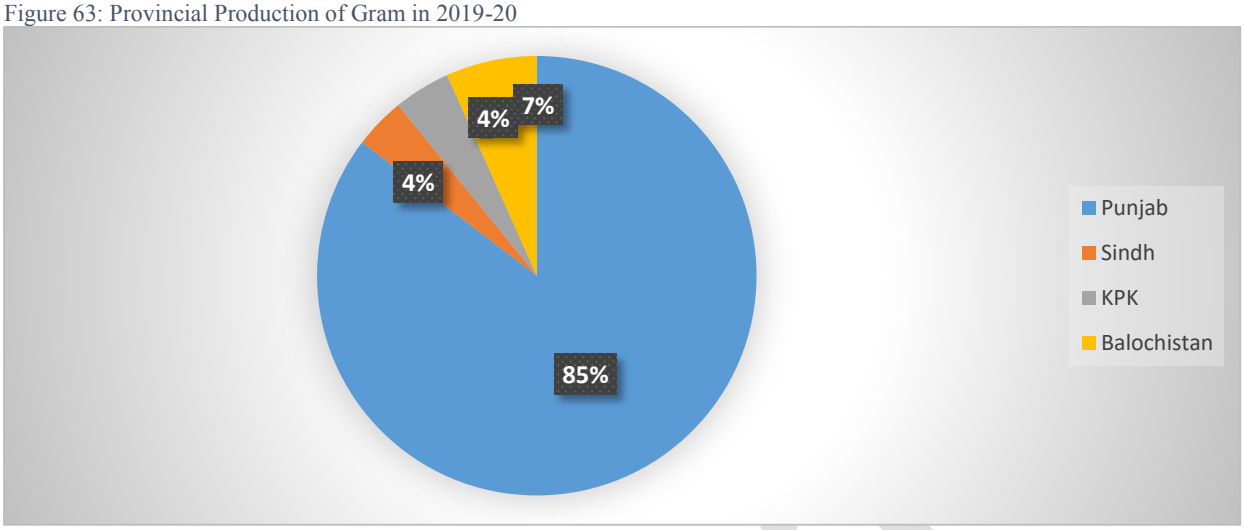
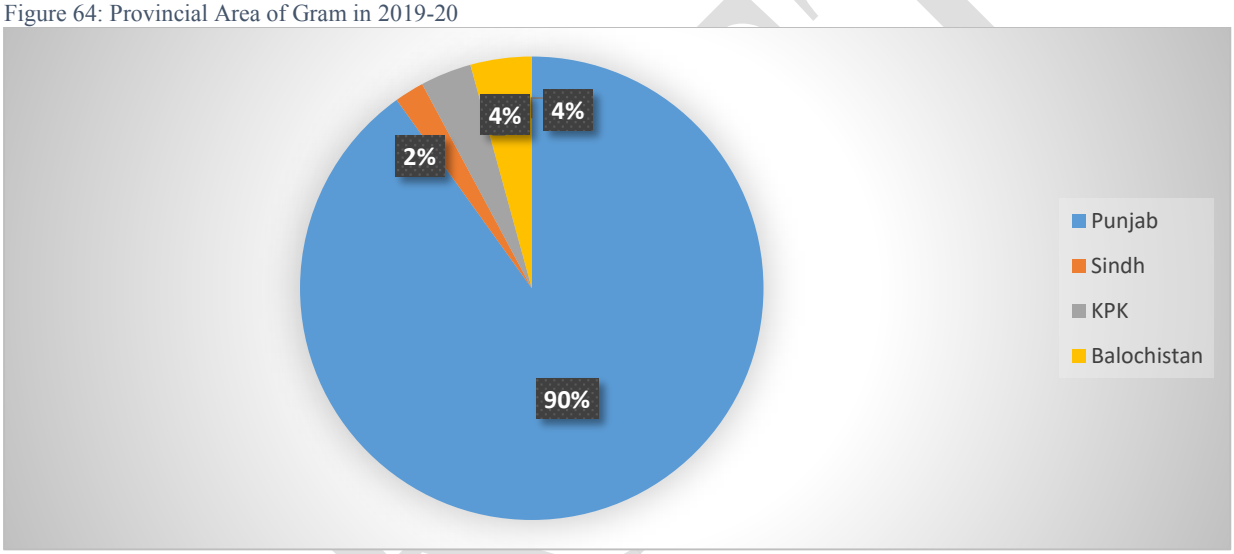
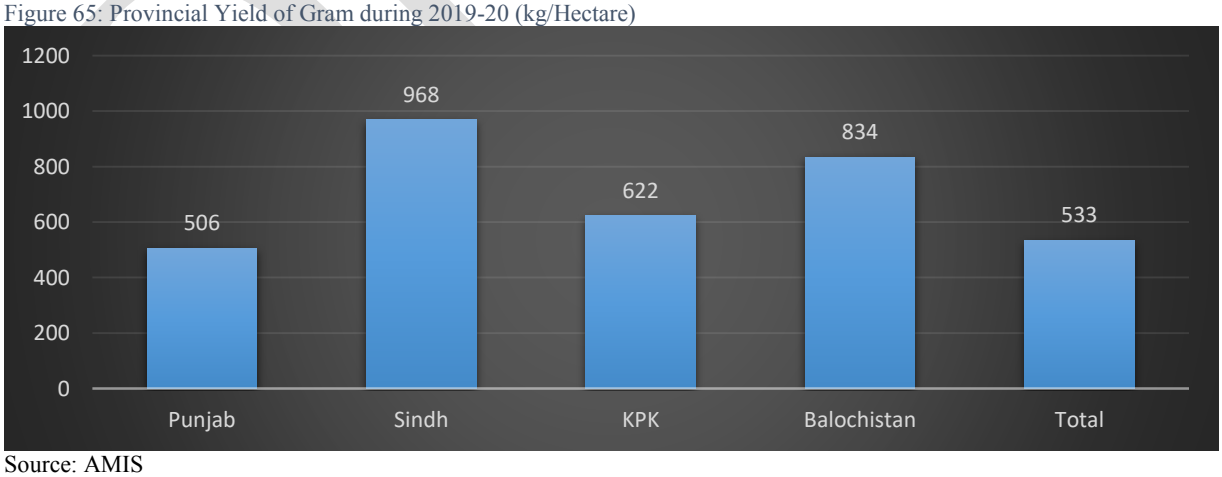


Figure 64: Provincial Area of Gram in 2019-20



Source: AMIS

Figure 65: Provincial Yield of Gram during 2019-20 (kg/Hectare)



Source: AMIS

Table 68: Weight of Gram in Consumer Price Index (CPI)

Region	Gram Whole	Pulse Gram	Besan	Total
Urban	0.0912%	0.1660%	0.0830%	0.34%
Rural	0.1116%	0.2751%	0.0728%	0.50%
Source: PBS				

- In CPI, the total weight of gram/chickpea is calculated by adding the individual weights of gram whole, pulse gram and gram flour (besan), which is 0.34% for urban and 0.50% for rural.

Cost of production of Gram during 2021-22

Table 69: Cost of Production of Gram

S. No.	Operations/Inputs	Weightage (% share in total cost/Acre)
1.	Land preparation	12.23
2.	Seed and sowing	29.9
3.	Water	2.67
4.	Fertilizer	0
5.	Pesticides	1.3
6.	Harvesting	24.74
7.	Land Rent	26.87
8.	Transportation	2.24
9.	Total	100
Source: AMIS Cost of Production 2021-22,		

- To produce gram, the major costs include seed and sowing, land rent and harvesting.

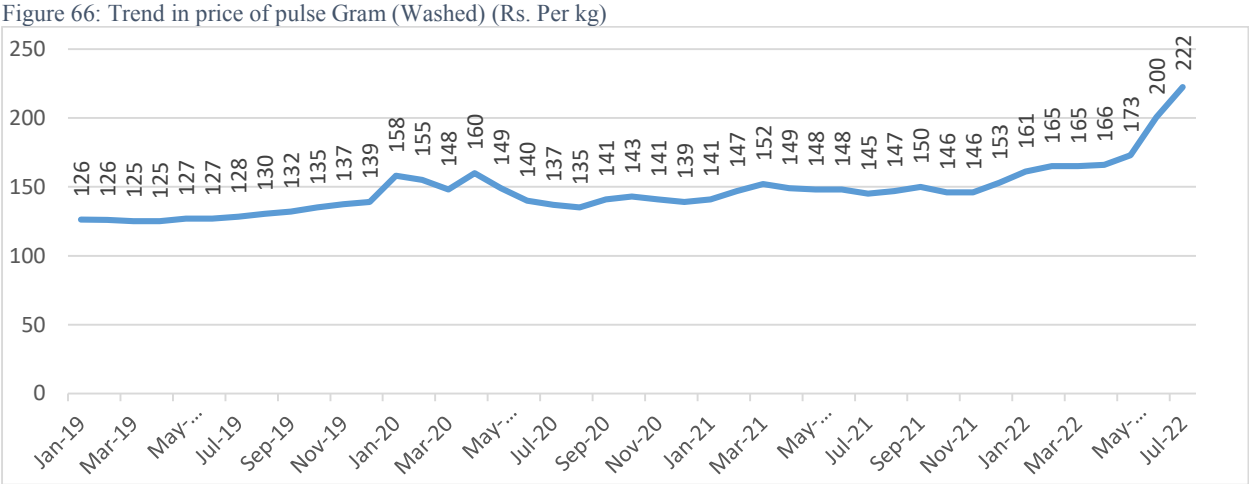
Retail price of gram from January 2019 to July 2022

Table 70: Average Price of Gram/Chickpea (1kg)

Commodity	Price July'22	Price June'22	July'21	%change July'22 over June'22	%change July'22 over July'21
Pulse Gram	222.42	200.48	145.89	10.94	52.46
Source: PBS					

- The average price of gram for the month of July'22 was 222.42/kg and this price increased by almost 11% compared to June'22. Comparing the price of gram from July'21 the price has increased by more than 50%.
- The average price of gram for the month of July'22 was 222.42/kg and this price increased by almost 11% compared to June'22. Comparing the price of gram from July'21 the price has increased by more than 50%. The figure below gives the price/kg movement of gram from January 2019 to July 2022. The data shows that the price of gram has increased 76% during this period.

Figure 66: Trend in price of pulse Gram (Washed) (Rs. Per kg)



Source: PBS

- The domestic production of gram is not sufficient to meet the domestic demand and in order to meet the requirement, Pakistan imports gram every year mostly from Canada, USA, Australia, China, Russia, Ukraine and Africa.[177]

Issues & recommendations

- Owning to the support of government to cereals the yield of rice and sugar have doubled and wheat yield has tripled since 1961 however the yields of chickpeas, lentils and other pulses have scarcely increased. This is more significant when comparing the average yield of chickpeas and lentils in Pakistan (0.4t-0.5t/ha) with that in India (around 1.0t/ha) for chickpeas and lentils (FAO 2017). Much of the policy and R&D focus has been on increasing the yield of wheat, rice and sugar whereas pulses have not remained in policy focus to increase domestic production and yield.
- Pulses are mostly grown on marginal lands where profitable production of other crops is not feasible. The marginal lands are generally degraded soils, low in organic matter and are nutrient deficient. Gram is grown in rain fed lands of Thal and arid lands of Potohar which are Zinc deficient resulting in low yield.
- According to the PBS, 977 thousand tonnes of pulses were imported at a cost of Rs68.27 billion in FY2019. During the same period Pakistan's export earnings from sugar were Rs32.147bn, wheat Rs20.12bn and raw cotton at Rs2.708bn, comparing the exports earnings with the pulses import, the import bill of pulses is high.[178]
- The input costs and market prices of pulses indicate that pulses offer profit margins of 40-50%[179] while none of the major crops grown in the country give such profit margins. In addition the other major crops grown in the country requires a higher use of fertilizer and water. Where pulse crops need only three irrigations, rice grows in standing water and maize requires 12 to 14 irrigations. The investment of water is very high on these crops, keeping in view that 93% of water consumed in Pakistan is on agriculture, where the global average is close to 70%. For a water deficient country, where the demand of pulses is high and each year the country spends a huge amount of scarce foreign exchange on their import, encouragement through policy intervention will bring multiple benefits, where it will increase the domestic pulse production, it will also result in efficient use of water and reduce the import bill.

177 https://www.researchgate.net/publication/342626740_Pulses_Production_in_Pakistan_Status_Constraints_and_Opportunities

178 https://www.dawn.com/news/1562080

179 ibid

- Of the total cropped area only 6% area is under pulse cultivation. Within pulses, chickpea is the major pulse which is cultivated on 73% of the area under pulse cultivation. 80% of the production of chickpea is in the Thal region which provides low level of nutrients and is barani/rain fed, resulting in low potential yield. The yield can be improved if pulses are grown in irrigated land using proper crop management and pest control.
- On the supply side, the seed corporations and companies do not produce and market the seed of pulses rather their focus is on cereals and cotton. The public sector also has not shown much interest in increasing the production of pulses by producing and distributing quality seeds, further there has been lack of institutional support to the private sector in quality seed production and supply.
- There is a 35% regulatory duty (RD) on pulses, imposed in 2006. The RD was intended for the local pulse produce to meet the domestic demand and to lower the level and variability of domestic pulse prices. However the data suggest over 70% rise in gram price alone in the last two and a half years. Thus the prices have increased in level and variability significantly since its introduction in 2006. This duty has, where discouraged farmers to cultivate pulses, at the same time Pakistan's dependency on imported pulses has increased owing to higher domestic demand. It is expected that the removal of the RD will increase production and lower the domestic pulses prices.
- On the demand side, farmers face many issues in cultivating pulses resulting in low pulse production. These issues include pests and diseases, low mechanization, inefficient input use, a poorly developed agribusiness sector, losses of chickpea grain during harvest (30%) and lack of access to high-yielding varieties. Over 80% of farmers use their own seeds for pulse production and only 2-5% use certified seeds of recommended varieties that are high yield and climate resilient, resulting in lower yield.
- Harsh weather patterns like unpredictable rainfalls and droughts are major obstacles in increasing chickpea production. Heavy rainfall at the time of sowing and harvesting also damages the crop. Farmers have lack of information and training on growing pulses, they do not distinguish between the seed varieties of irrigated and rainfed area, which is a serious constraint. In addition most farmers are not planting according to the recommended seed rate and do not observe the optimal sowing time. An intervention by the Extension Departments is recommended to create awareness about seed variety, use and cultivation of pulses.
- Farmers engaged in the production of grams have limited access to agri loans from ZTBL and other commercial banks. They usually depend on the village dealer for loans and seeds. In case of excess production they do not have the storage facilities to store the surplus and sell at a low price to the village dealers. To overcome these problem the government should provide farmers good quality pest resistant seeds, encourage them to have easy loans from ZTBL and establish warehouses and storage facilities with the cooperation of private bodies. literature suggest that 15-20% of pulse yield can be increased through use of quality seeds.
- Compared to developed countries of Australia and Canada, the harvesting of pulses in Pakistan is through manual means. At the time of harvesting, the shortage of labor and machinery is also the main cause of post-harvest losses. In the case of chickpea, the labor is not available due to harvesting of wheat as chickpea mature 15–20 days earlier than wheat. Sometimes labor is available for harvesting but no labour is available for threshing,
- Moreover, the threshing of pulses in Pakistan is done with wheat thresher which is usually available after wheat threshing. Thus the unavailability of farm machinery is also a major obstacle in increasing the area and production of pulses in Pakistan. The

application of pesticides, insecticides, and harvesting is through manual means. The provision of drills, tractor, mounted sprayers, and mechanical harvesting can significantly boost pulse production.

10.2. Mungbean

Introduction

- Mungbean (Vigna radiata (L). Wilczek) is a pulse crop that is particularly attractive for farmers in South Asia because of its short duration and decent performance under adverse climatic conditions such as heat, drought and salinity.[180]
- Mungbean is one of the most import Kharif Pulse crop of Pakistan. It is mainly grown in southern Punjab and Sindh province. Punjab is the major mungbean growing province that alone accounts for 80% area and production.[181] Cultivation of Mungbean is concentrated in the districts of Layyah, Bhakkar, Mianwali and Rawalpindi.[182]
- According to Pakistan Bureau of Statistics, Mungbean consumption per capita stands at 0.84 kg in Pakistan.[183]

Global Perspective

- The global mungbean area is about 7.3 million ha, and the average yield is 721 kg/ha. India and Myanmar each account for 30% of global output of 5.3 million tons. Other large producers are China, Indonesia, Thailand, Kenya, and Tanzania.[184]

Table 71: Average yield of the world and regional countries (tonnes/hectares)

Countries	Yield tonnes/hectares
World	0.73
India	0.56
Bangladesh	0.62
Myanmar	1.3
Australia	1.5
Pakistan	0.87

Source: https://avrdc.org/intl-mungbean-network/ ,https://angrau.ac.in/downloads/AMIC/GREENGRAM%20OUTLOOK%20REPORT%20-January%20to%20May%202021.pdf,https://en.banglapedia.org/index.php/Mungbean#:~:text=In%20Bangladesh%2C%20mungbean%20is%20traditionally,this%20crop%20is%20widely%20cultivated., https://agricultureandfoodsecurity.biomedcentral.com/articles/10.1186/s40066-020-00260y#:~:text=Average%20mungbean%20yields%20in%20Myanmar,even%20lower%20in%20South%20Asia, https://qaafi.uq.edu.au/article/2021/02/mungbeans-unmasked#:~:text=The%20average%20annual%20production%20over,incident%20on%20the%20mungbean%20crop.,

Domestic Production, Area, and Yield

- During 2021-22, Mungbean was grown on an area of 301.8 thousand hectares and its production stood at 263.8 thousand tons. During 2021-22, the production of mungbean increased by 29 percent as compared to same period of last year. Similarly, area under production increased by 30.6 percent compare to last year.
- From 2016-17, production of mungbean increased by 102 percent, area by 69 percent and yield by 20 percent. Table 11 below presents the five year trend of area under Mungbean and its production.

[180] https://www.tandfonline.com/doi/pdf/10.1080/23311932.2018.1499241
[181] www.aari.punjab.gov.pk/mung_pulses
[182] https://zarat.kp.gov.pk/crops/view_crop/81
[183] https://www.pbs.gov.pk/sites/default/files//pslm/publications/hies15-16/TABLE_23.pdf
[184] https://link.springer.com/chapter/10.1007/978-3-030-20008-4_1

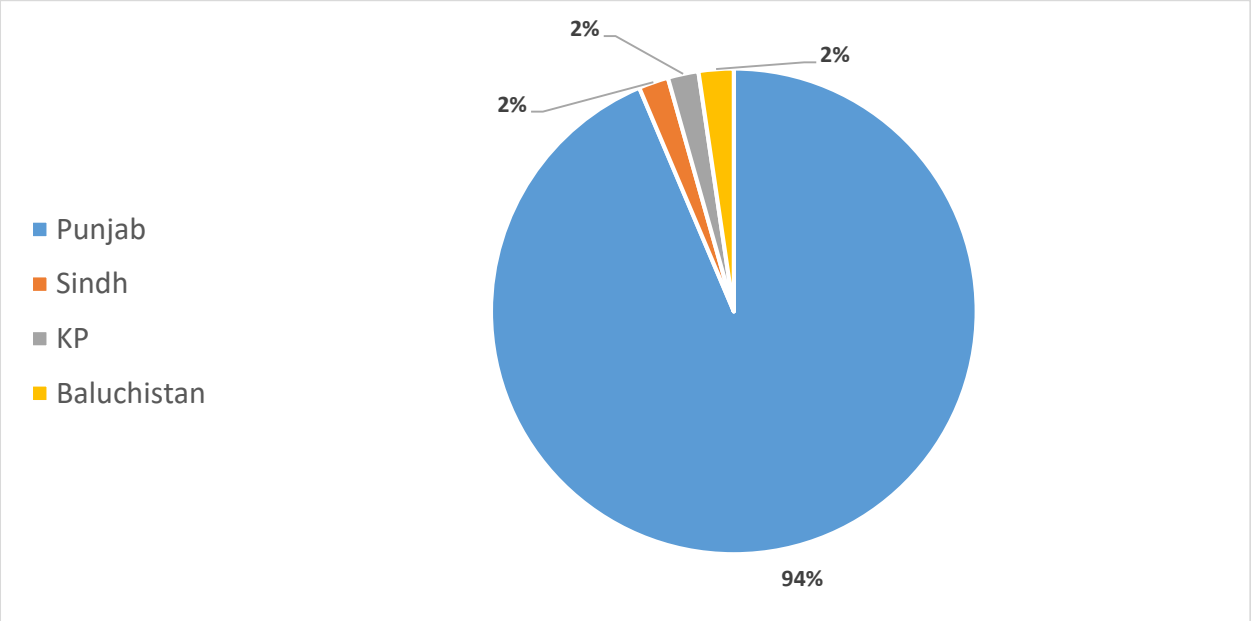
Table 72: Area, Production and Yield of Mungbean in Pakistan

Year	Area (000 Hectares)	Production (000 Tonnes)	Yield (Kgs/Hec)
2016-17	178.8	130.1	728
2017-18	162.4	122.0	751
2018-19	163.2	117.8	722
2019-20	172.9	125.9	728
2020-21	231.1	204.5	885
2021-22 (P)	301.8	263.8	874
Source: Economic Survey of Pakistan			

Provincial Share in Area, Production, yield

- During 2020-21, the highest share in production of Mungbean belongs to Punjab (94%) and the remaining 6 percent share to Sindh (2%), KP (2%), and Baluchistan (2%). Similarly, in area under production, 91 percent area under cultivation falls in Punjab, while the rest is divided in Sindh (3%), KP (3%), and Baluchistan (3%). Yield (KGs per hecatre) stands highest in Punjab (918), followed by KP (656.2), Baluchistan (631.56), and Sindh (404.5). Average yield (KGs per hectare) for Pakistan during 2019-20 was 874.1.[185.]
- Pakistan has become self-sufficient in mungbean production as the first estimate of the crop for 2021-22. The first estimate of the crop for 2021-22 puts the mungbean output at 253,000 tons, more than enough to meet domestic demand for about 180,000 tons.[186]

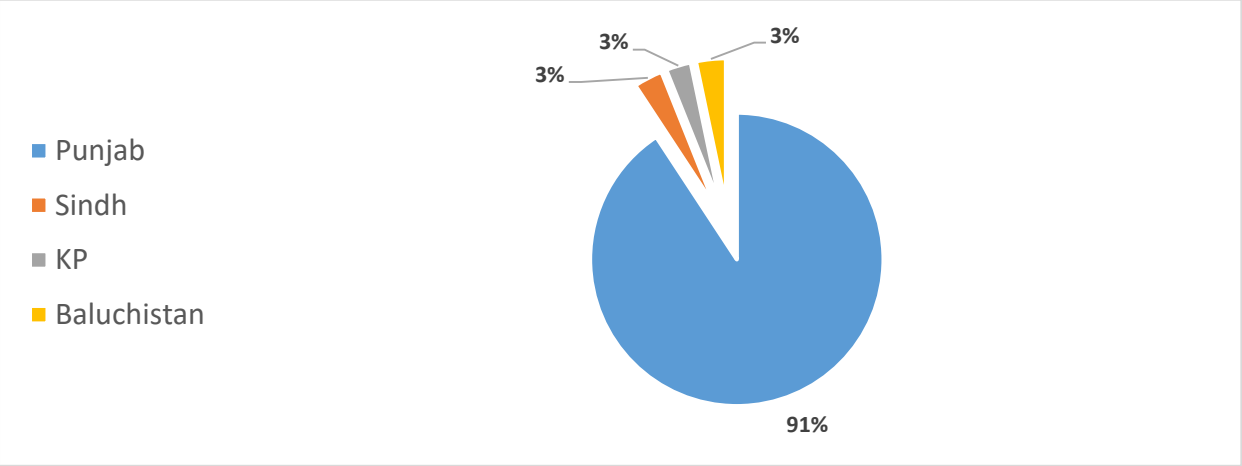
Figure 67: Provincial share of Mungbean production during 2020-21



Source: Calculated from AMIS data

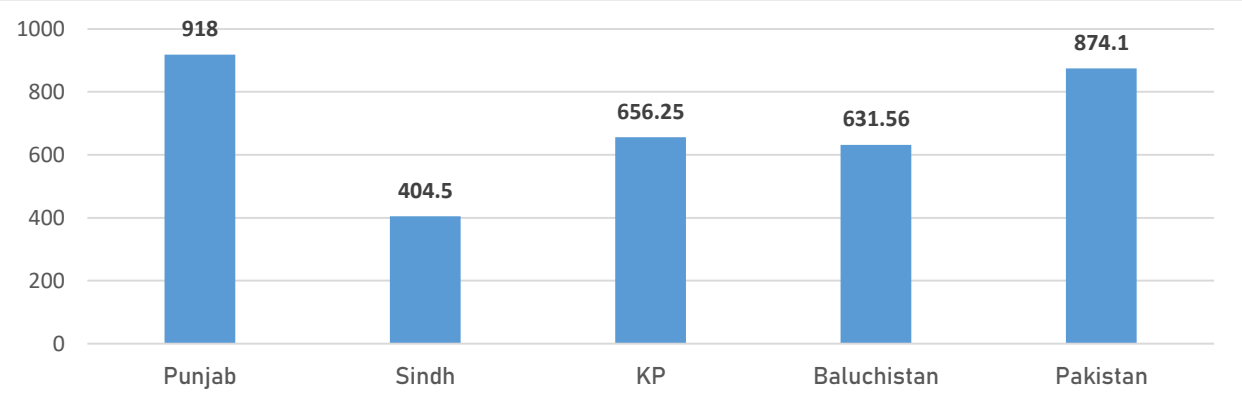
[185] http://www.amis.pk/pdf/Supply%20and%20Price%20Situation%20Report%20June%202022.pdf
[186] https://www.dawn.com/news/1646790

Figure 68: Provincial share of Mungbean area in production during 2020-21



Source: Calculated from AMIS data

Figure 69: Provincial Yield of Mungbean during 2020-21 (KGs per hectare)



Source: Calculated from AMIS data

Sowing and Harvesting Season

- There are two main planting seasons for mungbean, spring and the more conventional kharif. Planting within the timeframe is critical to maximize the yield and grain quality.
- **Spring Season:** In Spring season, mungbean can be successfully grown where the irrigated water is available. In this season there is less vegetative growth and low risk of insect attack hence the grain quality is better.
- **Kharif Season:** In Pakistan, almost 80% mungbean is planted in Kharif season. Kharif planting is equally successful in irrigated and rainfed areas. Although it is grown in different crop rotations, about 75% cultivation follows mungbean - wheat crop rotation. Table below presents the time for sowing and maturity of the mungbean crop in Pakistan.
- In Pakistan, there are distinct regional differences in the period for growing mungbean. In southern Punjab, which is the crop's traditional area, it is sown in early May (Bhakkar) to June (Layyah) and harvested in about 83 days in August. In Potohar region, it is sown mostly in late June to early July and harvested from late September to early October and the average growing period was 93 days. Lastly, in Sindh it is sown from February to March and harvested in about 77 days in May. Some farmers in Sindh grew mungbean twice a year.[187]

[187] https://www.tandfonline.com/doi/pdf/10.1080/23311932.2018.1499241

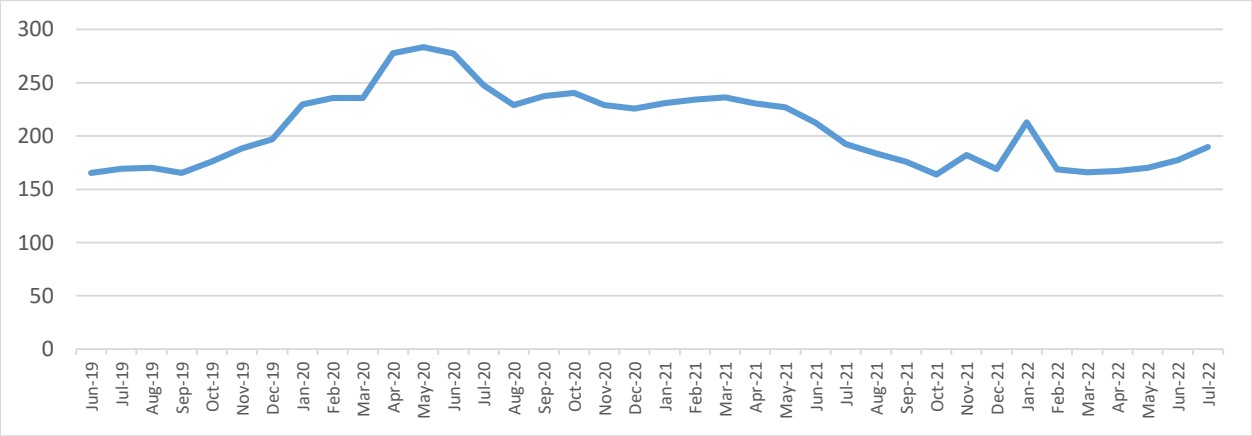
Table 73: Sowing Season of Mungbean in Pakistan

Area/Zone	Season	Planting Time
North Punjab	Spring	End March to Mid-April
	Kharif	End June to Mid-July
Central Punjab	Spring	March
	Kharif	Mid-May to Mid-June
Southern Punjab	Spring	End February to Mid-March
	Kharif	Mid-May to Mid-June
Northern KP	Spring	Mid-March to Mid-April
	Kharif	July
Southern KP	Spring	March
	Kharif	Mid-May to Mid-June
Sindh	Spring	Mid-February to Mid-March
	Kharif	Mid-June to Mid-July
Baluchistan	Kharif	July
Source: Mungbean Production Manual, University of Agriculture, Faisalabad.		

Retail Price of Mungbean

- Figure below shows the average price (1Kg) of mungbean for the period June 2019 to June 2022. Data has been retrieved from Pakistan Bureau of Statistics. It can be observed from the figure that the price stood highest in the month of May 2020 and continue to remain high during 2020. Afterwards, price shows a declining trend till June 2022.
- During 2020 price was highest as the country was hit by the pandemic which raise the demand of essential commodities. Due to increase in demand of pulses, Market traders exploited a soaring demand from charitable organizations, elites, industrialists and upper income group people who were massively procured commodities, particularly pulses, in a bid to provide ration bags that contain sugar, ghee/cooking oil, flour, rice, soaps, etc to the needy persons.[188]

Figure 70: Price of Mungbean (washed) 1Kg from June 2019 to June 2022



Import of Mungbean

- Below the figure shows import quantity and value of mungbean from 2017-18 to 2021-22*. Over the years, 2020-21 shows the highest import whereas the lowest in 2017-18. During 2021-22*, total value of import totaled at PKR 906.8 million whereas the

[188] https://www.dawn.com/news/1548710

quantity stood at 1,1151.9 million tons. The major import came from Afghanistan followed by Argentina, Brazil and Uganda.

Figure 71: Import of Mungbean from 2017-18 to 2021-22*

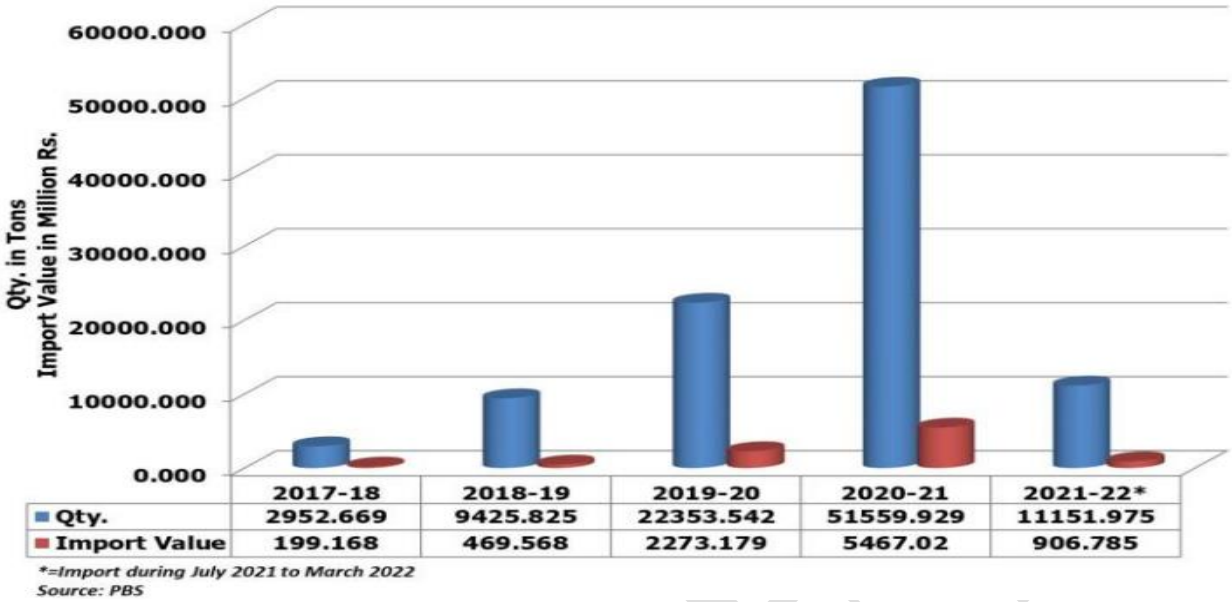
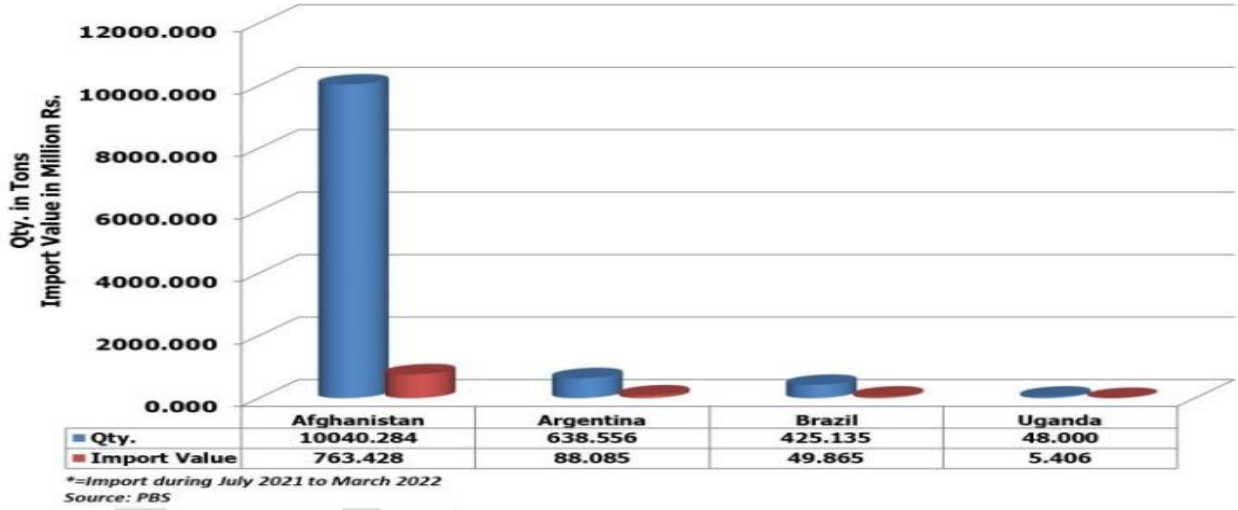


Figure 72: Country-wise import of Mungbean 2021-22



Cost of Production of Mungbean 2021-22

- During 2021-22, Weighted Average Cost of Production (Rs. /acre) of Munhbean is PRs. 27,158. The major component of cost in production of mungbean includes cost of land, fertilizer, land preparation and seed and sowing.

Table 74: Weighted Average Cost of Production, Mungbean (2021-22)

Operation / Inputs	Total Weighted Cost (Rs./acre)	Cost in percentage form
Cost of Land Prep	**3,666**	**13%**
Cost of Seed & Sowing	**3,114**	**11%**
Cost of Water	1,963	7%
Cost of Fertilizer	**5,807**	**21%**
Cost of Pesticides	1,929	7%

Cost of Weedicides	662	2%
Cost of Harvesting	1,981	7%
Land rent	**8,000**	**29%**
Cost of other expense	36	0%
Cost of Transport	635	2%

Issues & recommendations

- During 2020, price of Mungbean was highest as the country was hit by the pandemic that raise the demand of essential commodities. Due to increase in demand of pulses, market traders exploited the rising demand from charitable organizations, elites, industrialists and upper income group people who were massively procure commodities, particularly pulses, in a bid to provide ration bags that contained sugar, ghee/cooking oil, flour, rice, soaps, etc to the needy persons. After the peak pandemic period, price of mungbean started to decline as the demand normalized.
- In Pakistan, the average mungbean yield is low in the wheat-fallow system of Potohar region where mungbean is produced under rainfed conditions. Lack of water, insect pests and plant diseases as their main constraint. Potential exists in expanding mung bean production both through intensification (i.e., improved seeds, more inter cropping with cereals) and expansion of copping area.[189]
- The combination of nitrogen and phosphorous fertilizers plays an important role in the growth, development and yield of mungbean.[190] In case of DAP, the price trend shows an increasing trend starting from PKR. 4,000 in January 2020 to 10,000 in June 2022. This shows the significant increase in farmer cost of production due to the core role of fertilizer as input in production of mungbean.
- The average yield of mungbean in Pakistan is relatively better compare to regional countries and in 2021, the production has been surpassed the first estimate of the crop for 2021-22 estimated targets.[191] To reduce the import bill i.e., 906.7 million rupees in 2021-22, government may possibly promote more production of mungbean in the country to save the foreign exchange.

[189] https://www.tandfonline.com/doi/full/10.1080/23311932.2018.1499241
[190] https://pakjas.com.pk/papers/508.pdf
[191] https://www.dawn.com/news/1646790

10.3. Mash bean

Introduction

- Mash bean (Vigna mungo (L.) Hepper) family Leguminoseae locally known as sabut maash, is a highly praised legume in Pakistan due to its dieto-therapeutic importance. It is grown in both spring and kharif season. Seeds are used in culinary dishes since primeval. The seeds are eaten after cooking. Seeds are the chief constituent of many traditional products like wari, papad, idli, dosa, halwa and imrati. The seeds are well-known due to their therapeutic and nutritional potential.
- It is an important pulse crop, not only in Pakistan but also in whole world. It grows on marginal lands where other crops perform poorly. Being leguminous, it demands less nitrogenous fertilizers and it fits well in different crop rotations systems to maintain the fertility level of the soil.[192] According to Pakistan Bureau of Statistics, Mash bean consumption per capita stands at 0.48 kg in Pakistan.[193]
- India currently represents the largest producer of mash bean, accounting for more than two-thirds of the global production. Other major regions include Myanmar and Thailand.[194]

Domestic Production, Area and Yield

- During 2021-22, Mash was grown on an area of 8 thousand hectares and its production stood at 6.1 thousand tons showing a decrease of 11 percent compare to last year. From 2016-17 to 2021-22, production and area have been continuously declining. Production have been decreased by 18.03 percent whereas area by 113.75 percent. Table below presents the five year trend of area under Mash and its production.

Table 75: Area, Production and Yield of Mash bean

Year	Area (000 Hectares)	Production (000 Tonnes)	Yield (Kg/Hec)
2016-17	17.1	7.2	421
2017-18	15.5	7.3	471
2018-19	14.1	6.9	489
2019-20	13.9	6.5	468
2020-21	11.0	7.0	636
2021-22 (P)	8	6.1	762.5
Source: Economic Survey of Pakistan			

Provincial Share in Area, Production and yield

- During 2020-21, the highest share in production of Mash bean belongs to Baluchistan (65%), followed by Punjab (22%), KP (13%). Similarly, in area under production, 48 percent area under cultivation falls in Baluchistan, followed by Punjab (43%), and KP (9%). Yield (KGs per hectare) of Mash bean stands highest in KP (900), followed by Baluchistan (830.13), and Punjab (319.14).[195]
- Pakistan is deficient in mash bean production to meet the domestic demands. Pakistan needs to import mash bean to meet its requirements. Leading mash bean producing districts are Narowal, Rawalpindi and Sialkot. But the area in these districts is continuously decreasing.[196]

Figure 73: Provincial share of Mashbean production during 2020-21

[192] https://biolres.biomedcentral.com/articles/10.1186/0717-6287-47-23
[193] https://www.pbs.gov.pk/sites/default/files//pslm/publications/hies15-16/TABLE_23.pdf
[194] https://www.imarcgroup.com/global-black-gram-market
[195] http://www.amis.pk/pdf/Supply%20and%20Price%20Situation%20Report%20June%202022.pdf
[196] https://aari.punjab.gov.pk/system/files/Annual%20Report%202019-20%20Pulses%20.pdf

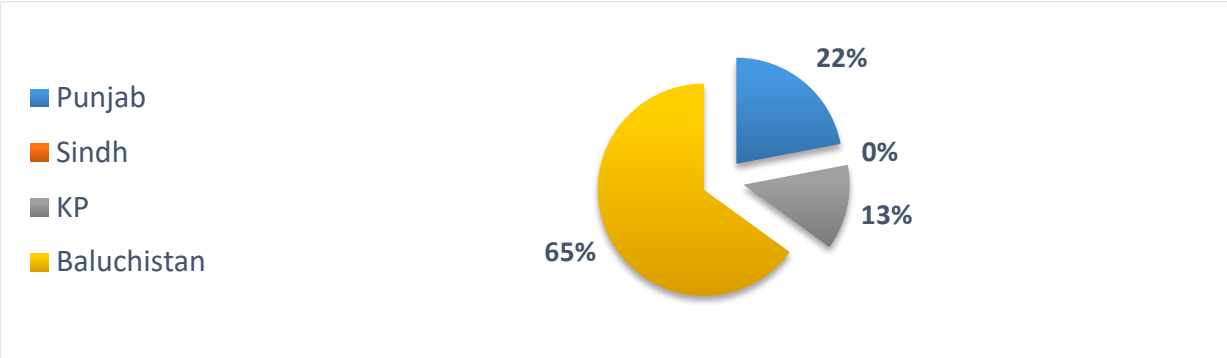


Figure 74: Provincial share of area in production of Mashbean during 2020-21

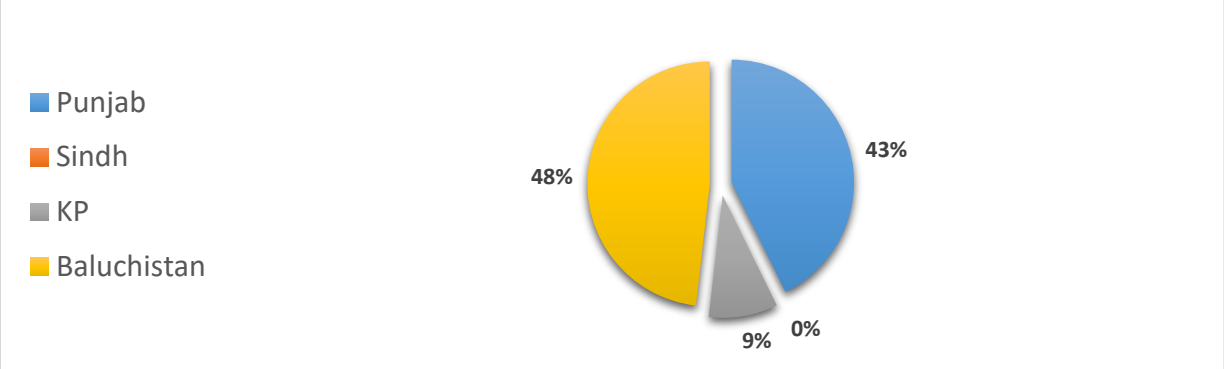
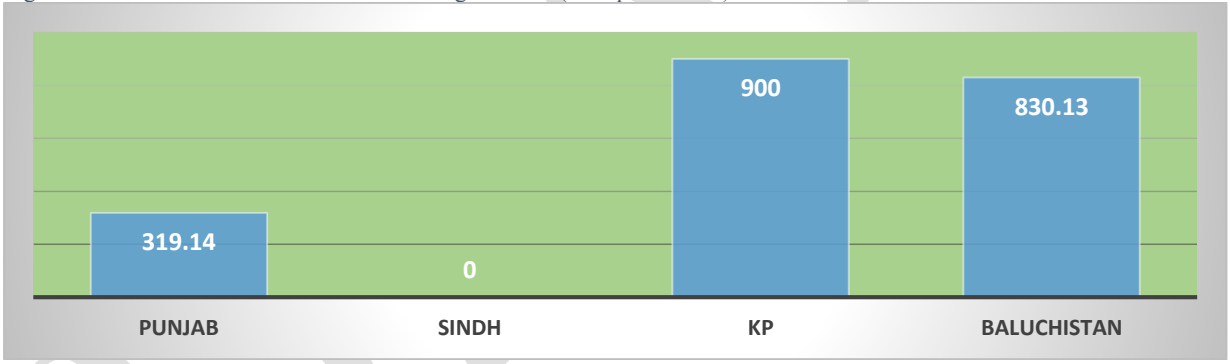


Figure 75: Provincial Yield of Mashbean during 2020-21 (KGs per hectare)



Sowing and Harvesting Season

- Mash beans are short-duration crops with a maturity period of just 60 to 90 days. It is often intercropped with maize, sorghum, cotton, and millets because of their short maturity period, or are rotated with cereal crops. Intercropping Mash beans with other crops results in improved soil fertility, low incidence of pests and diseases, and higher production of dry matter.[197] Below table shows the sowing and maturity of mash beans in Pakistan.

Table 76: Sowing and Maturity Season of Mash in Pakistan

Season	Sowing	Maturity
Season 1 (Spring)	1st March-31st March	60-85 days
Season 2 (Kharif)	25th June-31st July	60-85 days
Source:http://www.parc.gov.pk/index.php/en/csi/137-narc/crop-sciences-institue/712-national-coordinated-pulses-programme		

[197] https://www.fao.org/3/i7108en/I7108EN.pdf

Major Districts in Mash bean Production

Table 77: Major districts of Mash in Provinces

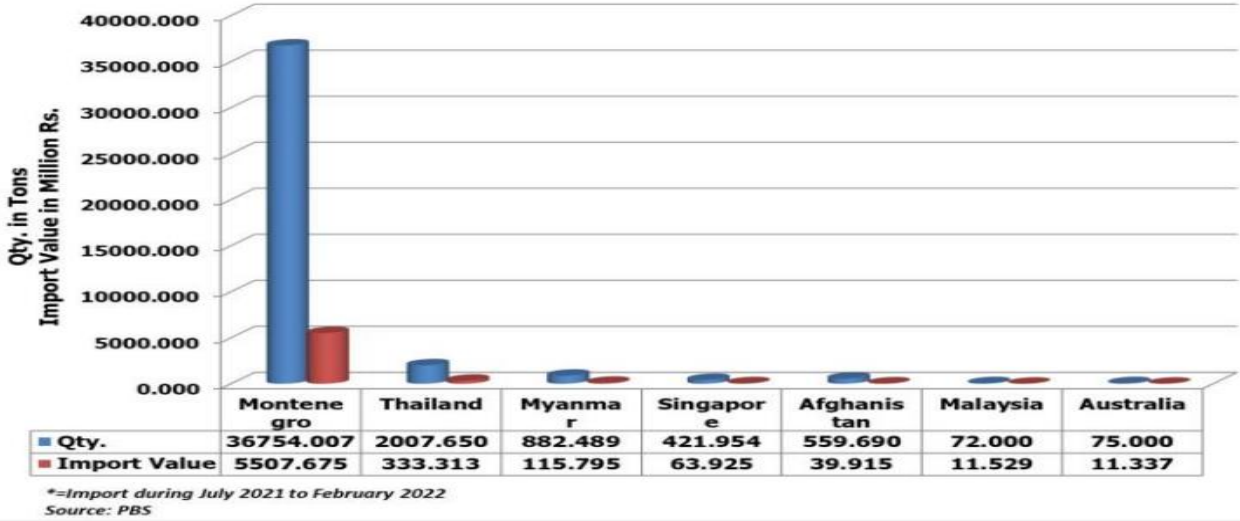
Province	Districts
Punjab	Narowal, Rawalpindi, Jehlum, Sialkot and Gujrat
Balochistan	Khuzdar, Awaran, Musa Khail, Barkhan, Kharan, Zhob, Killa Saifullah
KP	Lower and Upper Dir, Chitral, Kurram Agency
Source: http://www.amis.pk/Agristatistics/DistrictWise/2012-2014/Mash.html	

Import of Mash bean

- Below the figure shows import quantity and value of Mash bean from 2017-18 to 2021-22*. During 2020-21, Pakistan imported around 66 thousand tons of mash beans which amounted to 9,349 million rupees. The major import came from Montenegro, followed by Thailand, Myanmar, Singapore, and others. The local production of mash bean in the country caters 10 percent of the demand, remaining 90 percent is through imported mash beans.

Figure 76: Import of Mash bean in Pakistan from 2017-18 to 2021-22*

Figure 77: Country-Wise import of Mash bean in Pakistan during 2020-21



Cost of Production of Mash bean

- During 2021-22, Weighted Average Cost of Production (PKR. /acre) of Mash bean is PKR. 23,449. The major component of cost in production of mash bean includes cost of land, fertilizer, and land preparation.

Table 78: Weighted Average Cost of Production, Mash bean (2021-22)

Operation / Inputs	Total Weighted Cost (Rs./acre)	Cost in percentage form
Cost of Land Prep	5431	23%
Cost of Seed & Sowing	1952	8%
Cost of Water	0	0%
Cost of Fertilizer	5508	23%
Cost of Pesticides	351	1%
Cost of Weedicides	40	0%
Cost of Harvesting	1875	8%
Land rent	8000	34%
Cost of other expense	292	1%
Cost of Transport	303	1%
Source: https://crs-agripunjab.punjab.gov.pk/system/files/COP%20Mash%202021-22.pdf#overlay-context=node/204		

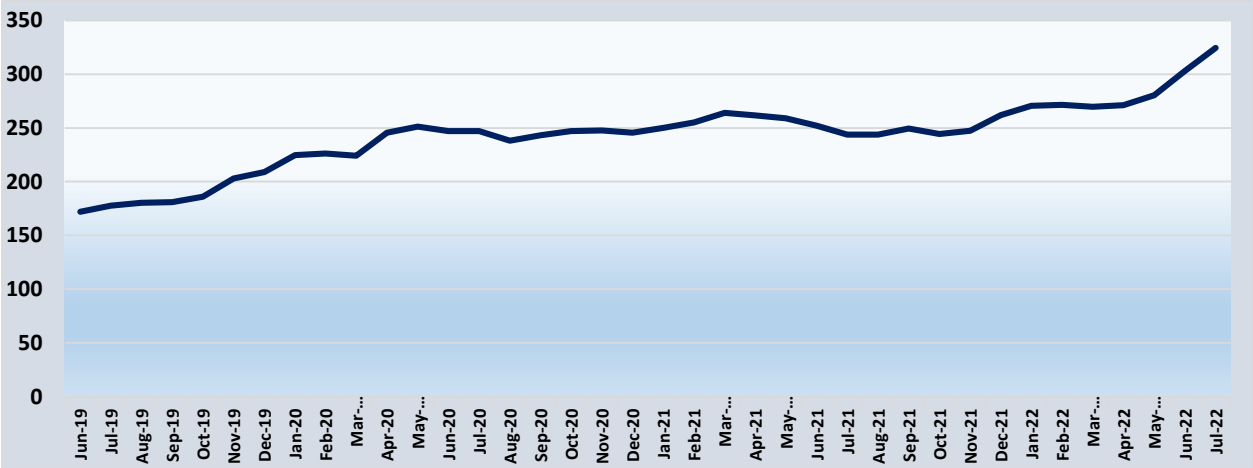
Retail Price of Mash bean

- Figure below shows the average price (1Kg) of mash bean for the period June 2019 to July 2022. Data has been retrieved from Pakistan Bureau of Statistics. It can be observed from the data that the price of mash bean has been increasing since June 2019 from PKR 172.02 to 324.44 in July 2022. The increase from June 2019 to July 2022 is around 89 percent.
- In Pakistan, 90 percent of mash bean is imported to cater the demand locally, as a result the local price linked to the exchange rate of the country. In June 2019, one dollar was approximately equal to 165 Pak rupees[198] that increased to 239.7 on 1st August 2022. The currency devaluation played key role in the appreciation of mash bean price locally in the last three years.

[198] https://www.sbp.org.pk/ecodata/crates/2019/Jun/03-Jun-19.pdf

- In 2020, due to Covid-19, increase in the demand of pluses have been witnessed in the country. Market traders exploited the increasing demand from charitable organizations, elites, industrialists and upper income group people who were massively procured commodities, particularly pulses, in a bid to provide ration bags that contain sugar, ghee/cooking oil, flour, rice, soaps, etc to the needy persons.

Figure 78: Price of Mash bean per kg from June 2019 to July 2022



Issues & recommendation

- There has been a sharp decline in production and area over the last five years, and, consequently, Pakistan has emerged as a large importer of mash beans. Local farmers use local seeds saved by them, and adoption of improved varieties is low. To reduce the import bill of the country, government may promote the production of mash bean locally specially in KP and Baluchistan where yield of mash bean is better than Punjab, through R&D in seed development and improving seed distribution.
- As the world rebounds from the COVID-19 crisis, the mix of rising demand and supply constraints has led to increased prices of food commodities. Energy prices, particularly of oil and natural gas, also increased sharply and are increasing costs of production, transport, storage, and processing of food in Pakistan. Further in recent years the Fertilizer prices especially phosphate fertilizer has risen sharply raising the cost of production.
- In Pakistan, 90 percent of mash bean is imported to cater the local demand, the domestic price is thus linked to the exchange rate of the country. In June 2019, one dollar was approximately equal to Rs.165 which increased to Rs. 239.7 on 1st August 2022. The currency devaluation has thus played a key role in the appreciation of mash bean price domestically in the last three years.
- The main diseases of mash bean are yellow mosaic virus (YMV), leaf crinkle virus (LCV), cercospora leaf spot, bacterial blight and charcoal rot. Plant disease of mash bean crop in Pakistan are a constant threat and often a limiting factor in the cultivation.[199]

[199] https://www.cabi.org/isc/abstract/19886768098

10.4. Masoor (Lentil)

Introduction

- Lentil is the second major **Rabi pulse crop** after chickpea in Pakistan.[200] It is mainly grown in all the provinces but **50%** area is in **KPK**.[201] Pakistan's production of masoor and area under cultivation have declined over the last five years with area reaching at 5.8 thousand hectare in 2021-22 from 17.9 thousand hectares in 2015-16. Similarly the production of crop has declined to 4.1 thousand tons during 2021-22 from 7.8 thousand tons during 2015-16 a decline of 47%. However, its consumption has increased substantially. The table below presents the weight of Masoor in the Pakistani consumer basket.

Table 79: Weight of Masoor in Consumer Price Index

Region	Weight
Urban	0.1624%
Rural	0.2076%
Source: PBS	

Global Perspective

- Canada is the largest lentil producer in the world with production of 2,868 thousand tons from an area of 1,705 thousand hectares giving a yield of 1,682 Kgs per hectare during 2020. India comes second with production of 1,180 thousand tons from an area of 1,354 thousand hectares giving a yield of 872 Kgs per hectare. Canada and India produce together more than 50 % of world's total lentil.[202] Pakistan stood at **19th** position out of 42 countries in Masoor **production** in world.[203] Table below presents the major producers of Masoor in world.

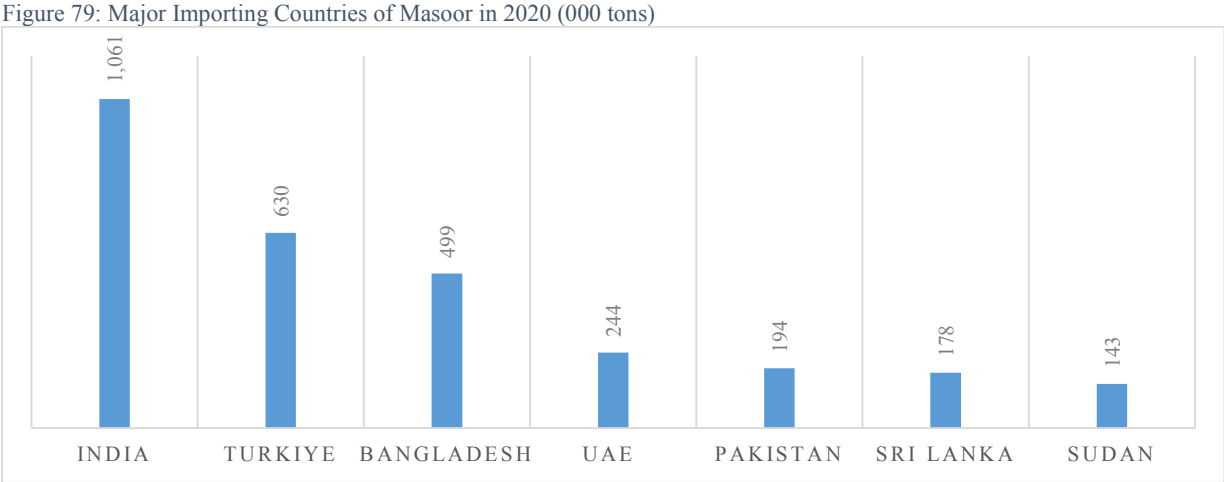
Table 80: Major Producers of Masoor in World in 2020

Country	Production (000 tons)	Area (000 Hectares)	Yield (KGs Per Hec)
Canada	2,868	1,705	1,682
India	1,180	1,354	872
Australia	526	412	1,275
Turkiye	371	248	1,497
USA	336	208	1,616
Nepal	263	213	1,235
Syria	200	113	1,777
Pakistan	5	10	510
Source: AMIS			

- India, Turkey and Bangladesh were among major importers of masoor during 2020. Pakistan stood at **5th** with **imports** of 194 thousand tons of masoor during the same period. The figure below presents the major importers of masoor in world during 2020.

[200] https://www.bakhabarkissan.com/masoor/
[201] Author's calculation based on Economic Survey and Amis Data.
[202] https://www.atlasbig.com/en-us/countries-lentil-production
[203] Supply and Price Situation Report June 2022, AMIS.

Figure 79: Major Importing Countries of Masoor in 2020 (000 tons)



Source: AMIS

Domestic Production, Area, and Yield

- During 2021-22, Masoor was grown on an **area** of **5.8** thousand hectares and its **production** stood at **4.1** thousand tons. The area of masoor has declined by 60% from 14.6 thousand hectares during 2016-17 to 5.8 thousand hectares during 2021-22. Similarly, the production has declined by 39% from 6.7 thousand tons in 2016-17 to 4.1 thousand tons during 2021-22. However, the yield has observed a substantial increase of 54% from 459 Kgs per hectare during 2016-17 to 707 Kgs per hectare during 2021-22. A part of increase in yield can be attributed to decline in area of Punjab where yield is lower as compared to other regions. The area is on a decline mainly due to shift of main lentil area to other crops (such as wheat), weed and disease problems and non-availablility of certified and quality seed of high yield.[204] Table below presents the trend of area under Masoor and its production.

Table 81: Area, Production and Yield of Masoor in Pakistan

Year	Area (000 Hectares)	Production (000 Tonnes)	Yield (Kgs/Hec)
2016-17	14.6	6.7	459
2017-18	13.6	6.4	471
2018-19	12.9	6.0	465
2019-20	9.5	4.9	516
2020-21	6.9	4.1	594
2021-22 (P)	5.8	4.1	707
Source: Economic Survey of Pakistan			

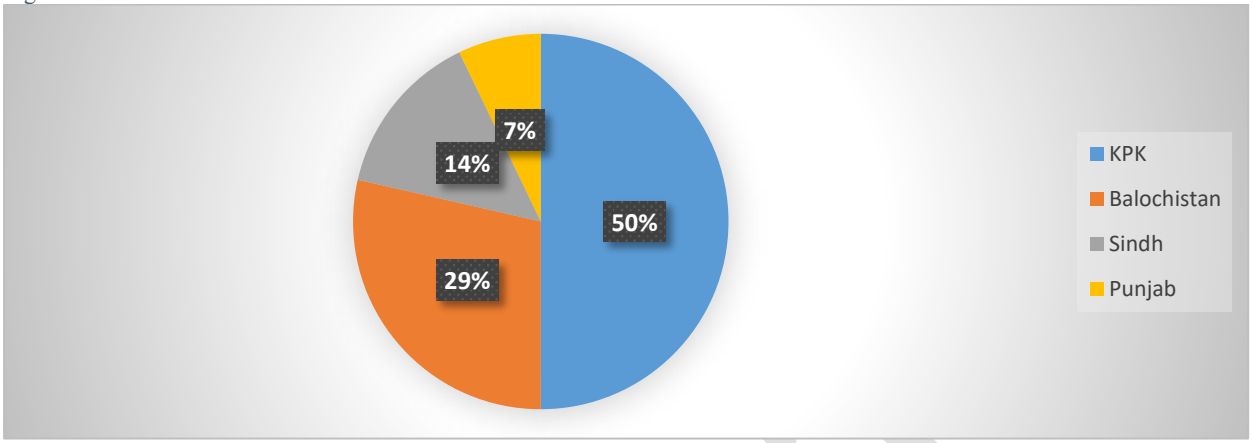
- The yield of lentil in Pakistan has reached about 707 kg per hectare in 2021-22; which is far less than other lentil cropping countries of the world. The lack of intensive lentil breeding programs can be attributed as the main reason for lower yield potential of lentil varieties in Pakistan (Gupta et al., 2011; Roychowdhury et al., 2012). Various strategies can be adopted for genetic improvement of lentil to develop new promising varieties of the crop. Mutation breeding is one of such strategies.

Provincial Share in Area and Production

- KPK is the major province of masoor production having a share of around 50% during 2020-21. Balochistan stands second with a share of 29% in masoor production. Punjab has the lowest share of only 7% in masoor production. Following figure presents the provincial share in masoor production during 2020-21.

[204] Masoor - E Agriculture Service for Farmers – Bakhabar Kissan

Figure 80: Provincial Share in Masoor Production



Source: AMIS

- The yield of masoor differs across provinces. Balochistan and Sindh had the highest yield of 667 Kgs per hectare during 2020-21. Yield in the province of Punjab was lowest at 375 Kg per hectare during same period. The yield in Punjab is lower because the lentil requires low level fertile land[205] whereas, the land in Punjab has higher fertility. Following table presents the provincial area, production and yield of masoor during 2020-21.

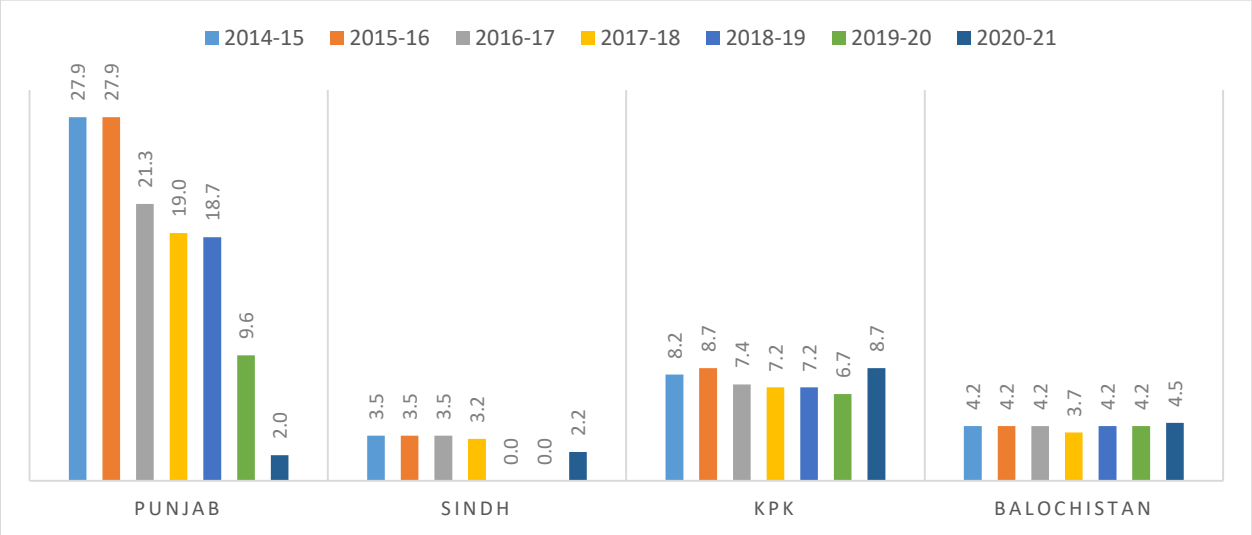
Table 82: Provincial Area, Production and Yield of Masoor in 2020-21

Province	Area (000 Hec)	Production (000 Tons)	Yield (Kgs per Hec)
KPK	3.5	2.1	600
Balochistan	1.8	1.2	667
Sindh	0.9	0.6	667
Punjab	0.8	0.3	375
Source: AMIS			

- KPK has become the largest province with area under masoor in 2020-21. The area under masoor used to be highest in the province of Punjab in previous years but it has declined to 0.8 hectares. Area under masoor in KPK has increased by 30% reaching 8,700 acres during 2020-21. Similarly, the area under masoor in Balochistan has also increased by 7% to 4,500 acres during 2020-21. Following figure presents the trend in area under masoor across provinces of Pakistan.

[205] Masoor - E Agriculture Service for Farmers – Bakhabar Kissan

Figure 81: Provincial Trend in Area under Masoor (000 Acres)



Source: AMIS

Sowing and Harvesting Season

- Masoor is a Rabi crop and it's planting starts in late September and continues till end of November. The maturity period of masoor depends on the variety as there are early maturing varieties as well as standard maturing varieties. Masoor 85, Masoor 93 and Chakwal Masoor are among famous varieties of masoor in Pakistan. Masoor 85 takes over 97 days till maturity.[206] However, Masoor 93 takes 184 days till maturity.[207] Although the crop becomes available in the month of February but due to lower production the cropping pattern does not affect the availability of masoor in country. Table below presents the sowing and harvesting pattern of masoor in Pakistan.

Table 83: Planting and Harvesting Season of Masoor

Province	Planting*	Harvesting**
Punjab	1st October-15th November	92-184 Days
Sindh	15th October-30th November	92-184 Days
KPK	15th September-31st October	92-184 Days
Balochistan	1st October- 31st October	92-184 Days

*https://fasalbachao.com/lentil-cultivation-in-pakistan-%D9%85%D8%B3%D9%88%D8%B1-%DA%A9%DB%8C-%DA%A9%D8%A7%D8%B4%D8%AA/
**Siddiqui, M, A. et, al. (2020), Tariq, M, A. et, al. (2015). download (psu.edu)

Major Districts in Lentil Production

- KPK has become the major province in masoor production. Bannu, Kohat and D.I. Khan are among major masoor producing districts in KPK. Similarly, Lasbela and Khuzdar are among major masoor producing districts in Balochistan. Table below presents the major districts of masoor production across provinces of Pakistan.

Table 84: Major Districts of Lentil Production acros Provinces of Pakistan

Province	Districts
KPK	Bannu, Kohat, D.I. Khan, Hazara, Bajaur, Swat
Balochistan	Lasbela, Khuzdar, Kallat, Mastung

[206] Field Evaluation of High Yielding Genotypes of Lentil (Lens Culinaris Medik.) Developed through Induced Mutagenesis (researcherslinks.com)
[207] download (psu.edu)

Sindh	Thatta, Badin, Shikarpur, Larkana, Jacobabad, Dadoo
Punjab	Rawalpindi, Jhelum, Chakwal, Gujrat, Sialkot, Bahawalpur, Muzaffargarh, D.G. Khan
Source:https://fasalbachao.com/lentil-cultivation-in-pakistan-%D9%85%D8%B3%D9%88%D8%B1-%DA%A9%DB%8C-%DA%A9%D8%A7%D8%B4%D8%AA/	

Cost of Production

- On average it costs around Rs. 18,192 to produce masoor from one acre of land. Considering the average yield of 152.8 Kg from one acre of land the average cost of producing one kg of masoor is estimated to reach Rs. 119 during 2021-22. Land rent accounts for the highest share of 38% followed by cost of harvesting (21%), land preparation (17%) and Seed and sowing (13%). Following table presents the cost of masoor production during 2021-22.

Table 85: Average Cost of Production for Masoor in 2021-22

Operation/Input	Cost (Rs./Acre)	Share in Cost
Land Rent	7,000	38%
Cost of Harvesting	3,750	21%
Land Preparation	3,170	17%
Seed and Sowing	2,363	13%
Cost of Dung	739	4%
Cost of Water	581	3%
Cost of Pesticides	422	2%
Cost of Transportation	167	1%
Cost of Fertilizer	0	0%
Cost of Other	0	0%
Total Cost/Acre	18,192	
Total Cost/40 Kg	4,762	
Yield (40 kg)	3.82	
Source: AMIS		

Imports of Lentil

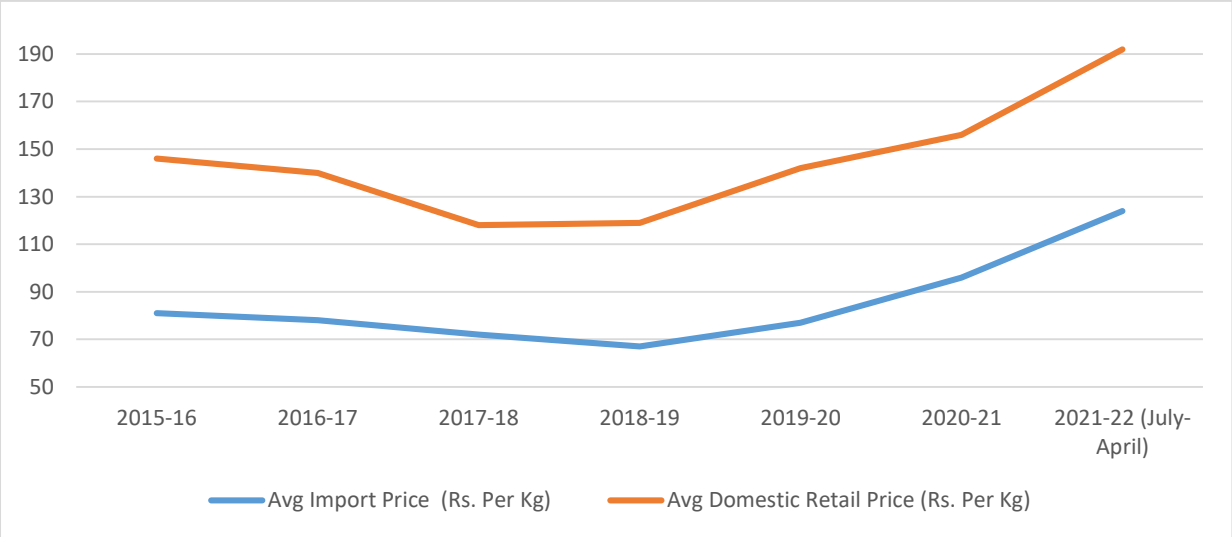
- Since the domestic production of masoor is very limited in Pakistan the major proportion of masoor consumption is fulfilled through imports. Canada and Australia are major exporters of lentils to Pakistan with share of 51% and 37% respectively during 2020-21. Pakistan imported 92 thousand tons of masoor by spending around Rs. 11.5 billion during July 2021- April 2022. On average it costed Rs. 124 per kg to import masoor. Table below presents the trend in imports of masoor in Pakistan.

Table 86: Trend in Imports of Lentil in Pakistan

Year	Import (000 tons)	Import (Mln Rs.)	Import Price (Rs. Per Kg)
2015-16	86	6,984	81
2016-17	193	15,048	78
2017-18	50	3,636	72
2018-19	110	7,340	67
2019-20	172	13,201	77
2020-21	173	16,618	96
2021-22 (July-April)	92	11,466	124
Source: PBS			

- It can be observed that imports and import price don't show a negative relation. Sometimes, the imports increase with an increase in price and in other years imports decrease with an increase in price. This shows that there are other factors as well that are affecting the demand for masoor in Pakistan. It can be a substitution effect between pulses and other sources of protein.
- A comparison of import price and domestic retail price shows that domestic prices are highly affected by the movement in import price of masoor. The domestic prices have remained higher by around Rs. 60 on average during 2015-16 to 2021-22. This difference was lowest during 2017-18 and 2018-19. This difference may be the cost and margin of mills processing the raw imported pulse. Following figure presents the trend in average import price and domestic retail price of masoor.

Figure 82: Comparison of Average Import Price and Average Domestic Retail Price of Masoor

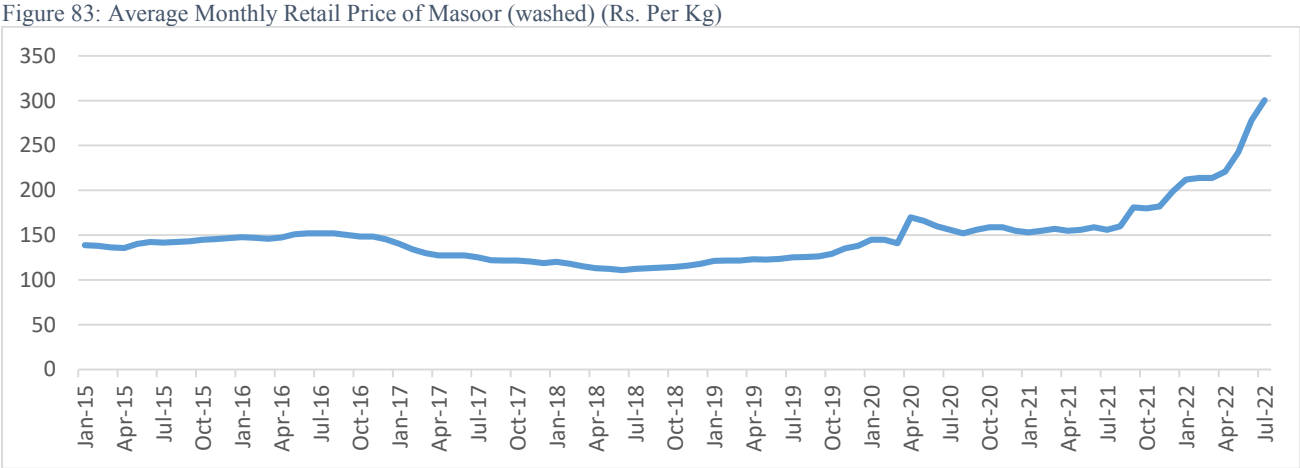


Source: PBS

Retail Price of Masoor

- Average retail price of "washed masoor" has more than doubled from Rs. 139 per kg in January 2015 to Rs. 301 per kg in July 2022. The price of masoor has remained stable for the period of January 2015 till March 2020. A sudden increase of Rs. 29 was observed in the price of masoor during April 2020 due to Covid-19 but the price adjusted afterwards. However, after August 2021 the price of Masoor is on an increasing trend reaching all time high at Rs. 301 in the month of July 2022. The rise in price of commodity can be attributed mainly to exchange rate fluctuation and a rise in international transportation charges which have increased post Covid. Following figure presents the trend in retail price of masoor in Pakistan.

Figure 83: Average Monthly Retail Price of Masoor (washed) (Rs. Per Kg)



Source: PBS

Issues and Recommendations

- Masoor production in Pakistan has declined over the past few years, caused by the decline in area planted and yields. The area has decreased due to shift of lentil area to other crops (mainly wheat), weed and disease problems and non-availability of certified and high yield varieties.[208] Hence, there is a need to develop and promote high yield varieties, seed dissemination mechanism and awareness on better crop management techniques.
- Consumption of masoor has increased in Pakistan steadily and imports have risen dramatically. Concerned about this increase in imports, the Pakistani Government stopped pulse exports by imposing a 35 percent regulatory duty (RD) on export in 2006.[209] This was done with the intent to secure domestic production for domestic consumption. Since that time, pulse exports have all but ceased. But, such policies are anticompetitive and are barrier for exporters to enter international markets. The decision to export/import any commodity shall be left to market forces. This will also play as autocorrecting measure as the growers will grow the commodity in which they have competitive advantage and will leave growing commodities in which they don't have competitive advantage.
- The Government also supports agriculture through subsidies on urea fertilizer, water and energy. These subsidies favor urea fertilizer-intensive crop production over pulse production, which requires relatively less urea fertilizer. Therefore, the government needs to review these subsidies on certain crops and allow the market forces to play their role.
- The Government implements a procurement price for wheat, which discourages pulse production by making pulses relatively less profitable and more risky to produce compared with wheat. Therefore, the government needs to shift the policy focus towards pulses which have high domestic demand and their import consumes scarce foreign reserves.

[208] https://bakhabarkissan.com/masoor
[209] attachments_final_report_adp-2016-043.pdf (aciar.gov.au)

SECTION-III

Key Findings & Recommendations

Sr. No.	Key Findings/Barriers	Policy Recommendations
1.	**Policy Focus**	The goal of an agricultural policy is to obtain a high agricultural growth rate, increase agricultural productivity, better use and conserve available resources, institutional development, promote exports, and increase farmers' incomes. In Pakistan, the government's role in agriculture has been extensive and often the good efforts intended to incentivize result in unintended consequences that at times include creating market distortions. Governments in developing world often intervene in agriculture markets to ensure sustainable farm incomes and provision of essential food items to its growing population. **In Pakistan, much of the policy focus has been on wheat, rice and sugarcane whereas other crops have not remained in policy limelight to increase domestic production. Hence, the production of other crops has not increased comparably (Refer Figure 2).** On the supply side, the seed corporations and companies focus has remained on production and marketing of seeds for cereals and cotton. The public sector also has not shown much interest in increasing the production of crops by producing and distributing quality seeds, further there has been lack of institutional support to the private sector in quality seed production, supply and storage. The Government uses commercial loans to finance the purchase, storage, and sale of wheat. The outstanding debt for the commodity (wheat) operation as of June 30' 2021 was Rs548 billion and was further estimated to rise to Rs. 640 billion by the end of June 2022. Where this support is an expensive policy and has a heavy burden on national exchequer, the government needs to devise a mechanism to reduce its burden through engagement of private sector in the activities of procurement, storage and sale of wheat. The private sector has evolved to the extent that it can handle bulk storage and sale of the commodity. The Competition Commission of Pakistan vide its Policy Note issued on 26th August, 2020 on the Wheat Sector has recommended that, till the time the support price mechanism is in place, it may be announced prior to the sowing season. Currently, the government announces the support price at the time of sowing season. Announcing support price before the start of season will incentivize wheat sowing as the farmers make arrangements for sowing of wheat well before time. This step will not only help to ensure a good income for farmers and ensuring supply in markets but it will also help increase the yield.

		There is an active 35% regulatory duty on export of pulses under S.R.O.049(I)/2006. The RD is intended to meet the local demand of pulses and to maintain competitive prices. However, this duty has discouraged farmers to cultivate pulses at the same time Pakistan's dependency on imported pulses has increased owing to higher domestic demand, resulting in spending scarce foreign exchange on the pulse import. It is expected that the removal of the RD will not only increase domestic production but it will also result in lower domestic prices. Where wheat and sugarcane are the two essential commodities on which the government gives support prices making them attractive for the farmers to grow, other important essential crops such as pulses, other cereals, oil seeds and vegetables are not as attractive to grow. Resulting in the country to import many essential food items such as pulses, edible oil and oil seeds. In comparison India gives support price on 22 essential commodities including cereals, grains, oil seeds, pulses and some vegetables. It is critical that the policy focus is also directed at the other essential commodities and they are also as attractive for farmers to grow to increase their domestic production and to reduce the import burden.
2.	**Structural Issues of APMs, Rent Seeking Behavior of Market Intermediaries, Asymmetric Information and Weak Governance**	The Agriculture Produce Market (APM) is the place where the sellers of agricultural commodities interact with the buyers to determine/establish the market price. The APM is a physical market where either the farmer or a middleman (who can be a village *Biopari*/Commission Agent/Pre-Harvest Contractor) brings the agricultural produce for auction to another middleman (*Arhti/auctioneer*)[210] who sells it to the wholesaler (*Pharia*), who then sells it to the retailer or the consumer. APMs are the principal instrument connecting buyers and sellers, therefore farmers ability to get a competitive price for their produce inter alia depends upon how the APMs are designed, and how they function. What happens in these APMs, how the buyers and sellers interact, how much information is available to the market players, what are the information asymmetries that exist between these players all affects the price a farmer receives for his harvest. **The total number of APMs operating in Pakistan including both public and private (grain and fruit & vegetables) is 345**.[211] The increase in the number of these markets over decades has been very slow resulting in multiple issues of inefficiency, week monitoring by the Market Committees (MCs) and exploitation of market intermediaries.

[210] There are multiple roles that can be played by an Arthi, he can also be the pre-harvest contractor, financier of farmer.

[211] https://www.monash.edu/__data/assets/pdf_file/0010/1428769/WP1_Rana_complete.pdf

		In Pakistan, **farmers only sell 10-15% of their produce directly to the market** rest is sold to a village *biopari*/middleman. In case of large markets the village *biopari* or the middleman buys produce of small farmers, aggregates it and bring it to the market. The auction in the market is conducted by the *Arhti* who is at times the farmers financier as well. *Arhti* is the lynchpin of the agricultural produce markets operating in the country. He is the commission agent and under *the Punjab Agricultural Produce Markets (General) Rules, 1979*[212] (for reference) the commission agent/***Arthi* is entitled to a commission of 1.50% on food grain and other crops, 2.5% on fruits, and 3.12% on vegetables**, worked out on the basis of the value of the agricultural produce. However on ground not only these rates are higher but also there is lack of uniformity in the rates across markets. The mediating role of the *Arthi* allows him to carry out the auction on his terms as all produce brought to the market must be sold through auction, in other words through the *Arthi*. These *Arthis* operate under license granted by the Market Committees (MCs)[213] that monitor the operations of the mandis/markets.[214] **The number of *Arthis* operating in the 262 markets of Punjab is 11,000** which is much less than the actual requirement. New licenses are issued sparingly therefore giving more monopoly power to *Arthis*. The *Arthi* has forward and backward credit linkages which makes him the principle market agent. Where the farmer takes credit from the *Arthi*, no interest is charged making the farmers inclined towards this mode of financing.[215] *Pharia*/wholesaler (known as *Masha Khor* in Sindh) also operates in the APMs. The *Arthi* auctions the produce which is bought by the *Pharia*. The Pharia breaks the lot he buys, grades it and sells either in the same market or another. He is both the buyer and the seller in the same market. Under the institutional framework the APMs/mandis are to be regulated by Market Committees (MCs), having representation of growers, market operators and consumers. The MCs collect fees chargeable on all bulk sale of agricultural produce in the market. The market fee is assessed and collected by the inspectors. They also are to be present at the time of auction and note the auction /wholesale price and the retail price of all agricultural produce brought for sale. In practice, there is derth of market intelligence

[212] Provinces have similar margins of commission agent

[213] In Punjab, MCs are constituted under *Section 8 of the Punjab Agricultural Produce Markets Ordinance, 1978*.

[214] MCs are mandated to develop new markets, issue license of auction, development and maintenance of market infrastructure and collecting fees.

[215] According to an estimate a small Arthi has a credit portfolio of 10-15 million and a large Arthi has a credit portfolio ten times higher.

		and the inspector relies on the information provided by the *Arthi* on the sales volume and the final price. Studies suggest that there is under reporting of sales volume by the Arthis as the inspectors are unable to keep track of all auctions and have to rely on the information provided by the *Arthi*. He is thus the main beneficiary of the lack of monitoring by the MCs staff in the form of collection of market fee.[216] The retail price list of the agricultural commodities in the market is issued by the MC. **The rate list is based on the wholesale prices plus 16% margin – 6% for the pharia, and 10% for the retailer**. However this pricing mechanism is not the same in all APMs. Furthermore the retail prices are artificially depressed consequent to which the retailers have the retail list but seldom sell at the issued rate list. Under the current market operations the Arti enjoys *rent seeking* and frequently engages in exploitative practices due to monopoly power. He has complete information about the quantum of sales, and the quantity and quality of agricultural produce brought to the APM. Consequent to weak management, market intelligence, and serious capacity issues the market allows him to manipulate the system. There is no readily available information on the sales volume handled by various markets. The number of inspectors per market are far less than the actual requirement. As licensing criteria is stringent the number of Artis per market is also less. The institutional mechanism that governs these APMs requires a complete over haul. The constitution of MCs, their functions, services provided need to be revisited. If the licensing by MCs is made easy the number of Artis will increase, reducing their manipulation of other market players. The Provincial Directorate's capacity enhancement and development is required at all levels including the quality and quantity of human resource, the equipment, the infrastructure and market intelligence in order to check and minimize the rent seeking behavior of *Arthi*. This will result in the required market efficiency in APMs consequently the manipulation of the farmer by the Arthi will decline and the result will be a more competitive price both for the farmer and for the end consumer. In addition, the pricing mechanism adopted w.r.to the commissions of the *pharia* and the retailer is not uniform across APMs and requires uniformity which will subsequently also translate into more competitive agricultural commodities prices.
3.	**Inefficiency owing to Low Yield**	High crop yield is not only critical for food security and availability of crops at competitive prices, but is equally significant to generate higher farmer incomes and reduce poverty. There are several factors that affect crop yield and can be pulled together into three categories

[216] The Commission conducted a pilot study on 'Assessment of Supply Chain from Farm gate to retail - Tomatoes and Onions' and conducted market survey of various mandis of Punjab, Sindh and KP.

		(a) technological (b) biological and (c) environmental. Technological factors include farming practices (such as mechanization, use of high yield seeds, genetically improved varieties) and managerial decisions, biological factors include disease, insects, pests and weeds and environmental factors include climatic conditions (such as salinity, heat stress etc.) soil fertility, water availability, and topography. Low yield is a common issue among all crops of Pakistan. **The major reason of low yield is lack of R&D in high yield varieties and under-developed seed dissemination mechanism. Over 80% of farmers use their own seeds for different crops and only 2-5% use certified seeds of recommended varieties that are high yield and climate resilient, resulting in lower yield**. Farmers have lack of information and training on growing different crops. They do not distinguish between different seed varieties and prefer the varieties they traditionally grow. The unavailability of farm machinery is also a major obstacle in increasing the area and production of various crops in Pakistan. In addition, the application of pesticides, insecticides, and harvesting is done through manual means, all factoring into low yield per area. An intervention by Federal Seed Certification and Registration Department, provincial Agriculture Extension Departments, Seed Development Departments is recommended to develop mechanism for dissemination of high yield seed varieties, R&D on high yield crops, creating awareness about high yield seeds and genetically improved crops and their cultivation. Better use of registered and unadulterated pesticides is also required to control the issue of pests, weeds and insects that affect crop yield. Improving the crop yield will not only increase the domestic production of essential commodities but will also enable local crops to compete in the international markets.
4.	**Trade Barriers**	**Protectionism through export/import ban and tariffs act as barriers to entry for traders to reach international markets.** The objective of trade protectionism is to protect a nation's vital economic interests such as its key industries, commodities, and employment of workers. However, due to protection, consumers have a very limited choice w.r.to the quantity, quality, and type of product that is otherwise available to them without this protection. The protection of an industry may actually end up costing the government significant amount of money and financial resources in order to protect it. This may actually promote inefficiencies in the industry and provide no incentive to make efficient, intelligent, long-term investments to enhance industry efficiency. **In Pakistan, two major agricultural commodities, wheat and sugar are frequently protected from international competition and the domestic wheat and sugar market has thus remained**

		priced well above the international market. These both markets are protected from imports by a tariff of 60% and 40% respectively, which is abolished at the times of shortage. This protects the local industry and provides no incentive to invest in higher yield/sucrose varieties. Farmers in Pakistan use their own wheat produce for seed purposes instead of adopting certified seeds which results in lower yield.[217] Instead of adopting a protectionist approach if the government focuses on the provision and distribution of certified wheat seeds to farmers, it will increase the efficiency of water and other resources and will make wheat sector efficient worldwide. Likewise, in sugarcane production, the sucrose recovery rate is crucial in sugar production. Sugarcane varieties having low sucrose content produce less amount of sugar as compared to higher sucrose varieties.[218] Adoption of high sucrose varieties will enhance the efficiency of resources used in sugarcane production and will increase the production of sugar. According to PSMA only 19 out of 91 sugar mills (20%) have been able to achieve sucrose recovery rate of higher than 10%.[219] If access to international market is open and competition is allowed in this sector there will be incentive to invest in adoption of new seed varieties, farm mechanization and new technology. The RD (as discussed above) on pulses imposed in 2006 was intended for the local pulse produce to meet the domestic demand and to lower the level and variability of domestic pulse prices. However, **evidence suggests that neither the volatility in prices of pulses has been in control nor the production of pulses has increased to fulfill the domestic demand. In fact, due to the RD the pulse prices have risen.** For onion export there is a barrier to export in the form of a minimum dollar value ($400), small growers thus find it difficult to export and incur a financial loss due to not being able to export in the face of a bumper crop. Further, the low yield and low quality agricultural crops fetch a low international price when exported as these do not fulfill the standards of international markets. Steps need to be taken by the federal government and agricultural departments to help the farmers in accessing international exports markets and to grow high yield quality crops demanded in international markets as well.
5.	**Access to Finance**	Small farmers dominate agricultural landholding patterns in Pakistan, where financial exclusion remains alarmingly high. Farmers, particularly the small landholders face problems in

[217] https://www.tandfonline.com/doi/full/10.1080/15427528.2015.1004147
[218] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8819023/
[219] http://www.psmacentre.com/documents/PSMA%20Annual%20Report%20Final%20%202021.pdf

		accessing finance from the banking sector due to their inability to provide collateral acceptable to banks. Hence, they are forced to rely on informal sector to meet their agricultural credit requirements. Zarai Taraqiati Bank Limited (ZTBL) incorporated as a public limited company on 14 December 2002 is the leading financial institution which provides rural and agricultural financial/non-financial services to the rural population of Pakistan which comprises 63% of the total population.[220] The bank offers various agricultural loans and schemes such as tea plantation and processing, bio flock fish farming, financing for Gur making, milk chilling units, soya bean cultivation, financing for golden/misri chicken poultry and Agri. Land Development through Alternate/ Renewable Energy. The Bank serves approximately 5 million clients and over 1 million deposit account holders. The average loan size is approximately Rs 162,331, comprising 68%, 29% and 3% of subsistence, economic and large growers respectively. **Not only the outreach of ZTBL remains limited but the farmers who are engaged in the production of crops other than cereals also have limited access to agricultural loans from ZTBL and other commercial banks. The farmers rely on informal modes of financing and depend on the village dealer for loans and seeds. This acts as a disincentive to grow crops other than cereals.** State Bank of Pakistan (SBP) has introduced various agricultural financing products however the access to financing still remains limited due to asymmetric information on the demand side. On the supply side the availability of such financing facilities by the financial institutions remains focused on prominent districts. Availability of financing is a pre requisite for an efficient agriculture sector and the government needs to provide a level playing field to access finance for all types of crops and production areas.
6.	**Access to Market-Agriculture E-Commerce**	Efficient agricultural marketing plays a crucial role in the development of agricultural sector. The marketing systems in developing countries like Pakistan face problems, such as high transaction costs, poor infrastructure (physical and institutional), absence of market information, asymmetric information and insufficient markets. Agricultural produce are marketed through specified mandis in Pakistan. The farmers grow and bring their produce to mandis to sell the produce. In mandis many people are involved in the sale and purchase of agricultural produce including commission agents,

[220] WB data, 2021

		dealers and wholesalers. Consequently, majority of farmers in Pakistan have no direct access to interlinked markets and have to deal with middlemen rather than selling directly to the market. The price of a commodity thus increases due to change of hands as every person involved in the supply chain keeps his margin before selling it to next person involved. **The price which the farmer gets at farm gate or at mandi is far below the price paid by end consumer.** With the advancement in technology, internet penetration has increased manifold throughout the world. Internet connectivity allows the buyers and sellers to interact through online selling platforms. In 2022, **the global ecommerce retail sales is estimated at $5.5 trillion which is 20% of the total retail sales**.[221] By 2025 the ecommerce sales is expected to reach $7.3 trillion and the expected share of 23%. Agriculture e-commerce is the buying and selling of agricultural produce online. Through agriculture e-commerce the challenges and inefficiencies of the agri supply chain can be addressed. Farmer access to customers is streamlined as they bypass the intermediaries and sell directly to agri businesses, retailers, consumers and consumer groups. Thus resulting in supply chain efficiency and generation of fair incomes for the farmers.[222] In Indonesia, *Eragano* launched an agri e-commerce service in 2015, selling produce such as coconuts, chilies and potatoes. The number of active farmers has reached 7,000 with 25 large industrial buyers on the platform. In Colombia, *Frubana* launched in 2018 is an online platform enabling farmers to sell directly to restaurants in Bogotá. In Pakistan and Thailand, *Ricult* launched its pilot in 2018 with 10,000 farmers on its platform. It connects farmers to buyers at large mills across its two markets. In 2019, the service grew to around 35,000 farmers across Thailand and Pakistan. There are multiple benefits of agriculture e-commerce, **it reduces wastage of farm produce and brings in market efficiency.**[223] The online platforms provide farmers an alternative market and the farmers neither have to accept low prices offered by middlemen nor have to search for a last-minute buyer and increase the risk of post-harvest losses. **The online platforms result in fair incomes for the farmers as they are offered better value for their produce compared to what an average middleman pays.** Through digital/mobile money solutions on these agri e-commerce platforms, farmers can build their transaction history which can be

[221] https://www.shopify.com/blog/global-ecommerce-sales
[222] https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/05/E-commerce_-in_agriculture_new_business_models_for_smallholders_inclusion_into_the_formal_economy.pdf
[223] In Colombia through *Frubana*, post-harvest losses of 3% were recorded against an average of 58% for farmers that sell through traditional channels.

		used to show their credit worthiness to the financial institutions or financial service providers, thus improving their access to credit. **In Indonesia, crowdfunding platforms are used by individuals to invest in farmers**. **In Pakistan, mobile penetration is high and teledensity stands at 88.6% (July 2022). The share of smartphone users is higher (53.8%) than basic phone users (46.2%)**[224] **and 88% of the population has access to internet/broadband services** With access to internet and mobile technology, the agriculture e-commerce platforms has great potential for Pakistani farmers as it can mitigate the supply chain issues in accessing markets by the farmers. The government needs to focus on the development of an agri e-commerce ecosystem which would require the government ministries (federal and provincial) and the regulators (PTA, SBP) to establish an enabling regulatory environment to govern the agriculture e-commerce. In addition, the government may also provide support services such as providing information to the farmers through these e-commerce platforms and hold events to raise farmer awareness of agri e-commerce opportunities.
7.	**Storage**	The self-sufficiency in food grain and adequate arrangements for its storage go hand in hand. Storage is an important link in ensuring continuous supply of food and other agricultural produce for the consumers, and strengthening the economy as a whole. The storage of wheat, rice, seeds of pulses and oilseed crops is important for food security. In Pakistan, grain storage is primarily in the public sector and is the responsibility of Pakistan Agricultural Storage and Services Corporation (Passco) as well as four provincial food departments. Total wheat storage capacity in the public sector is estimated at about 5.2 million tons.[225] Pakistan is facing grain storage problems at large scale throughout the country, due to either traditional methods of seed storage or shortage of commercial grain storages or their management. **The shortage of grain storage facilities results in huge post-harvest losses that range from 15pc to 35pc and affects national agricultural output**. Similarly, in case of excess production in crops such as onion, tomato and potato, farmers do not have the storage facilities and are compelled to sell their produce at a low price to the village dealers. In worst case scenario they end up wasting the whole crop due to higher charges incurred for transporting the crop to mandis.

[224] https://www.pta.gov.pk/en/telecom-indicators
[225] https://www.dawn.com/news/966953/problems-of-grain-storage

		In case of wheat, the government procures wheat from farmers on MSP and stores it in its godowns. The procurement and storage of wheat by government has resulted in crowding out of the private sector from storage industry. The production, consumption and stock keeping of wheat in Pakistan is in such pattern that it does not leave room for private sector storage industry. Around 1/3rd of the total wheat is kept by the farmers for their domestic consumption. The procurement by government hovers between the ranges of 25%-39%.[226] Considering this situation there is no room left in storage for private sector. For instance if 27 million tons of wheat is produced in a year then 9 million tons (1/3rd of total production) is retained by farmers and another 8.1 million tons (30%) is procured by the government. After subtracting these two major chunks, only 9.9 million tons of wheat is left as marketable surplus. This surplus is consumed within 4 months[227] hence leaving no room for storage capacity in private sector. Similarly, the investment by private sector in storage of other crops is also limited which results in non-availability of storage facility or higher charges incurred due to lower economies of scale. Milk is a highly perishable commodity and it needs to be stored immediately, however due to lack of storage capacity in milk industry, 20% milk produced is wasted. According to data available there is a huge gap between the public sector's total storage capacity and its actual need. According to estimates there is room for developing proper storage facilities for 16 MMTs of wheat, 4.4 MMTs of rice, 4 MMTs of maize and 3 MMTs of potatoes.[228] The State Bank of Pakistan (SBP) has announced various financing schemes such as financing facility for the storage of agricultural produce for the establishment/expansion of silos, warehouses and cold storage facilities. Such schemes are introduced to encourage the private sector to invest in agricultural storage facilities, however the access to finance through such schemes has remained limited due to the stringent financing criteria set by the commercial banks. To overcome the financing problems faced by the private sector to develop storage facilities, the SBP should encourage and incentivize the private commercial banks to increase lending for such facilities. Likewise, the government should also encourage and incentivize the private sector to make investment in establishing silos, warehouses and cold storage facilities through provision of low cost land, energy and other infrastructure. These incentives will not only increase domestic agricultural production but will help

[226] https://www.cc.gov.pk/images/Downloads/policy_notes/policy_note_wheat_sector.pdf
[227] The consumption of wheat in Pakistan is between 27-30MMTs per annum or 2.25-2.5 MMTs per month. Hence the remainder of 9.9 MMTs of wheat can suffice consumption of around 4 months.
[228] https://www.dawn.com/news/1328783

		develop ancillary industries and will enable country to export agricultural commodities and earn foreign exchange. Furthermore, the development of grain storage can also help the country mitigate the adverse effects of floods and droughts, occurring at regular intervals recently. In the past few years, extreme weather conditions have become common place in Pakistan. Heat waves, droughts, and floods have become a yearly endemic, affecting food and agriculture. According to the Global Climate Risk Index 2021, between 2000 and 2019, Pakistan was the 8th most affected country from climate change in the world[229] and Pakistan ranked 75th out of 113 countries in the Global Food Security Index 2021 whereas the regional countries such as India ranks at 71st, Bangladesh 84th, and Sri Lanka 77th.[230] As per the United Nations Economic and Social Commission for Asia and Pacific (UNESCAP), Disaster Report 2022, Pakistan could lose more than 9 percent of its annual GDP due to climate change.[231] Strategic Grain Reserves/Buffer Stocks are preserved to assist emergency relief operations, support public distribution of food to chronically food insecure populations, and reduce volatility in consumer and/or producer prices. SGRs are very efficient in overcoming temporary supply shortages without distorting local markets substantially.[232] To avert the crisis of food security and food price volatility in the flood situation of Pakistan, Strategic Grain Reserves (SGRs) can be a useful policy tool where target disbursement is made to only food insecure people. Food transfers made through SGRs may consist of staple foods, complemented with provision of pulses, vegetables, and animal-sourced foods. During a meeting of NPMC in 2021, Finance Ministry also directed the relevant departments to build strategic reserves of essential commodities such as sugar, wheat, pulses, edible oil and ghee to ensure price stability and prevent undue profiteering and hoarding.[233] As SGRs are very efficient in

[229] https://germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021_1.pdf
[230] https://impact.economist.com/sustainability/project/food-security-index/Index
[231] https://www.unescap.org/sites/default/d8files/knowledge-products/Asia-Pacific%20Disaster%20Report%202022%20for%20ESCAP%20Subregions%20-%20Pathways%20to%20Adaptation%20and%20Resilience%20in%20South%20and%20South%E2%80%91West%20Asia.pdf
[232] https://www.researchgate.net/publication/301320300_Volatile_and_Extreme_Food_Prices_Food_Security_and_Policy_An_Overview
[233] https://www.brecorder.com/news/40100212/essential-commodities-tarin-directs-depts-to-maintain-strategic-reserves

<table>
<tr><td></td><td></td><td>overcoming temporary supply shortages without distorting local markets substantially.[234]</td></tr>
<tr><td>8.</td><td>Water Efficiency</td><td>Agriculture is considered the greatest consumer of fresh water. Use of modern irrigation technologies can reduce the use of fresh water in agriculture such as through drip irrigation by 30 to 70% and also improve the yield by 30-200% of different crops.[235]

About 90% of the water is used for agriculture in Pakistan, whereas the global average is around 70%. Water is a scarce resource, however in Pakistan's agriculture there is inefficient use of water. The new hybrid seed varieties require less water and give better yield but the farmers have limited access to these seed and crop varieties. In addition, the government supports agriculture through subsidies on urea fertilizer, water and energy. These subsidies result in farmers focus on high delta crops[236] that require more water. Further these crops are more fertilizer and energy intensive over their counterparts. The table below[237] lists water consumption by 5 major crops in Pakistan. The share of wheat crop is highest in irrigation water due to large acreage. Literature supports that rice and sugarcane both have the same water delta.

<table><tr><th>Crop</th><th>Water Consumption million acre feet (MAF)</th></tr><tr><td>Wheat</td><td>39</td></tr><tr><td>Cotton</td><td>29</td></tr><tr><td>Rice</td><td>26</td></tr><tr><td>Sugarcane</td><td>23</td></tr><tr><td>Maize</td><td>5</td></tr></table>
Pakistan's major agricultural export earnings is tilted towards rice and cotton based textile. The sugar demand stands over 5 million tons against a total installed capacity of 10 million tons. On average the sugar production is greater than the demand, and the excess surplus is exported. During FY2021-22 production of sugar stood at 7.8 million tons and the excess production is to be exported.

Pakistan is among the top 10 countries facing water scarcity issues. Tarbela dam's capacity to store water has been reduced by 40% due to accumulating silt. The country is facing climate change issues, with frequent spells of drought and flood conditions in the coming</td></tr>
</table>

234 https://www.researchgate.net/publication/301320300_Volatile_and_Extreme_Food_Prices_Food_Security_and_Policy_An_Overview

235 https://goexplorer.org/water-efficient-agriculture/#:~:text=In%20areas%20where%20irrigation%20is,helpful%20techniques%20in%20this%20arena.

236 Defined as the total depth of water required by a crop to attain maturity, it is also the total quantity of water required by a crop for its complete nourishment.

237 https://www.researchgate.net/publication/325286086_Planning_for_Sustainable_Agriculture_in_Pakistan

		years. It is the need of the hour to optimally allocate water in agriculture and use it more efficiently. On average wheat crop requires 5 irrigations per acreage however with improved seed quality, genetics and water planning it can be reduced to 3 irrigations. The amount of water saved through this is estimated to be more than the combined water stored in Tarbela and Mangla dams. [238] At policy level, water efficient crops need to be focused such as low delta pulses and oil seeds which also have high domestic demand. Where water is scarcely available, drip irrigation system is an option to use water more efficiently. Furthermore, the use of high yield seeds is all need of the hour for a more water efficient agriculture.
9.	**Contract farming/ Vertically integrated companies**	The agriculture sector can be modernized through Contract farming. Through Contract Farming farmers are linked to markets by either formal or informal contracts as a result of some type of arrangement with a buyer who adds value to the raw commodity in some way (processing, storage, and marketing). It results in better yield through the use of new and improved seeds, skill development of farmers and boosting the exports. Contract Farming is being adopted in many developing countries for the production of agricultural commodities including India, Thailand, Indonesia, Malaysia, Vietnam, Philippines and Cambodia. In Pakistan, it is being practiced for the production of Potatoes by PepsiCo and maize by Rafhan maize products Co. Ltd and under CPEC some agricultural products are also being cultivated through contract farming e.g red chilies. Nevertheless, there is a lack of formal contract farming with defined quantity, quality standards and pricing parameters in Pakistan. Majority of farmers have small land holding and the level of mechanization is low as compared to other regional countries, encouraging contract farming will result in higher output, efficient use of resources and increase farmer incomes. Furthermore, economies of scale can be achieved and farm mechanization level can be enhanced if the government encourages large scale farming through vertical integration and contract farming. Vertical integration has been a success in Russia where it has led to the creation of about 60 large vertically integrated companies, which occupy leading positions in the production of agricultural products and food. In a similar manner, the government may facilitate private sector by providing it credit and land on soft terms. This will enable the country to become self-sufficient in

[238] ibid

		production of essentials and will result in economies of scale, efficiency and higher farm mechanization level as well. The government should encourage contract farming which will also ensure provision of formal credit to small and marginalized farmers by the banks on the guarantee of the processor. It will strengthen the farmers-processor relationship, will provide short term financing to processors, and is mutually beneficial for farmers, processors, and banks/DFIs by reducing cost of doing business and post disbursement monitoring.

Annex-I (Abstracts)

Onion

There are five varieties of onions cultivated in Pakistan. Onion is both a Rabi and Kharif crop. Availability of onion is throughout the year however a dip/shortage appears in December-January period. The per capita consumption on onion is 0.95kg/month, 11.4 kg/annum and the total consumption stands at 2.6 million tons

Pakistan is ranked 6th in world in onion production with over 2.1 million tons total production (2021). China is ranked number one in onion production. The global average yield is 19 tonnes/ha whereas in Pakistan it is between 13-14 tonnes/ha. Pakistan has low average yield per hectare and ranges between 13-14 tons/hectare, against the potential of 22 tons/hectare. The per hectare yield is lower than countries such as Iran, Nigeria, Sudan and Uganda who have better yield.

Sindh is the major onion producing province with 37% production share followed by Baluchistan 32%, Punjab 21% and KPK 10%. Onion yield is the highest in Baluchistan and KP province and Punjab has the lowest per acre yield. 319 thousand tons of onions were exported during 2021-22 and 134 thousand tons imported during the same period. Major imports come from Afghanistan.

The gap between the actual and the potential yield is attributed to poor management practices and storage facilities resulting in post-harvest losses. Farmers do not get enough return due to the poor marketing system. 30% of Pakistani onion is wasted due to lack storage facilities and substandard packing, handling, transportation and marketing.

Lack of availability of high quality seeds a critical factor contributing to low yield per hectare. Mal practices by traders/middlemen, collusive tendencies in the market intermediaries (agents/Arti). Hoarding by retailers/Wholesellers anticipating an increase in onion price is also responsible for higher price of onion and other essential food items such as tomatoes.

Edible Oil & Ghee

Pakistan's total annual edible oil requirement is 4.1 MMT. During FY (Jul-Mar) 2022, 14% of total edible oil consumed was domestically produced and 86% was imported. 2.754 MMT of edible oil (including oil seeds for crushing) was imported during FY 2021-22. The local production of edible oil during FY 2021-22 (July-Mar) is estimated at 0.460 million tons. The edible oil available from all sources i.e. imported and locally produced is provisionally estimated at 3.214 million tons. Compared to FY2020-21, in FY2021-22 the oil seeds production increased by 20% and the oil production increased by 23% in Pakistan.

Pakistan is the 8th largest consumer of edible oil and the 4th largest importer of palm oil globally. The per capita annual edible oil consumption of Pakistan is 22kg. Palm oil has the largest share in consumption (75%) followed by Soybean, Rapeseed, Cottonseed and sunflower oil.

In the international market, the edible oil prices did not show high variation up to FY19, however post Covid the international prices have increased rapidly. Many factors are responsible for the global rise in prices;

Rise in demand for biofuels- renewable energy projects in China, biodiesel plants in Southeast Asia (Indonesia & Malaysia) has resulted in higher demand for oilseeds and oils towards biofuels which has resulted in higher demand and pushed up the prices.

In case of sunflower oil, a sharp decrease in supply due to Russia-Ukraine war, as both these countries together account for 75% of sunflower oil production. Before the war Ukraine was the largest exporter of sunflower oil. Due to war the Ukrainian farmers will miss the planting and harvesting season.

In Indonesia, due to rise in domestic palm oil prices, the Indonesian government has found evidence of cartel activity, where producers, distributors, business associations, government officials and retailers are colluding to restrict supply and fix prices.

La Nina effect, a weather pattern which causes drier weather in soybean crop growing areas of South America, while bringing heavier rainfall to palm oil regions of Indonesia and Malaysia disrupting harvesting and logistics on palm estates and affecting port operations.

Post Covid labour shortages in Malaysia, resulted in less availability of workers in plantation areas, affecting harvesting and keeping the supplies low.

Potato

Potato is one of the most important edible and profitable crops of Pakistan. It is the second most important crop after wheat, rice and maize and can be called a complete food. Potatoes have become the fastest growing food crop in the country, resulting in tremendous gains in cultivated area and average yields.

During 2021-22, the potato was cultivated on an area of 313.8 thousand hectares with the total production of 7,937.1 thousand tons. The national consumption is around 4 to 5 million tons. Out of 157 countries Pakistan is the 18th leading potato producer in the world. Further, Punjab is the major producer of potatoes with the production share of 97% of the total national production.

Potato processing industry is comprised of four segments i.e. potato chips, French fries, potato flakes and starch flour. The snacks industry is experiencing an annual growth of 20-30%, chips being the most common and popular processed product constitutes around 85% of the snack business. Also, Pakistan is one of the largest exporter of potatoes. During July 2021 to March 2022, Pakistan has exported 315,764 thousand tons of potato valuing PKR 13,749 million.

According to the Punjab Crop Reporting Service, the acreage has grown up to 740,400 acres, an increase of around 35 per cent. This 35% increase in acreage, translating into an increase of 3 million tons of overproduction in Punjab.

The major cost component in the production of potato is cost of seed & sowing and fertilizers. In the past two years, price of potato is fluctuating, however, it didn't show a drastic increase in the price.

There is a need to create linkages of farmers with the processing industry. Provincial Agriculture departments/Research institutes are advised to do research and develop potato seed for farmers as per the requirements of processing industry.

Presently, Pakistan exports around 15% of the total production which is very low. In order to handle the windfall production of potatoes, the government needs to identify and devise a plan for the export of potato. Also potato is a bumper crop this year, government may consider operationalize barter trade mechanism with other countries i.e. Russia, Iran, China and India.

Further, the government may encourage public private partnership program with the food chains keeping in view the protocols as set under the sanitary and phytosanitary (SPS) framework.

Poultry

The poultry industry of Pakistan is a major livestock sub-sector, playing a pivotal role in economic growth and rural development. Being the 11th largest producer of the poultry products in the world, the current investment in Poultry Industry is more than PKR 750 billion. Approximately 60% of poultry farming is being carried out conventionally while 40% is based on environmentally controlled sheds.

The poultry sector in Pakistan comprises of a large number of small farmers scattered over different areas. The total number of broiler and layer farms in Punjab alone are 13,865 and 2,300 respectively.

Poultry meat production has increased from 1,657 thousand tonnes in 2019-20 to 1,977 thousand tonnes in 2021-22. Per capita consumption of poultry meat in Pakistan is approximately 6.62 kgs annually and per capita consumption of eggs is 88 eggs annually.

The poultry process comprises of import of GP stock, breeding of parent stock, hatching of day old chicks, layer farming, and broiler farming. Poultry feed, vaccines, and medicines are its ancillary or allied sectors.

Punjab is the major supplier of broiler and around 80% of the broiler is sold through direct marketing system in which sales are made directly from farm gate to wedding halls, traditional nais, restaurants and shopkeepers.

Poultry prices should be based on demand and supply mechanism, the fixation of poultry prices by the government should be discouraged and let the market forces decide the prices.

Since feed is the major cost component that accounts for around 75% of the total cost of broiler, recently the price of feed has increased by (27%), which is attributed to the increase in the prices of Maize (25%), soybean meal (67%), vaccines and medicines (20-50%).

Post-harvest pollution (dust pollution) caused respiratory illness in chickens, outbreak of major viral diseases e.g. Newcastle Disease, Infectious Bronchitis & Avian Influenza, sudden increase in ambient temperature and low moisture resulted in the death of chickens and affected the production.

Wheat

Wheat is one of the major agricultural crops in Pakistan, which is grown by 80 percent of farmers on an area of around 9.0 million hectares (close to 40 percent of the country's total cultivated land). It accounted for 7.8 percent of the value added in agriculture and 1.8 percent of the GDP during 2021-22.

Wheat is cultivated during the winter or "Rabi" season in Pakistan. However, the month of sowing and harvesting differ across provinces due to difference in climate conditions.

During 2021-22, area sown decreased to 8,976 thousand hectares (2.1 percent) against last year's production of 9,168 thousand hectares. The production of wheat declined to 26.394 million tons (3.9 percent) compared to 27.464 million tons of last year.

Wheat is a staple food in Pakistan and it contributes 72 percent of Pakistan's daily caloric intake with per capita wheat consumption of around 124 kg per year. Its consumption stood at 27.2 MMTs during MY 2021/22. It grew by 3.8 percent during 2021/22 as compared to previous year.

Punjab is the major producer of wheat having a share of 77% with a production of around 19.4 million tons in 2019-20. On average it costs Rs. 47,432 to produce wheat from one acre. In terms of per kg it cost Rs. 39.33 to produce wheat from one acre of land.

The federal government sets a minimum guaranteed support price or procurement price and an issue price for wheat sold to flour mills. Through provincial food departments, the GOP procures wheat from farmers at the support price and then releases wheat to the flour mills at the government fixed issue price. The MSP may be abolished and the price determination may be left on market forces. As the markets of maize and rice are efficiently working due to stable demand and without the government intervention.

The provincial governments impose ban on inter provincial and inter-district movement of wheat during shortage of the commodity. Additionally, the purchase of wheat is also banned sometimes for private sector which is against the spirit of free market.

The Government uses commercial loans to finance the purchase, storage, and sale of wheat. The outstanding debt for the commodity operation as of June 30 2021 was Rs548 billion, which is estimated to rise to Rs640 billion by the end of June 2022. The recommendation of CCP to abolish such costly policies is still pending for implementation.

Sugar

Sugar is second largest agro-industry sector after textile in Pakistan. Pakistan stood the world's fourth largest producer of sugarcane, the sixth largest producer of cane sugar and the eighth largest consumer of sugar.

Sugarcane is grown on approximately 1.2 million hectares and provides the raw material for 90 sugar mills. Its area accounted for around 5 percent of total cropped area in Pakistan. During 2021-22, a highest amount of 88.6 million tons of sugarcane was produced with a yield of 70.3 tons per hectare. Its production accounted for 3.7 percent in agriculture's value addition and 0.8 percent in GDP during 2021-22. Sugar production grew by 38% from 5.6 million tons in 2020-21 to 7.8 million tons in 2021-22 and it weighs 3.4% in LSM.

Per capita consumption of sugar is hovering around 25 kg per year. Total consumption of sugar has reached 5.9 million tons during MY 2021-22. Bulk sugar consumers such as bakeries, candy, ice cream, and soft drink manufacturers account for about 60 percent of total sugar demand.

Brazil, India and China are the major producers of sugarcane with a share of 65.6% during 2020. However, India, Brazil and EU-28 are the major producers of Sugar in world. In terms of consumption, India, EU-28 and China are the major consuming nations of sugar in world.

On average it costs Rs. 117,044 to produce sugarcane from one acre of land in province of Punjab. Land rent, seed and sowing, cost of water, harvesting cost and cost of fertilizer are the major components with a share of 89% in total cost.

The MSP for sugarcane is Rs. 225 per 40 kg which accounts for 80% of total cost in the production of sugar. The retail price of sugar is hovering around Rs. 88 per kg in June 2022 which used to be Rs. 54 per kg in January 2015.

The international prices of sugar used to be higher than domestic price of sugar by over $100 per ton. But recently the domestic prices have become lower than international price mainly because of increasing international prices and declining value of PKR.

Pakistan exported sugar valuing $ 198, $ 508 and $223 million during 2016-17, 2017-18 and 2018-19 respectively owing to high domestic stocks. But this resulted in speculation of shortage in domestic market and prices of sugar started increasing in 2019. The government banned the export and allowed import of sugar to maintain strategic reserves. Considering this situation, it is recommended that the GOP shall maintain the domestic stocks above 2.0 million tons.

The MSP shall be abolished for sugarcane which will provide level playing field among crops. This will also provide incentive to mills to invest in high yield varieties and higher sucrose recovery rate.

The decision to export sugar shall be taken considering the availability of stocks in domestic market. In this regard, Government shall also keep the cushion for smuggling that is unavoidable. Pakistan may consider developing ethanol based automotive industry that is eco-friendly and will eventually lead to decline in import bill of oil.

Milk

Milk covers a wide range of nutrients, including vitamins, minerals, protein, healthy fats and antioxidants that help maintaining health. During FY 2021-22, the livestock sector in Pakistan grew at a rate of 3% accounting for about 61.9% of agriculture value addition and 14% of GDP.

The importance of the sector can be realized from the fact that more than 8 million rural families are engaged in the production of livestock and deriving more than 35-40% of their income from this sector.

India is the world's largest milk producer, with 22 percent of global production, followed by the United States of America, China, Pakistan and Brazil. In terms of consumption, India has consumed around 83 million metric tons of milk followed by European Union with 23.9 million metric tons. Europe is the leading cow milk producer around the world. The production share of buffalo is higher in Asia, i.e., 98.5% which shows that Asia is the leading buffalo milk producer around the world.

Pakistan is the 4th largest producer of milk. The consumers have a general preference for buffalo milk that accounts for 60% of the total production. The average annual yield per milking animal in the world is 2.33 tonnes compared to 1.62 tonnes in Pakistan. Punjab and Sindh are the main dairy producing provinces contributing 57% and 25% of dairy animals in the country. Around 61% of the dairy farming is being carried out by farmers with a herd size of 1 to 4 animals whereas the proportion of large scale commercial farming is very limited.

About 95% of the milk produced reaches consumers via the informal sector, an extensive, multi-level distribution system of middlemen. Demand for open raw milk is much higher than for processed milk because consumers dislike heat-treated milk because of its taste.

The cost of production is high in peri-urban areas as compared to urban areas because fodder in mainly procured from urban areas and the rising prices of fuel and electricity impacted the fodder prices as well.

Since prices of milk are being regulated by district governments under the Profiteering and Hoarding Act, 1977 despite of the fact that there is no price control mechanism for the inputs that are being supplied to farmers. This capping of price triggers adulteration and supply shortage and hence consumers are forced to buy the inferior quality milk and at the same time consumers are charged higher prices in the name of superior quality of the milk.

Small farmers do not have access to market and unaware of the demand, resultantly they have to rely on middlemen to market their produce. Lack of knowledge and awareness about the productive benefits of disease control. Vaccination and treatment for the animals was generally ignored by the smallholder farmers which results huge losses. It significantly decreases the milk production.

Rice

Rice is Pakistan's third largest crop in terms of area sown. Pakistan is 11th largest producer and fourth largest Exporter of Rice in the world. Its production comprises of 34 percent of basmati (fine) types and 66 percent of coarse types. During 2021-22(P), it contributed 2.4 percent of value added in agriculture and 0.5 percent in GDP.

During 2021-22, production of rice rose by 10.8 percent and area sown by 6.05 percent. From 2016-17 to 2021-22(P), production of rice increased by 36.12% and area by 22%. Punjab have the highest share of 63% in production followed by Sindh (29%), Baluchistan (6%), and KP (2%). Also, yield per Kgs/Hec during 2021-22(P) was increased by 4.3% compare to last year.

Rice consumption per capita reached 18 kg in 2017 in Pakistan.

Rice crop in Pakistan is planted from May-June during the Kharif season. The annual rice harvest generally occurs from October-December. Traditionally, 40 to 45 percent of the crop is used for local consumption, with the balance exported.

During 2021-22, total quantity of rice export was 4,004 thousand tonnes out of which 3,411 thousand tonnes was non-basmati rice while 632 thousand tonnes was basmati rice. Overall the exporting earning of rice during 2021-22 totaled PRs. 357 billion in which PRs. 99 billion earning was for Basmati rice while PRs. 258 billion was for non-Basmati rice.

During 2021-22, Weighted Average Cost of Production (Rs. /acre) of Basmati rice is PRs. 66,773 while for non-Basmati rice is PRs. 60,332. The major component of cost in production of rice includes cost of water, fertilizer, land and land preparation.

Price of Basmati rice have been increased by 49.13% from PRs 79.97 in June 2019 to 119.26 in July 2022. Similarly, price of IRRI-6 rice have been increased by 50.18 % for the same period from PRs 58.92 to 88.49 per kg. The price increase didn't show any untoward increase/decrease in that period, that shows the price increase is a result of general inflation in the country.

Production of Rice is confined to irrigated fields, while no sustainable solutions to guarantee water security have been developed. Lack of technological innovations and low quality seeds result in lower yield of the crop and poor growth. Also, they are prone to weeds, insects, and diseases. High cost of inputs (e.g., fertilizers) discourage small farmers to grow. Additionally, no policy framework has been developed to expand the area under cultivation for rice.

Tomato

Tomato is mainly produced by small farmers in Pakistan. Due to wide seasonality in production, tomato availability and its price fluctuate widely through the year. Production of tomato in the year 2020-21 remains at 818.7 thousand tonnes whereas the area in production stands at 69.5 thousand hectares. Similarly, the highest producer of tomato is Baluchistan and the highest area in production belongs to Sindh.

Pakistan ranks at 128th position with respect to the tomato consumption in the world. According to the FAO Balance Sheet data, per capita per annum consumption of tomato in Pakistan during 2013 was 4.8 kg.

The prices of tomato are lower during the first eight months of the year, though, after August, the prices started to increase till the start of next year. The increase and decrease of prices over the period can be termed as the seasonality of the product in which supply demand gap increased. The major component of cost in production of tomato includes cost of fertilizer, land, harvesting, transport and seed & sowing.

The value of exports of Tomatoes from Pakistan totaled PKR 1,465 million in 2020-21. Top export destinations of Tomatoes from Pakistan in 2020-21 was Afghanistan whereas the value of imports of Tomatoes to Pakistan totaled PKR 10,614 million and the quantity was 371 thousand tonnes. Top trading partners import of Tomatoes of Pakistan in 2020-21 were Afghanistan, Iran, Algeria, and Uzbekistan.

The major factors which influence availability and pricing include Supply gaps i.e., seasonality of tomato, perishability and shorter shelf life, lack of grading and packaging, manipulation by commission agent, level of enforcement of price regulations and inadequate awareness about prices and availability.

Inadequate availability of quality seeds and other inputs reduce yield. The non-institutional financing by the commission agents exploit farmers and is one of the barrier to entry in other markets. High post-harvest losses and absence of grading, packaging, and branding regulations also limit ability of the farmers and market players to compete.

Gram

Gram is the major pulse produced in Pakistan with a share of 53% among pulses. It is a Rabi crop having a short duration and can be grown between September and November. Gram production increased by 36% percent to 319 thousand tons whereas the area under cultivation declined by 1.8%. The yield therefore increased compared to FY21 to 368 kg/ha.

Chickpea (gram) crop is mostly grown in Punjab (850 thousand hectare), followed by Balochistan (40 thousand ha) and KPK (34 thousand ha) in cultivated area. In total gram production, Punjab contributes about 85% toward total production, followed by Balochistan and KPK. The major chickpea producing area in Pakistan is Thal region which contributes about 80% to its production and is considered the home of chickpea in Pakistan.

The yield of gram is highest in the provinces of Sindh and Balochistan with yield of 968 kg per hectare and 834 kg per hectare respectively. However, Punjab has the lowest yield of 506 kg per hectare.

The average price of gram for the month of July 2022 was 222.42/kg and this price increased by almost 11% compared to June'22. Comparing the price of gram from July'21 the price has increased by more than 50%.

Much of the policy and R&D focus has been on increasing the yield of wheat, rice and sugar whereas pulses have not remained in policy focus to increase domestic production and yield.

Gram is grown in rain fed lands of Thal and arid lands of Potohar which are Zinc deficient resulting in low yield.

The input costs and market prices of pulses indicate that pulses offer profit margins of 40- 50% while none of the major crops grown in the country give such profit margins. Additionally, the other major crops grown in the country requires a higher use of fertilizer and water. Where pulse crops need only three irrigations.

There is a 35% export tax on pulses which distorts the market for exporters. In order to enhance its efficiency the Government shall abolish the said tax and provide a level playing field for traders. Similarly, the access to finance for farmers growing chickpea from formal sector is low and they have to rely on village dealers who exploit their position.

At the time of harvesting, the shortage of labor and machinery is also the main cause of post-harvest losses. The threshing of pulses in Pakistan is done with wheat thresher which is usually available after wheat threshing. Thus the unavailability of farm machinery is also a major obstacle in increasing the area and production of pulses in Pakistan.

Mung Bean

Mungbean is one of the most import Kharif Pulse crop of Pakistan. It is mainly grown in southern Punjab and Sindh province. Punjab is the major mungbean growing province that alone accounts for 80% area and production. Cultivation of Mungbean is concentrated in the districts of Layyah, Bhakkar, Mianwali and Rawalpindi.

According to Pakistan Bureau of Statistics, Mungbean consumption per capita stands at 0.84 kg in Pakistan. During 2021-22, Mungbean was grown on an area of 301.8 thousand hectares and its production stood at 263.8 thousand tons. During 2021-22, the production of mungbean increased by 29 percent as compared to same period of last year. Similarly, area under production increased by 30.6 percent compare to last year.

During 2020-21, the highest share in production of Mungbean belongs to Punjab (94%) and the remaining 6 percent share to Sindh (2%), KP (2%), and Baluchistan (2%). Similarly, in area under production, 91 percent area under cultivation falls in Punjab, while the rest is divided in Sindh (3%), KP (3%), and Baluchistan (3%). Yield (KGs per hecatre) stands highest in Punjab (918), followed by KP (656.2), Baluchistan (631.56), and Sindh (404.5). Average yield (KGs per hectare) for Pakistan during 2019-20 was 874.1.

The global mungbean area is about 7.3 million ha, and the average yield is 721 kg/ha. India and Myanmar each account for 30% of global output of 5.3 million tons. Other large producers are China, Indonesia, Thailand, Kenya, and Tanzania.

Price stood highest in the month of May 2020 and continue to remain high during 2020. Afterwards, price shows a declining trend till July 2022. During 2020 price was highest as the country was hit by the pandemic which raise the demand of essential commodities. During 2021-22, Weighted Average Cost of Production (PKR. /acre) of Mungbean is PRs. 27,158. The major component of cost in production of mungbean includes cost of land, fertilizer, land preparation and seed and sowing.

2020-21 shows the highest import whereas the lowest in 2017-18. During 2021-22*, total value of import totaled at PKR 906.8 million whereas the quantity stood at 1,1151.9 million tons. The major import came from Afghanistan followed by Argentina, Brazil and Uganda.

The average yield of mungbean in Pakistan is relatively better compare to regional countries and in 2021, the production has been surpassed the first estimate of the crop for 2021-22 estimated targets. To reduce the import bill i.e., 906.7 million rupees in 2021-22, government may possibly promote more production of mungbean in the country to save the foreign exchange.

Mash Bean

During 2021-22, Mash was grown on an area of 8 thousand hectares and its production stood at 6.1 thousand tons showing a decrease of 11 percent compare to last year. From 2016-17 to 2021-22, production and area have been continuously declining. Production have been decreased by 18.03 percent whereas area by 113.75 percent.

The highest share in production of Mash bean belongs to Baluchistan (65%), followed by Punjab (22%), KP (13%). Similarly, in area under production, 48 percent area under cultivation falls in Baluchistan, followed by Punjab (43%), and KP (9%). Yield (KGs per hectare) of Mash bean stands highest in KP (900), followed by Baluchistan (830.13), and Punjab (319.14)

Mash beans are short-duration crops with a maturity period of just 60 to 90 days. Pakistan is deficient in mash bean production to meet the domestic demands. Pakistan needs to import mash bean to meet its requirements. Leading mash bean producing districts are Narowal, Rawalpindi and Sialkot. But the area in these districts is continuously decreasing.

The local production of mash bean in the country caters 10 percent of the demand, remaining 90 percent is through imported mash beans. During 2020-21, Pakistan imported around 66 thousand tons of mash beans which amounted to 9,349 million rupees.

During 2021-22, Weighted Average Cost of Production (PKR. /acre) of Mash bean is PKR. 23,449. The major component of cost in production of mash bean includes cost of land, fertilizer, and land preparation.

Price of mash bean has been increasing since June 2019 from PKR 172.02 to 324.44 in July 2022. The increase from June 2019 to July 2022 is around 89 percent. Due to its major import, currency devaluation played key role in the appreciation of mash bean price locally in the last three years.

There has been a sharp decline in production and area over the last five years, and, consequently, Pakistan has emerged as a large importer of mash beans. Also, locally most farmers use local seeds saved by them, and adoption of improved varieties is low.

As the world rebounds from the COVID-19 crisis, the mix of rising demand and supply constraints has led to increased prices for food and related commodities. Energy prices, particularly of oil and natural gas, also increased sharply and are increasing costs of production, transport, storage, and processing of food in Pakistan.

Masoor (Lentil)

Lentil is the second major Rabi pulse crop after chickpea in Pakistan. It is cultivated during October-November and starts maturing after 92 days and can take up to 184 days depending on the variety. Canada and India are major producers of Masoor in world with production of 2.9 and 1.2 million tons respectively whereas Pakistan stood 19th out of 42 countries during 2020. India, Turkey and Bangladesh are major importers whereas Pakistan is 5th largest importer of masoor in world.

The production of Masoor stood at 4,100 tons from area of 5,800 hectares having a yield of 707 kgs per hectare during 2021-22. Currently KPK is the major masoor producing province with a share of around 50%. The area under Masoor in Punjab has declined substantially due to lower yield whereas the area in Balochistan and KPK has slightly increased due to higher yield in these regions. The decline in area of Punjab and increase in the area of Balochistan is resulting in higher yield at national level. Bannu, Kohat, D.I. Khan are the major district of masoor in KPK whereas, Lasbela, Khuzdar and Kallat are the major masoor producing districts in Balochistan.

On average it costs around Rs. 18,192 to produce masoor from one acre of land. Considering the average yield of 152.8 Kg from one acre of land the average cost of producing one kg of masoor is estimated to reach Rs. 119 during 2021-22. Land rent accounts for the highest share of 38% followed by cost of harvesting (21%), land preparation (17%) and Seed and sowing (13%).

Canada and Australia are major exporters of lentils to Pakistan with share of 51% and 37% respectively during 2020-21. Pakistan imported 92 thousand tons of masoor by spending around Rs. 11.5 billion during July 2021- April 2022. On average it costed Rs. 124 per kg to import masoor during same period.

The domestic prices of masoor are highly affected by the movement in import price of masoor. The domestic prices have remained higher by a margin of around Rs. 60 on average during 2015-16 to 2021-22. Average retail price of "washed masoor" has more than doubled from Rs. 139 per kg in January 2015 to Rs. 301 per kg in July 2022. After August 2021 the price of Masoor is on an increasing trend reaching all time high at Rs. 301 in the month of July 2022.

The decline in area of masoor is due to lower yield, competition from other crops (wheat) and weed and disease problems. Export tax of 35% has been implemented on export of masoor which discourages traders from exporting the commodity and distorts the level playing field for domestic producers in international markets.

Subsidies provided by government on urea fertilizer, water and energy to support agriculture distorts the market and encourages more urea fertilizer intensive crops. These subsidies shall be abolished to promote competition among crops. The policy of wheat procurement distorts level playing field and makes pulse a risky crop as compared to wheat. Therefore, the policy of MSP and wheat procurement shall be abolished to enhance competition among crops.

Competition Commission of Pakistan

7, 8, 9, 11 Floors South , ISE Towers 55-B, Jinnah Avenue,
Islamabad, Pakistan.

Ph: (+92) 51-9100260-3 || Fx: (+92) 51-9100251

Twitter: @CCP_Pakistan