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IMPACT OF EXPANSION OF HOUSING SOCIETIES ON AGRICULTURAL PRODUCTION IN PAKISTAN

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Abstract

This research paper aims to investigate the ramifications of the rapid expansion of housing societies on agriculture crop production in Pakistan. Utilizing a combination of primary and secondary data sources, the study assesses the impact of housing societies on agricultural land and crop production. The study scrutinizes the correlation between population growth rate and agricultural production over the period of 1972- 2017. The findings reveal a three-fold increase in population growth from 1972 to 2017, while agricultural production exhibited nominal growth. Around 20% to 40%, of agricultural land has been converted into residential areas due to the proliferation of cooperative housing societies.

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1. INTRODUCTION

Urbanization has a significant impact on the ecological process and is a key factor in global climate change. Rapid development is a response to worldwide population increase, and one of its concerns is the transformation of farmland into urbanized areas. Public and private developers have taken over hundreds of acres of agriculture land for housing developments and have built housing societies in the adjoining-urban areas. As a result, agriculture land is rapidly decreasing and it has declined 169.51 percent over the last 20 years (sq. km) (Bhutto & Bazmi, (2017). The cities are expanding without planning, developing infrastructure and basic amenities. Almost the population of almost all cities of Pakistan has been doubled during last 20 years, creating multi-dimensional problems like traffic congestion, shortage of houses, water scarcity, deforestation, high street and road crimes and health care issues. (Mohsin & Anwar et al. (2019). Agriculture sector plays a vital role in the developing countries like Pakistan because it provides jobs to workers and produce food crops to meet food needs and cash crops like cotton and sugarcane to provide raw material to textile and sugar industries. Agricultural land is also necessary for people's existence and well-being. Despite the loss of agricultural land due to expansion of industry urban areas, many attempts have been made over the years to improve land productivity (Mohsin & Khan, (2017). Agriculture is responsible for about 20.9 % of Pakistan’s gross domestic product

(GDP) and employs 43.4 % of its workforce. Most notably, 65.9% population are directly or indirectly are dependent on agriculture for subsistence. The population explosion, declining agricultural areas, increasing in demand for water supplies, extensive soil depletion, and fragile infrastructure represent significant challenges for Pakistan's policy makers. The rising percentage of rural poverty in Pakistan has raised questions about the agricultural growth and production patterns. Agriculture experienced average annual growth of more than 3.52 percent from 1995–96 to 2014–15. As a result, the rural poverty increased rapidly. Poverty is prevalent in rural areas, where people are deprived of money, clothes, shelter, treatment, schooling, hygiene facilities, and human dignity Pakistan will need to produce more food for a growing population on a smaller and smaller amount of land. The most difficult task is to determine how to boost output from a declining productive soil while preserving the production efficiency of limited water resources (Mazhar & Fadia, (2019).

1.1 Background of study

According to the Pakistan Constitution (1973), “The Land Acquisition Act 1894”; “The Registration Act, 1908”; and the “Colonization of Government Lands Act, 1912”. the property rights of people are protected. Under clause 23 of 1973 constitution, every person has the legal right to purchase, retain, and dispose of property in any area of Pakistan) while under clause “24, no property shall be acquired forcefully or to be taken its possession by the

Government except for public purposes." Pakistan's constitution emphasizes the importance of housing and states that everyone has the right to have adequate and accessible housing, as well as appropriate sanitation and hygiene facilities. It is estimated that 800,000 houses are constructed every year but even then, there is a shortage of 350,000 per annum. (The National Housing Policy, 2001). Various policies were introduced and development authorities were established in major cities to reduce growing housing problem in different period but the desired results could not achieve due to consecutive policy changes. In 2018 the government announced to build 5 million low-income houses in Pakistan and asked all commercial banks to provide loans at 5 percent interest rate for 5 5 years to 20 years. It also gave generous fiscal incentives to private developers. During 2019 to 2022 thousands of housing societies and commercial plazas were built under this program. But the prices of houses and shops were so much high that low-income people could not avail that opportunity because all focus were on the development and sale of residential plots at high prices than constructing low-income houses. This policy was also failed.

1.2. Population explosion

In Pakistan total four national censuses were held from 1972 to 1017. In the first census of 1972 total population of the country was 65,30 million out of which rural population was 48,71 million while urban population was 16,54 million and population density per square kilometer was 82. The second national population census

was held in 1982 and total population was 84,25 million. Around 60,41 million population lived in the rural areas while 23,84 million lived in urban areas. The density of population was 183. The urban population was increased 69.60 percent from 1972 to 1994 (in 12 years period) while rural population was increased by 19.36% during the same period. It means that population migrated from rural to urban areas was on large scale during this period. Third official national census was held in 1998 and at that time Pakistan population was 13,23 million out of which urban population was 43,03 million while rural population was 89,31. During 16 years period Pakistan population was increased from 84.25 million to 13.23 million, an increase of 63.65% (an increase of 3.97 % per year) The fourth National population census was held in 2017 and at that time population was 207.68 million out of which 75.67 million population lived in urban areas while 132.30 million lived in the rural areas.During a period of 17 years Pakistan population was increased from 132.35 to 20,76,85 million, an increase of 63.72 percent, (about 3.74 percent increase per year). The increase in urban population was 56.87 %, around 3.34 percent per year. In short, from 1972 to 2017 Pakistan population was increased 314%, which is more than three times in a period of 45 years and it was 6.77 % per year. The urban population was increased by 218 percent during the same period. Annual increase in population growth rate was around 4.84%, which is highest in the world.

1.3. Theoretical foundation

This study was built on the basis of Thomas Robert Malthus's theory of population growth which determined close link between population growth and food supply**.** Malthus argued that high population growth has jeopardized the future of human being due to limited capacity of land to produce required quantity of food. He emphasized that the population will continue to grow in a geometric progression if unchecked against the means of subsistence which will increase only in an arithmetic way, thus, population growth always exceeds food production. He disclosed that between 1750 and 1850 the population of Europe increased from 140 million to 266 million and of the world population was jumped from 728 million to above one billion. He pleaded that population increases in a geometrical way and this fast pace would double population after every 25 years. In contrast, food supply would increase in an arithmetic way and consequently food production will be far lower than population growth. So, the food supply would be exhausted in a few years, resulting in the eruption of famine, wars, conflicts, earthquakes, etc. He opined that nature has its own checks on population which are assumed as positive checks. These checks include war, earthquakes, famine, drought, epidemic, floods, calamities, etc. Nature applies this check when population is gone out of control in order to create balance between population growth and food growth. Malthas suggested to apply negative checks to control population. These checks include artificial methods like late

marriage, simple living, celibacy, self-control, absentia and family planning. These methods will not only control population growth but also prevent the effects of catastrophes. However, this theory was proved incorrect in Advanced countries where population growth rate declined over the years to negative and agriculture production was surplus due to use of agricultural technologies. However, Malthus' prediction was proved correct in the developing countries like Pakistan where population growth was high as compared to agriculture production. Pakistan will have to import food grains in large quantity from other countries.

1.4 Expansion of Housing in Pakistan

According to Zameen.Com study, Pakistan is the seventh most populist country of the world with faster urban population growth around 3% per year. The current housing shortage is 10 million and it is expected to grow to 13 % by 2025. About half of housing shortage is in urban areas. According to the State Bank of Pakistan, the urban housing demand is grown up by 350,000 units every year of which demand is met by only 150,000 unis, more than 60 percent demand is yet to be met. Out of this, total demand, 60 percent of housing demand is originated from low-income group, while the supply of housing is predominantly in the middle to upper middle-income group. There is great mismatch between demand and supply of housing. As the pace of migration from rural to urban areas is fast and the new migrants prefer to live in informal areas, which is generally known as slum areas or Katchi Abadis. According to an estimate, about 47 percent of urban population live in these areas

because they could not afford to pay high rent or cost of other living facilities.

1.4.1 Defense Housing Authorities

About 8 biggest housing schemes under the names of Defense Housing Authorities have been developed in 8 cities of Pakistan and their total planned acquired area is around 62,544 acres. These housing schemes have been developed adjacent main cities and they are costly housing schemes. Low-income people cannot afford to purchase either plot or house there. The brief detail of these schemes is shown in the following table.: -

Table 1:

Defense Housing Authorities in Pakistan

S.No.	Name of Authority	Area in Acres	Phases/sectors
1.	Defense Housing Authority Multan	10,000	NA
2.	Defense Housing Authority Lahore	737	13 phases
3.	Defense Housing Authority Peshawar	17,000	10 sectors
4.	Defense Housing Authority Karachi	8,852	8 phases (17 sectors)
5.	Defense Housing Authority Islamabad	12,355	Six phases
6	Defense Housing Authority Bahawalpur	5,200	9 sectors

7.	Defense Housing Authority Quetta	8,000	NA
8	Defense Housing Authority Gujranwala	400	NA
	Total =	62,544 acres	

Source: Official websites of Defense Housing Authorities

1.4.2. Bahria Towns

Bahria Town was established a company for developing housing and other projects in different cities of Pakistan in 1996. So far it has completed 100 + projects among which are parks, roads, housing societies, flyovers, Mosques, etc. Its main projects are located in Karachi, Islamabad, Rawalpindi, Lahore, and Nawabshah. The company has employed more than 50,000 employees. It is claimed to be the largest Asia's real estate developers. The number of its customers are more than 250,000. Bahria Town housing schemes are costly residential areas and middle- and low-income people cannot afford to purchase a plot or a house there. However, high earning persons or overseas Pakistan prefer to invest in Defense House Societies and Bahria Towns.

1.4.3 Punjab Cooperative Housing Societies

Housing societies were developed in different cities of Punjab under the supervision of Punjab Cooperative Housing Societies Department to provide better and cheaper houses especially to the low- and middle-income people who, otherwise, cannot afford to own houses through individual efforts. They are functioning on the

cooperative principles of self-help, self-finance, mutual aid and self-governance. The brief detail of these societies is given in the following table.: -

Table 2:

Detail of Cooperative Housing society in Punjab

Name of Division	Total Societies	Functional	Non – Functional	Under Liquidation
Lahore	146	106	20	20
Rawalpindi	34	26	07	01
Multan	14	12	02	--
Faisalabad	16	15	01	--
Gujranwala	11	11	--	--
Sargodha	17	08	04	05
Bahawalpur	05	05	--	--
Sahiwal	10	06	--	04
D.G. Khan	01	01	--	--
Total:	254	190	34	30

Source: Multan Development Authority (https://mda.punjab.gov.pk)

1.3.4 Private Housing schemes In Multan

Private houses schemes approved by Multan Development Authority are presented in the following table.

Table 3.

Major Private Housing schemes in Multan

S.No.	Name of Housing Scheme	Area in Acres/Knals
1.	Canal Cantt View	110.0 Knals
2.	Catholic Cooperative H. Society	55.50 Knals
3.	City Housing Scheme	997.15 Knals
4	City Housing (Pvt) Ltd (Extension)	1998.63 Knals
5	Khan Village	92.45 Knals
6	Royal Archard Extension	3190.25 Knals
7	Royal Archard Housing Society	1699.0 Knals
8	Sabzwari Town	394.75 Knals
9.	Sahara LSD	158.95 Knals
10	Sayyan Village Housing Society	463.0 Knals
11	Shahjahan Canal Views Housing Society	304.5 Knals
12	Silver City	122.0 Knals
13	Silver Garden	139.0 Knals
14.	Sun City	130.0 Knals
15	Western Avenue	153.2 Knals

16	Revised Dream Garden	780.0 Knals
17.	Rehmat Colony Multan	407.4 Knals
18	Razia Saeed Housing Society	103.0 Knals
19	Professors/Officers Block	102.95 Knals
20.	PIA Employees Cooperative Housing Society	567.25 Kanals
21	Pear Residence	192.72 Kanals
22	Pear City Housing Scheme	354.1 Kanals
23	Officers Town	517.17.Kanals
24	New Crystal City	149.64 Kanals
25	Multan Canal View	247.7 Kanals
26	Mujahid Green Valley	158.0 Knals
27.	MDA Officers Cooperative Society	937.76 Knals
28	Gulshan-e-Wahid H.Society	300.0 Knals
29	Gulshan-e-Sakhi Sultan	106.4 Knals
30	Gulshan-e-Rehman Housing Society	575.73 Knals
31.	Gulshan-e-Mahar	150.45 Knals
32	Gulshan-e-Lal Shahbaz Qalandar	143.11 Knals
33	Gross Garden	156.0 Knals
34	Fine City	673.78 Knals
35	Farrukh Town	183.65 Knals
36	Farid Town	240.3 Knals
37	Faiz LSD	136.4 Knals
38.	Faisal Cottage	399.0 Knals
39.	Fahad Town	500.91 Knals

40.	Dream Garden Extension	200.0 Knals
41	Classical Villas	306.8 Knals

Source: MDA website.

1.5 Agriculture production in Pakistan

The production of major crops in Pakistan is presented in the following table.

Table 4:

Production of important crops in Pakistan (in 000 Tones//Bales)

Year	Wheat	Rice	Maize	Total	Sugarcane-	Cotton
						(000 Bales)
2010-11	25,214	4,823	3,707	33,744	55,309	11,460
2011-12	23,473	6,160	4,338	34,478	58,397	13,595
2012-13	24,211	5,536	4,220	34,468	63,750	13,031
2013-14	25,979	6,798	4,944	38,208	67,460	12,769
2014-15	25,086	4,937	5,271	37,498	62,826	3,960
2015-16	25,633	6,801	5,271	38,227	65,482	9,917
2016-17	26,674	6,134	6,134	40,168	75,782.	10,671
2017-18	25,076	7,450	5,902	38,975	83,333	11,946
2018-19	24,349	7,202	6,826	38,931	67,174	9,861
2019-20	25,248	7,414	7,883	41,097	66,38	9,148
2020-21	27,464	8,420	8,940	44,824	81,009	7,064

Source: Pakistan Bureau of Statistics,2021-2022

The data in Table 4 show that wheat production in Pakistan was increased from 25,214,000 tons in 2010-11 to 27,464,000 tons in 2020, an increase of 2, 250,000 tons during 10-year period. It is just

an increase of 9.18% or 0.9 percent per year. The production of rice crop was increased from 4,823,000 tons in 2010-11 to 8,429,000 tons in 2020, an increase of 3,597,000 tons, which is 42.71 % during 10-year period. It is 4.271 percent per year. Similarly, the other food crop is Maize whose production was increased from 3,707,000 in 20010-11 to 8,940,000 tons in 2020-21, which is an increase of 58.31% or 5.83 % increase per annum. Total production of these three food crops were increased from 33,744,000 tons in 2010-11 to 44,824,000 tons in 2020-21, an increase of 24.71 % in 10 years or 2.47 % per annum. This increase is far less population growth rate which was 6.77 % per year during 1972 and 2017 (see chapter 3). Wheat is major food crop of which production during was increased 0.9% per year. This is the reasons that Pakistan has been importing millions of tons of wheat every year from different countries to avert food crisis and price of floor has increased from Rs.15/- per kg in 2010 to Rs.100 per kg in 2020-21. Sugarcane is a cash crop of which production was increased from 55,309 ,000 tons in 2010 to 81,009,000 tons in 2020, an increase of 31.72 % in 10 years. Cotton is regarded as while gold and it is vital crop for providing raw material to Textile industry. Its production was decreased from 11.46 million bales in 2010-11 to 7,06 million bales in 2020-21, a decrease of 38.35% during 10-year period.

This objective of this study aims to identify the factors contributing to the high population growth rate in Pakistan, including social, economic, and cultural determinants, low crop production,

shortage of food, squeezing of fertile agriculture land, high prices of food items and balance of payment problems.

The study holds several significant contributions: For example, by examining the causes of high population growth, this study can provide valuable insights for policymakers to develop targeted strategies for population control and family planning. Moreover, the investigation into the development of housing societies and their impact on agricultural land can offer a comprehensive understanding of urbanization trends and their repercussions on rural and urban areas. Moreover, ty measuring the impact of housing society development on agriculture production, the study can shed light on the extent to which agricultural land conversion affects food security and sustainability. Additionally, the assessment of food crop shortages and their influence on food prices and the balance of payment will provide data that can guide economic policies and trade strategies to address food inflation and trade deficits. The findings from this study can inform evidence-based policy decisions related to urban planning, agriculture, population control, and economic stability, helping Pakistan address its current challenges effectively. By highlighting the potential consequences of continued conversion of productive land, the study can serve as a warning of the need for

sustainable land use practices to ensure food security for Pakistan's growing population.

2. Analysis of literature

Yin et al. (2011) investigated the development of land use/cover changes and urban expansion in Shanghai, China, throughout the transitional economy period (1979–2009). They pointed that urbanization accelerated at an unprecedented level, resulting in a significant loss of agricultural and green land. The findings indicates that from 1979 to 2000, urban expansion followed a north-south axis, but after that, growth shifted to a north-south axis, with growth spreading in all directions from both the existing urban area and along transportation lines. Policy reform, population growth, and economic development have all played significant role in Shanghai's urban areas. Jiang, Deng, and Seto (2013) analyzed the influence of China's urbanization on agricultural land usage intensity. The empirical study revealed that urbanization has decreased in farming land use intensity. The area of cropland per capita, which is a measure of land scarcity, was inversely related to the intensity of agricultural land usage. The findings revealed that GDP had a negative impact on agricultural land use intensity. Ashraf, Imran, and Shahbaz (2015) examined the protection of agricultural land Lahore, Pakistan. They used Landsat data from 2009 and 2012 to classify Land Use and Land Cover (LULC). The study adopted the Markov chain model. The findings show that over 2009 to 2012, a significant growth in housing societies and a massive reduction in agricultural

land were noted. The area of housing societies was increased from 18.8% to 60.3 percent and the agricultural land was decreased from 43.5 percent to 35.9%. during the study period. The results suggest to preserve productive land in order to ensure food security in future. Farah et al. (2016) investigated the shifting of property ownership structures in agricultural sector. The study based on interview survey that gather relevant material from farm families in three villages near the Faisalabad city, Punjab's rural-urban interface. The findings revealed a significant shift in landholding size between 2006 and 2015, with the majority of farmers (48.9%) previously owning up to 5 acres and now owning less than 2 acres (53.9%). This shift was mostly owing to land sales for housing societies (56.9%) and land division due to inheritance (17.8 percent). Wu, Li, and Yu (2016) noted the effects of urbanization on land use and land cover changes in Guangzhou, China. The study used time period from 1979 to 2013, a series of Landsat photos were used to analyses urban growth and consequent LULC changes over a 35-year period. The study noted that urban expansion was occurred by 1512.24 km^2 at a pace of 11.25 percent each year. Farmland, woodland, and mosaics of cropland and natural vegetation, among other land uses, were badly damaged. Ustaoglu and Williams (2017) investigated the factors influencing urban expansion and agricultural land conversion in 25 European Countries between 2000 and 2006. They found in urbanization processes in various areas of Europe. The study noted that the Common Agricultural Policy (CAP) subsidies had a significant impact on lowering urbanization and agricultural land use.

Akram and Siddiqui (2018) analyzed urban growth and agricultural land loss in the tehsil Multan, Pakistan. The findings of study revealed that 97 km^2 of agricultural land has been switched to urban land. From 1993 to 2012, the urban expansion was occurred from the south west, and from north east. The authors concluded that with rapid transformation, it is expected that urban sprawl would become a major concern for the residents of Multan city. Waqar carried out a comparative study to determine the impact of urbanization on agricultural land in Germany, Pakistan, and China by using time series data from 1960 to 2013. The variable used in regression models were agricultural land, urban population expansion rate, agricultural and industrial value-added as percentage of GDP. The empirical findings revealed that population growth in urban areas of Pakistan and industrial value have a negative and significant impact on per capita arable land, while China and Germany's industrial value added of GDP has a negative impact and the urban population growth rate has a positive and significant impact on per capita arable land. Ali (2020) assessed the effects of farmland conversion on agricultural production in Khyber Pakhtunkhwa's Tehsil Takht Bhai. The study mainly focused on constructed infrastructure on agricultural production during the period from 1985 to 2015. It was noted that massive growth was occurred in physical infrastructural expansion which negatively affected agriculture land and crop production.

2.2 Research Gap

According to the best of our knowledge no study has so far been conducted in existing compact form of investigating nexus between population growth, expansion of housing societies, low agriculture productivity and high food prices. It has made this study unique and valuable for policy makers, new researchers and academicians because it is totally different from traditional studies which has conducted individually on population growth and its impact, housing societies and their impact on urbanization, low agriculture productivity and its impact of prices of essential commodities. But this study has covered all these aspects.

3. Data and Methodology

3.1 Research Design

The secondary data was used in this study and it was collected from the Department of Agriculture, Government of Punjab. 11 Districts of Southern Punjab were selected as a sample or study through convenience sampling method. The rationale of this study is that a large number of housings societies have been developed in these 11 Districts, swallowing from 20 to 40% productive agriculture land.

4. Results

4.1. Area of Cotton crop

Cotton is a fiber and is known as white gold. It provides raw material to Textile industry, which is backbone of Pakistan and major export sector of the country. The area under cultivation of cotton crop is shown in the following table.

Table 5:

Cotton cultivation in different areas (in 000 Hect) during 2007-2020

Areas	2007-2008	2011-2012	2015-2016	2019-2020	Area increase or decrease during 2007-2020	Increase or decrease in % during 20007-2020
Punjab	2223.6	2533.69	2242.72	1879.73	-343.87	-8.45%
Multan Division	823.10	829.58	738.13	575.85	-247.25	-69.96%
D.G.Khan Division	479.6	441.10	427.33	411.15	-68.45	-8.57%
Bahawalpur Division	791.2	779.41	699.28	712.26	-78.94	-9.00%
Multan	189.0	179.68	163.89	140.42	-48.58	-13.45%
Lodhran	209.2	210.84	195.86	149.73	-59.47	-13.97
Khanewal	191.0	208.40	188.18	157.01	-33.99	-12.16
Vehari	233.9	230.66	190.2	128.69	105.21	-55.20
Muzaffargarh	198.7	171.17	145.68	136.78	-61.92	-68.83%
Layyah	36.4	47.75	45.32	36.42	0.2	0.1%
D.G. Khan	106.4	97.94	94.69	95.5	-10.9	-11.14%
Rajanpur	138.8	124.24	141.64	142.45	3,65	10.26
Bahawalpur	290.2	283.68	273.16	273.97	-16,23	-9.44
Rahim Yar Khan	276.0	244.02	206.79	214.08	-61.92	-12.89
Bahawalnagar	225.0	251.71	219.33	224.21	-0.79	-0..9%

Source: Punjab Agriculture Directorate, 2020.

The area under cultivation of cotton crop was drastically reduced in Punjab province during 2007-2020. The cotton cultivation area was reduced -343,000 Hectare, which was 8.45%. Major decrease in the area under cultivation was seen in Multan Division where the area fell 247,000 Hectare which was 69.96%, while cotton area was decreased in D.G.Khan division during 2007-2020 was 8.57%. The area under cultivation of cotton crop was reduced in Bahawalpur Division was 78,000 bales, which was 9.0%. In this way, major cotton area was reduced in Multan Division, which was 69.96%. It we look at District level we can see that major reduction in cultivation of cotton crop was noted in District Muzaffargarh (68.83%), District Vehari (55.20%) while the area under cultivation was decreased from 1 % to 14% in other districts of Southern Punjab.

4.2 Cotton production

The production of cotton crop during 2007-2020 is given in the following table.

Table 6:

Cotton Production in Punjab province, Division and Districts (in 000 bales) during 2007-2020

Areas	2007-2008	2011-2012	2015-2016	2019-2020	Production increase/decrease in 000 bales during 2007-2020	Increase or decrease during 2007-2020 (in %)

Punjab	9062.0	11129.0 0	6343.00	6306	-2,756	-43.70
Multan Division	3033.6	4006.01	1703.15	1854.16	-1179	-61,12
D.G.Khan Division	1927.1 0	1674.53	1339.94	1219.47	-707.63	-58.02
Bahawalpur Division	3127.5 0	3728.88	2458.63	2640.51	-486.49	-18.44%
Multan	760.1	870.39	354.44	495.14	-264.90	-53,51%
Lodhran	865.1	971.01	470.45	501.49	-363.61	-57.96%
Khanewal	736.7	1052.88	430.55	473.31	-263.39	-64.24%
Vehari	671.7	1111.13	447.71	384.22	-233.48	- 57.20
Muzaffargar h	741.9	660.94	317.66	339.37	- 402.53	-45.74
Layyah	118.3	147.12	141.05	134.88	16.58	8.77%
D.G.Khan	464.2	391.58	244.8	300.23	-163.97	-54.61%
Rajanpur	602.7	474.89	636.43	444.99	-157.71	-35.44%
Bahawalpur	1153.7	1363.48	904.78	994.88	-158.12	-15.96%
Rahim Yar Khan	1118.1	1125.30	743.66	824.93	-293.17	-13.55%
Bahawalnag ar	855.7	1240.10	810.19	820.7	-35.0	-10.42%

Source: Agriculture Marketing Information services, Government of Punjab.

The data in Table 6 shows that cotton production in Punjab Province was decreased 2,756,000 bales during 2007 and 2020, which was -43.70%. The same trend was seen in all three divisions of Southern Punjab, which are the main producers of cotton crop and feed Textile industry in this area and other areas of Pakistan. The cotton production in Multan division was decreased by 1,179,000 bales, which was -61.12% while cotton production in D.G.Khan Division was decreased -7,07,000 bales during 2007-2020 and it was 58.02%. However, the relative decrease in the cotton production in Bahawalpur Division was less as compared to Multan and D.G.Khan divisions during 2007-2020. It was 486,000 bales and in percentage it was 18.44%. In short cotton production was decreased in all three divisions of Southern Punjab and Multan was the worst one because here cotton production was decreased by 61,12 %. If we look at the data of different Districts of Southern Punjab, we will find major reduction in cotton production in Multan (53.51%), Lodhran (57.96%), Khanewal (-64.24%), Vehari (- 57.20), Muzaffargarh (-45.74), D.G.Khan (54.61%) and Rajanpur (35.44). The cotton production fell from around 8% to 16 percent in other Districts.

4.2 Wheat crop

4.2.1 Area of wheat crop

The area under cultivation of wheat crop is given in the following table.

Table 7

Wheat cultivation Area in Punjab Province, Divisions and Districts (in 000 Hect)

Areas	2007-2008	2011-2012	2015-2016	2019-2020	Increase or decrease in area in 000 Hect during 2007-2020	Increase or decrease in % during 2007-2020
Punjab	6402.0	6482.9	6913.9	6515.32	113.32	10.15%
Multan Division	790.7	764.4	865.20	730.04	-60.66	9.23%
D.G. Khan Division	803.0	818.3	902.82	1020.19	217.19	12.70%
Bahawalpur Division	904.5	884.2	980.53	995.91	91.41	11.01%
Multan	186.6	167.1	186.96	165.92	-20.68	-8.89%
Lodhran	157.8	166.3	203.15	164.70	6.9	10.43%
Khanewal	211.6	195.5	204.36	220.55	8.85	10.44%
Vehari	234.7	235.5	270.73	178.87	-55.83	-7.62%
Muzaffargarh	290.2	299.1	303.91	259.80	-30.4	-8.95%
Layyah	195.9	191.4	234.31	265.07	69.17	13.53%
D.G. Khan	173.6	168.4	191.00	253.73	80.13	14.61%
Rajanpur	143.3	159.4	173.60	241.59	89.29	68.59%
Bahawalpur	276.8	262.2	300.27	299.46	22.66	10.81%
Rahim Yar Khan	301.9	285.7	309.17	291.37	-10.53	-9.65%

Bahawalnagar	325.8	336.3	371.09	405.08	79.28	12.43%

The results in table 7 show the cultivation area of wheat crops in Punjab Province, three divisions and 11 Districts of Southern Punjab during the period of 2007-2020. The area under cultivation of wheat crop in Punjab Province was increase 113.32 Hectare which was around 10.15%. However, the area under cultivation of wheat crop was decreased in Multan and D.G. Khan divisions which was -60.66 Hectare and it was around -9.23%. Similarly, the area under cultivation was also decreased in D.G. Khan Division by 217.19 Hectare and it was around 12.70%. In contrast, the area under cultivation of wheat crop was increased by 91.41 Hectare in Bahawalpur division during 2007-2020 and it was around 11.01% Around 22% area under cultivation was decreased in Multan and D.G. Khan divisions during 13 years period. If we look at district wise result we will find that there is increase in area under cultivation of wheat crop in District Lodhran (10.43%), Khanewal (10.44), Layyah (13.53%), Bahawalpur (10.81%), Rajanpur (68.59%), D.G. Khan (14.61) and Bahawalnagar (12.43%) while area under cultivation of wheat crop was decreased in Multan District 8.89%, Vehari by 7.62%, Muzaffargarh by 8.95%, Rahim Yar Khan by 9.65%. In other words, area under cultivation of cotton crop was increased in 7 districts while it was decreased in four districts of Southern Punjab. Major increase was noted in District Rajanpur while major decrease was occurred in District Rahim Yar Khan.

4.2.2 Production of wheat crop

The production of wheat crop is shown in the following table.

Table 8:

Wheat Production in different areas (in 000 Tones)

Areas	2007-2008	2011-2012	2015-2016	2019-2020	Increase or decrease in production in 000 tones during 2007-2020	Increase or decrease in % during 2007-2020
Punjab	15607.0	17738.9	19526.67	19401.86	3,794.86	24.31%
Multan Division	2059.2	2265.1	2797.35	2466.00	406.8	11.97 %
D.G.Khan Division	1890.4	2103.9	2542.72	3189.99	1,299.99	16.87
Bahawalpur Division	2273	2715.2	3117.48	3512.15	1,239.15	15.45%
Multan	433.6	434.5	566.05	564.09	112.49	13.0%
Lodhran	407.3	500.4	688.02	554.45	145.15	13,61%
Khanewal	567.3	574.0	657.34	725.63	158.33	12.79%
Vehari	651.0	756.2	885.94	621.83	-29.17	-0.9 %
Muzaffargarh	688.4	823.2	876.21	815.94	127.43	11.85
Layyah	426.9	456.0	604.36	750.16	323.26	75.72%

D.G.Khan	440.9	447.9	527.69	788.36	347.46	78.80%
Rajanpur	334.2	376.8	534.46	835.53	657.63	250%
Bahawalpur	713.7	836.8	969.03	991.83	278.13	13.87
Rahim Yar Khan	724.4	887.2	1015.9.7	1016.46	292.06	14.03%
Bahawalnagar	834.9	989.2	1132.48	1503.86	668.96	18.01%

Wheat is the basic crop which is used as major food items by the people. Every Government tries to enhance its production by providing seed, fertilizer and pesticides, electricity at subsidized rates. The wheat production in Punjab Province was increased 3,794.86 tones during 2007-2020 and it was around 24.31% increase in 13-year period. In Multan division, wheat production was increased by 11.97%, in D.G. Khan division by 16.87%, and in Bahawalpur division 15.45%. If we glance wheat production at 11 districts of Southern Punjab we can note that the production was increased in Multan by 13.0%, Lodhran by 13,61%, Khanewal by 12.79%, Vehari by 0.9%, Muzaffargarh by11.85%, D.G. Khan by 11.85%, Rajanpur by 250%, Bahawalpur by 13.87%, Rahim Yar Khan by 14.03 and Bahawalnagar by 18.01%. Major increase was noted in Rajanpur District (250%), D. G.Khan (78.80) and Layyah (75.72%). It means D.G. Khan division took lead in cotton production during the 2007-2020. While in all other districts of Southern Punjab wheat production was increased between from 9% to around 18%. Vehari is the district where only 0.9% increase was occurred during 13-year period.

4.3. Sugarcane crops

4.3.1 Area under cultivation of sugarcane crop

The area under cultivation of sugarcane crop is tabulated in the following.

Table 9:

Sugarcane cultivation in different areas of Punjab (in 000 Hect)

Areas	2007-2008	2011-2012	2015-2016	2019-2020	Area increase or decrease in 000 Hect during 2007-2020	Increase or decrease in % during 2007-2020
Punjab	666.5	761.20	705.35	643.43	-3.07	-10.35%
Multan Division	49.3	32.0	28.33	-23.07	-26.23	-46.79%
D.G.Khan Division	81.0	74.10	93.08	90.65	9.62	8.93
Bahawalpur Division	129.9	152.65	171.59	181.30	51.40	39.56%
Multan	2.4	4.1	3.64	4.45	2.05	53.93%

Lodhran	2.0	2.0	2.02	3.24	1.24	38.27%
Khanewal	18.6	8.1	6.48	5.67	-12.93	-328.04%
Vehari	26.3	17.8	16.19	9.71	-16,59	-270.85%
Muzaffargarh	45.3	40.1	42.49	39.66	-5.64	-12.45%
Layyah	17.0	11.7	12.95	15.78	-1.22	-26.05%
D.G.Khan	4.9	4.5	7.69	10.12	5.22	48.41%
Rajanpur	13.8	17.8	29.95	25.09	11.29	44.99%
Bahawalpur	12.1	17.8	20.64	16.19	4.09	33.80%
Rahim Yar Khan	95.9	108.9	138.40	155.40	59.50	61.71%
Bahawalnagar	21.9	17.8	12.55	9.71	-12.19	-125.54%

Sugarcane is another important cash crop through which sugar is produced. This crop provides raw material to around 50 sugars mills operating in Pakistan. During the period of 2007-2020 the area under cultivation of sugar crop was decreased by 3.07 Hectare, which is around 10.35 %. Similarly, sugarcane cultivation area in Multan division was decreased by 26.23 Hectare, which was around 46.79% while in D.G.Khan and Bahawalpur divisions the area was increased by 9.62% and 39.56%, respectively. By glancing at different districts of Southern Punjab it was found the sugarcane area was increase in Multan by 185.41%, Lodhran by 38.27%, while in Khanewal, Vehari, Muzaffargarh, Layyah and Bahawalnagar it was decreased by

328.04%, 270.85%, 12.45%, -26.05% and -125.54% respectively. In contrast, the area under cultivation of sugarcane crop was increase in D.G.Khan by 48.41%, Rajanpur by 44.99%, Bahawalpur by 33.80% and Rahim Yar Khan by 61.71% Hectare. District-wise data of sugarcane cultivation area show 53.93% in Multan, 38.27 in Lodhran, 48.41% in D.G.Khan, 44.99% in Rajanpur and 61.71% in Rahim Yar Khan whereas the area was increased by 53.93% in Multan, by 38.27% in Lodhran, by -328.04 in Khanwal, by -270.85% in Vehari, -12.45% in Muzaffargarh, by -26.05% and 125.54% in District Bahawalnagar.

4.3.2 Production of sugarcane crop

The production of sugarcane crop is given in the following table.

Table 10

Sugarcane Production in different areas (in 000 Tones)

Areas	2007-2008	2011-2012	2015-2016	2019-2020	Increase or decrease in production in 000 tones during 2007-2020	Increase or decrease in % during 2007-2020

Punjab	40305.9	42893.0	41968.15	43346.58	3,040.68	9.28%
Multan Division	2578.8	1,813,8	1672.74	1456.85	-1121.95	-62.92%
D.G.Khan Division	4,237	4,538.8	6068.93	6645.90	2,408.9	36.24%
Bahawalpur Division	7,805.5	9,894.8	12652.47	13458.64	5,653.64	57.99%
Multan	106.6	205.3	184.76	234.85	128.25	45.39%
Lodhran	97.6	104.5	128.77	203.34	105.74	92.30%
Khanewal	911.7	421.0	403.70	408.63	-503.07	-55.18%
Vehari	1462.9	1083.9	955.51	610.03	-852.87	-58.38%
Muzaffargarh	2424.6	2372.3	2664.97	2882.35	457.75	18.90%
Layyah	827.7	628.9	695.13	1085.92	258.22	13,19%
D.G.Khan	242.3	256.6	471.60	775.42	533.12	51.37%
Rajanpur	742.4	1281.0	2237.23	1902.21	1,169.81	60.97%
Bahawalpur	633.8	1106.9	1361.04	1122.72	488.92	56.45%
Rahim Yar Khan	6174.5	7781.2	10569.42	11724.10	5,549.6	52.66%
Bahawalnagar	997.7	1006.7	722.01	611.82	-385.88	-38.67%

The results in table 10 show that production of sugarcane crop was increased by 3,040.68,000 tones in Punjab Province during 2007-2020 which was around 9.28% during 13 years period. However, the

production of sugarcane crop was decreased in Multan division by -1121.95,000 tones, which was around -62.92%. The production of sugarcane was increased in D.G.Khan and Bahawalpur Divisions by 36.24% and 57.99%, respectively during the same period. The District wise results show that sugarcane production was increase in Multan district by 45.39%, in Lodhran by92.30%, in Muzaffargarh by 18.90%, in Layyah by 13,19%, in D.G.Khan by 51.37%, in Rajanpur by 60.97%, in Bahawalpur by 56.45% and in Rahim Yar Khan by 52.66% whereas the production of sugarcane crop was decrease in District Khanewal by -55.18%, Vehari by -58.38% and Bahawalnagar by -38.67%. Khanewal and Vehari are the two district of Multan Division where sugarcane production fell substantially while D.G.Khan, Bahawalpur, Rajanpur and Rahim Yar Khan are the districts where sugarcane production was increased substantially. In district Layyah and Muzaffargarh, the production of sugarcane was increased between 13% and 19% respectively.

4.4. Rice crop

4.4.1 Area under cultivation of Rice crop

The area under cultivation of Rice crop is given below in the following table.

Table 11:

Rice cultivation in different Province, Divisions and Districts (in 000 Hect)

Areas	2007-2008	2011-2012	2015-2016	2019-2020	Increase or Decrease in Area in 000 Hect during 2007-2020	Increase or decrease in % during 2007-2020
Punjab	1977.6	1714.2	4399	2029.05	51.45	2.52%
Multan Division	77.7	57.9	178	145.69	67.99	55.33%
D.G.Khan Division	67.1	62.0	233	107.65	40.55	37.55%
Bahawalpur Divison	100.6	68.8	279	127.06	26.46	20.82%
Multan	17.0	10.5	30	42.49	25.48	59.99%
Lodhran	1.2	6.1	20	19.83	18.63	605.11%
Khanewal	30.4	21.9	51	39.66	9.26	23.34%
Vehari	29.1	19.4	77	43.71	14.61	33.42%
Muzaffargarh	23.9	23.1	93	41.68	17.78	42.65%
Layyah	4.8	6.5	36	13.76	8.96	65.11%
D.G.Khan	36.4	30.4	101	38.45	2.05	5.63%
Rajanpur	2.0	2.0	3	13.76	11.76	89.25%
Bahawalpur	6.4	4.1	36	18.62	12.22	65.62%
Rahim Yar Khan	24.2	18.2	62	20.63	-3.57	-14.75%
Bahawalnagar	70.0	46.5	181	87.81	17.81	20.28%

Table 11 shows the area under cultivation of rice crop. According to the results only 51.45,000 Hect were increased during 2007-2020 in

Punjab Province which is only 2.52%. In Multan division 67.99,000 Hect area was increased, which was 55.33% while in D.G.Khan Division 40.55,000 Hect area was increased during the same period and it was 37.55%. In Bahawalpur division the area under cultivation was increased to 26.46,000 Hect, which was 20.82%. The highest increase was increase in Multan division while low increase was recorded in Bahawalpur division. However, all three divisions recorded increase in area under cultivation. If we look at the data of different districts, we will find that area under cultivation was increased in Multan District 59.99% during 2007-2020, in Lodhran the increase was 605.11%, which was robust, while in Khanewal it was 23.34%, in Vehari it was 33.42%, in Muzaffargarh it was 42.65%, in Layyah it was 65.11%, in D.G. Khan it was nominal increase of 5.63%, in Rajanpur district it was 89.25%, in Bahawalpur it was 65.62%. However, in District Rahim Yar Khan the area under cultivation of rice crop was decreased by 14.75% whereas in Bahawalnagar the area was increased by 20.28%. It was district Lodhran where highest increase was recorded while it was District Rahim yar Khan where minus growth was recorded in area under cultivation.

4.4.2 Production of Rice crop

The production of Rice crop is given in the following table.

Table 12.

Rice Production in different areas of Punjab province (in 000 Tones)

Areas	2007-2008	2011-2012	2015-2016	2019-2020	Increase or decrease in production 000 tones during 2007-2020	Increase or decrease in % during 2007-2020
Punjab	3286.0	3277.0	3502.00	4143.72	857.72	20.69%
Multan Division	104.0	99.9	137.19	251.20	147.2	58.59%
D.G.Khan Division	114.30	124.3	187.79	213.30	99.0	13.38%
Bahawalpur Division	138.3	133.7	220.32	265.74	127.44	47.95%
Multan	22.5	17.0	24.40	79.85	57.35	71.82%
Lodhran	2.3	9.1	17.27	29.50	27.0	92.20%
Khanewal	40.2	37.4	37.31	72.02	31.82	44.18%
Vehari	39.0	36.4	58.21	69.83	30.83	-20.94%
Muzaffargarh	38.7	41.0	69.83	74.02	35.32	47.71%
Layyah	6.4	9.4	26.11	23.76	17.36	73.03%
D.G. Khan	63.4	70.0	89.89	88.53	25.13	28.38%
Rajanpur	5.8	3.9	1.96	26.99	21.19	78.51%
Bahawalpur	5.8	6.5	29.53	33.88	28.08	82.88%
Rahim Yar Khan	25.3	32.9	46.32	40.50	15.20	37.55%

Bahawalnagar	107.2	94.3	144.47	191.36	84.16	43.97%

The outcomes in Table 12 shows that rice production in Punjab province was increased by 20.69% during 2007 and 2020, around 1.72%. The rice production in Multan division was increased by 58.59%, in D.G. Khan division it was 13.38%, while in Bahawalpur division it was 47.95%. The production in Multan and Bahawalpur divisions were higher while in D.G. Khan division it was nominal during 12 years. The data relating to 11 districts of Southern Punjab show that rice production in Multan was increased by 71.82%, in Lodhran 92.20%, in Khanewal 44.18%. However, it was decreased by -20.94% in District Vehari. In District Muzaffargarh the rice production was increased by 47.71%, in Layyah 73.03%, in D.G. Khan it was 28.38%, in Rajanpur 78.51%, in Bahawalpur 82.88%, in Rahim

Yar Khan 37.55% and in District Bahawalnagar it was 43.97%. The highest rice production was recorded in District Lodhran while negative production was recorded in District Vehari. Rice is used for domestic consumption as well as it is exported to different countries because it is used alternate food after wheat.

4.5 Mango fruit

4.5.1 Area under cultivation of Mango

The data of area under cultivation of Mango in 11 districts of Southern Punjab is presented in the following table.

Table 13:

Mango cultivation in different districts of Southern Punjab (Area in 000 Hectares)

Districts	2007-2008	2011-2012	2015-2016	2019-2020	Area increase/ decrease in (000 Hect) during 2007-2020	Increase or decrease in % during 2007-2020
Multan	31565.0	31363	30998	30351	-1214	-10.39%
Lodhran	405.0	405	405	1117	712	75..80%
Khanewal	13314.00	13354	14022	14589	1275	10.95%
Vehari	2642.0	2509	2513	2260	382	-8.55
Muzaffargarh	19222.0	19020	19030	26304	7082	13.68
Layyah	158.0	158	158	276	118	17.46%
D.G .Khan	142.0	142	142	397	255	79.95%
Rajanpur	972.0	971	971	1119	147	11.51%
Bahawalpur	4350.0	4350	4767	2768	1582	-57.15%
Rahim Yar Khan	28732.0	28327	24038	16268	12,464	-56.61%
Bahawalnagar	1356.0	1414	1372	223	-1133	164,45%

The results in Table 13 shows area under cultivation of Mango in Multan was decreased by1214 Hect which was around 10.39% This

decrease was occurred during 2007-2020. However, the Mango area under cultivation was increased in District Lodhran and Khanewal by 712 Hect (75.80%) and 1275 Hect (10.95%). The Mango area was decreased in District Vehari by 382,000 (about 8.55%). A big jump was noted in District Muzaffargarh where mango area was increased from 19222,000 Hect to 26304,000 Hect and it was about 13.68%. The same trend was noted in District Layyah where Mango area was increased by 118,000 Hect which was nearly 17.46%. In District D.G. Khan a substantial increase was noted where the Mango area was recorded an increased from 142,000 Hect in 2007 to 397,000 in 2020 , an increase of 255,000 Hect and it was around 79.95%. The Mango area was also increased in District Rajanpur by
147,000 which was nearly 11.51%. However, a steep decline was noted in Mago area in District Bahawalpur where it was decreased from 4350 Hect in 2007 to 2768 Hect in 2020, a fall of 57.15%. The same trend was noted in District Rahim Yar Khan where Mango area fell from 28732,000 Hect in 2007 to 16268,000 Hect and the decline was around 56.61%. The substantial decline in Mango area was also noted where the area was declined by 1133,000 Hect and it was around 164,45%. The major increase in the area of Mango crop was recorded in District Rajanpur, D.G. Khan, Layyah, Lodhran, Muzaffargarh and Khanewal while major decline was occurred in Bahawalpur, Rahim Yar Khan, Bahawalnagar , Multan and Vehari districts.

4.5.2 Mango production in 11 Districts.

The mango production in 11 districts of Southern Punjab is highlighted in the following table.

Table 14:

Mango Production in three Districts of Multan Division (in 000 Tones)

Districts	2007-2008	2011-2012	2015-2016	2019-2020	Production increase/ Decrease in in 000 tones during 2007-2020	Increase or decrease in % during 2007-2020
Multan	393028.0	433898	414564	397507	+ 4479	10.11%
Lodhran	4666.0	4591	4900	14445	+9779	308.57%
Khanewal	149813.0	166281	174595	181676	+ 31863	21.26%
Vehari	33147.0	30084	28278	24206	-8941	-13.69%
Muzaffargarh	196021	228053	231702	382110	+186089	194.93%%
Layyah	18020.0	1805	1783	3153	-14867	-571.51%
D.G.Khan	1406.0	1353	1318	3575	+2169	254.26%
Rajanpur	11018.0	10749	9137	9911	-1107	-11.11%
Bahawalpur	40525.0	49352	43951	38295	-2230	-10.58%
Rahim Yar Khan	381706.0	266497	221508	217700	-164006	-57.03%
Bahawalnagar	18005.0	18388	13665	2053	-15952	11.40%

The production of Mango was increased during 2007 to 2020 in District Multan by 4479,000 tones which was around 10.11%. In District Lodhran and Khanewal the production of Mango was

increased by 9779,000 and 31863,000 tons respectively. However, the production of Mango was decreased by 8941,000 in District Vehari and it was around 13.69%. The Mango production in District Muzaffargarh was remarkably increased by 186089,000 tones which was about 194.93%%. The steep fall was noted in Mango production in District Layyah where it fell 14867,000 tones that was around 571.51%. The production of Mango in D.G. Khan district was increased by 2169,000 tones which was around 254.26%. The Mango production in Rajanpur, Bahawalpur, Rahim Yar Khan and Bahawalnagar was declined by 1107,000 tones (11.11%),2230,000 tones (10.58), 164006,000 tones (57.03%) and 15952,000 tones (11.40%) respectively. Major production of Mango was noted in District Multan, D.G .Khan, Lodhran, Khanewal while major decline was occurred in District Bahawalnagar, Rahim Yar Khan, Bahawalpur, Rajanpur, Layyah and Vehari.

4.6 Citrus fruit

4.6.1. Area under cultivation of Citrus fruit

The area under cultivation of Citrus fruit is presented in the following table.

Table 15:

Citrus Cultivation in different districts of Southern Punjab (Area in Hect)

Areas	2007-2008	2011-2012	2015-2016	2017-2020	Area increase or decrease in 000 Hect during 2007 and 2020	Increase or decrease in % during 2007-2020
Punjab	189784.0	183568	181785	421001	-231,217	-45.07%
Multan Division	21069	21233	21760	49626	28,557	42.45%
D.G.Khan Division	6204	6090	6079	14163	7,959	43.80%
Bahawalpur Division	12041	11678	12078	28022	15,981	42.96%
Multan	5907.0	5871.0	5803	14535	8, 628	40.64%
Lodhran	1524.0	1522.0	1446	1931	407	21.07%
Khanewal	6612.0	6936.0	7213	18296	11,684	36.13%
Vehari	7026.0	6904.0	7298	14864	7838	47.26%
Muzaffargarh	1084.0	1015.0	1001	2461	1377	44.04%
Layyah	4473.0	4477.0	4480	10774	6301	41.51%
D.G.Khan	325.0	326.0	326	596	271	54.53%
Rajanpur	322.0	272.0	272	332	10	3.01%
Bahawalpur	7271.0	6872.0	6760	15230	7,959	47.74%
Rahim Yar Khan	1512.0	1511.0	1865	4017	2,505	37.68%
Bahawalnagar	3258.0	3295.0	3453	8775	5,517	37.12%

The data in table 15 has been given about area under cultivation of Citrus fruit. The data show that area under cultivation of Citrus in Punjab province was decreased by -231,217 Hect, which was 45.07%. However, the area under cultivation was increased in Multan division by42.45%, in D.G.Khan division by 43.80%, in Bahawalpur by 42.96%. At district level the highest increase was noted in District D.G.Khan where area was increased by 54.53% while the increase in district Rajanpur was only 3.01%.

4.6.2. Production of Citrus fruit

The production of Citrus fruit is tabulated in the following.

Table 16

Citrus production in different districts of Southern Punjab (in Tons)

	2007-2008	2011-2012	2015-2016	2019-2020	Production in 000 increase or decrease during 2007-2020	Increase or decrease in production in % during 2007-2020
Punjab	2059507.0	2076831	2276077	2397306	337,799	14.09%
Multan Division	243055	241214	246769	231105	-11,950	-4.91%

D.G.Khan Division	55388	53743	57523	62637	7249	11.57%
Bahawalpur Division	104045	101828	109481	111275	7,230	6.59%
Multan	56180.0	55467.0	55344	55123	-1057	-1.88%
Lodhran	14620.0	14916.0	14531	8216	6,754	46.19%
Khanewal	84033.0	92409	98459	100491	16,458	16.37%
Vehari	79222.0	78422	78435	67275	-11,947	15.08%
Muzaffargarh	10013.0	8540.0	8733	8717	-1296	12.94%
Layyah	39799.0	40151.0	43311	50562	10,763	21.28%
D.G.Khan	3089.0	3102.0	3150	2162	927	40.85%
Rajanpur	2487.0	1950.0	2329	1196	-1,291	48.09%
Bahawalpur	59568.0	56675.0	56963	59928	360	0.60%
Rahim Yar Khan	13903.0	13786.0	19322	16316	2,413	14/78%
Bahwalnagar	30574.0	31367.0	33196	35031	4,457	12.72%

Source: Authors own calculation

Table 16 shows that the production of Citrus production was increased 14.09% in Punjab Province during 2007-2020 while in Multan division it was decreased by -4.91%. In D.G. Khan and

Bahawalpur division the production of Citrus was increased by 11.57% and 6.59% respectively. In Multan and D.G. Khan districts the production of Citrus was decreased by -1.88% and 46.19% respectively. The production in District Khanewal was increased 16.37% whereas it was decreased in District Vehari by -15.08% and District Muzaffargarh by 12.94%. In District Layyah the production of Citrus was increased by 21.28%. In Districts D.G. Khan and Rajanpur the production of rice crop was decreased by 40.85% and 48.09%
respectively. Nominal increase was noted in District Bahawalpur where production was increased by 0.60%, while production in District Rahim Yar Khan and Bahawalnagar was increased by 14/78% and 12.72%. In short, the production of Citrus was decreased in Multan, Lodhran, Vehari, Muzaffargarh, D.G. Khan and Rajanpur while rice production was increased in Bahawalnagar, Rahim Yar Khan, Bahawalpur, and Khanewal.

The results in table 16 show that wheat production was increased from 25,214,000 tons in 2010-11 to 27,464,000 tons in 2020, an increase of 2, 250,000 tons during 10-year period. It is just an increase of 9.18% or 0.9 percent per year. The production of rice crop was increased from 4,823,000 tons in 2010-11 to 8,429,000 tons in 2020, an increase of 3,597,000 tons, which is 42.71 % during 10-year period. It is 4.271 percent per year. Similarly, the other food crop is Maize whose production was increased from 3,707,000 in 20010-11 to 8,940,000 tons in 2020-21, which is an increase of 58.31% or 5.83 % increase per annum. Total production of these

three food crops were increased from 33,744,000 tons in 2010-11 to 44,824,000 tons in 2020-21, an increase of 24.71 % in 10 years or 2.47 % per annum. This increase is far less than annual population growth rate which was 6.77 % per year during 1972 and 2017. Wheat is major food crop of which production was increased 0.9% per year as compared to population growth of more than 3 percent per year. This is the reasons that Pakistan has been importing millions of tons of wheat every year to avert food crisis and the price of floor has increased from Rs.15/- per kg in 2010 to Rs.100 per kg in 2020-21.Sugarcane is a cash crop of which production was increased from 55,309 ,000 tons in 2010 to 81,009,000 tons in 2020, an increase of 31.72 % in 10 years. Cotton is regarded as while gold and it is vital crop for providing raw material to Textile industry. Its production was decreased from 11.46 million bales in 2010-11 to 7.06 million bales in 2020-21, a decrease of 38.35% during 10-year period. It is a great loss because Pakistan imported raw cotton worth US$ 1.70 billion in 2020 and USD 1.838 billion during nine months of 2021. From these figures one can imagine how much valuable foreign exchange Pakistan is spending on cotton import. The costly import also enhanced cost of production of Textile products and made Pakistan uncompetitive in international market.

5. Discussion

From 1972 to 2017 Pakistan population was increased 314%, which was more than three times in a period of just 45 years, an increase of 6.77 % per year. The urban population was increased by

218 percent during the same period. Per annum increase in population rate was around 4.84%, which was highest in the world. According to Malthus' theory if preventive checks were not applied**,** the population would become double within 25 years. But Pakistan has strengthened Malthus prediction by increasing population 314% within 45 years. In other words, Pakistan population was increased 157% within 22.5 years. This is the reason that Pakistan has been facing Malthus' positive checks like wars, famine, drought, low productivity, social conflicts, depletion of natural resources, high living cost and widespread poverty and backwardness. Around 63.56 percent Pakistan's population still lives in the rural areas. In the words of Carl Marx, Pakistan has a surplus army of labour both in urban and rural areas and capitalists as well as feudal are maximizing their profit by paying very low wages to labour, forcing workers to work for longer hour and live at subsistence level. According to 2017 census, the population of Punjab Province was 109,99,000 out of which 40,54,7000 lived in urban while 69,44,2000 lived in the rural areas and the population density was 5.36. During a period of 17 years Pakistan population was increased from 13,23,52000 to 20,76,85000, an increase of 63.72 percent, about 3.74 percent increase per year. The increase in urban population was 56.87 %, around 3.34 percent per year. The current housing shortage in Pakistan is 10 million and it is expected to grow to 13 % by 2025. About half of housing shortage is in urban areas. According to the State Bank of Pakistan, urban housing demand is grown up by 350,000 units every year of which demand is met by only 150,000

unis, more than 60 percent demand could not be met due to financial constraints. Out of this total demand, 60 percent of housing demand is originated from low-income group, while the supply of housing is predominantly for the middle to upper middle-income group. There is great mismatch in the provision of low-income housing and demand. According to an estimate about 114,639 hectors agriculture land have so far been devoured by private housing societies, causing severe shortage of crop production. The real estate sector growth was started in 1980s when developers started purchasing low price agriculture land for converting into residential societies. It created price boom in real estate. Defense Housing Societies and Bahria Towns also played significant role in raising prices of real estate. The establishment of Development Authorities in Lahore, Multan, Rawalpindi, D.G. Khan, Bahawalpur, Gujranwala and Faisalabad in 1980s also built housing colonies on agriculture land. According to the Kisan Board Pakistan (2020), housing schemes have so far eaten up 20-30 per cent of the fertile land in Punjab. In Lahore alone,70 percent of agricultural land has been converted into residential colonies. Faisalabad has lost 30pc of its fertile land to real estate developers. The mushroom growth of housing societies in all cities have posed serious threats to environment as well as food security. It is an open secret that thousands of trees of Mango, Citrus and other fruits are cut down every year by real estate developers in the name of housing development, thereby reducing green productive land for agriculture production. The reduction of green landscape causes increases in temperature, air pollution, ground

water depletion and level of emission in urban areas. The disastrous flood and heavy rains occurred in 2022 have caused 1500 people deaths and about USD 26 billion infrastructure and crops loss in Pakistan. The findings show that the private developers did not develop housing societies to meet the shortage of housing in the Pakistan but they entered the sector to earn high profit on their investment.

6. Conclusion and policy implications

High population growth rate, low crop yield and lack of job opportunities in rural areas force the people to migrate to urban areas in order to improve their income, education and living standard. It creates high demand for housing in urban areas. But high prices of land in urban areas compel them to live in the slump areas. This causes the development of small towns in outskirts of Pakistan's major cities. In order to accommodate the new migrants, the developers-built hundreds of low-income housing societies where no proper living facilities or basic amenities are available. The people will have to live there in miserable conditions there. These residential societies were built on agriculture land situated in the adjacent areas of big cities. In this way, unplanned housing societies and urban population are increasing while production of major crops are decreasing year after year, producing food shortage and increasing prices of food items and vegetables. Pakistan has to import billions of dollars of food grains every year and is facing the issue of food insecurity.

The policy implications of this study are that high population growth, rapid expansion of housing societies and declining of crops production has created multi-dimensional challenges for policy makers to cope with them. To solve these problems the policy makers have so far taken short-term policy initiatives which have worsen the situation and made it unmanageable. They should devise long term policies in order to solve these problems on permanent basis. In this respect, it can be suggested to provide educational, health and other necessary facilities in the rural areas, besides generating job opportunities in order to stop migration from rural to urban areas. Similarly, regulatory framework should be strengthened to restrict expansion of unplanned housing societies. No housing scheme should be approved without provision of necessary basic amenities. It will reduce growing population pressure on big cities and end the mushroom growth of slum areas. It will also stop rapid conversion of productive agriculture land into residential areas. Currently, food inflation is one of the main issues for policy makers. This challenge could be managed by increasing production of food crops by encouraging the farmers to produce more through fiscal incentives. Leaving the issue of declining production of food crops and allowing opportunists to exploit the situation for making money is a dangerous strategy, which Pakistan cannot afford for a long time.

Data Statement

The data that supports the findings of this study will be available on strong request.

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