Unravelling Food Security Disarrays in Pakistan through Multifaceted Analysis, and Future Projections

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ARTICLE INFO	ABSTRACT
	This study addresses food security for sustainable development of the populace in Pakistan. Achieving universal food security requires the sufficient availability of all food groups at micro and macro levels. However, existing disarrays in policy formulation, agricultural research and development, and the narratives of development practitioners have led to disarray in food availability, and requirement in Pakistan. The objectives include examining the regional growth trends in the per capita availability of selected food items, and the trends in the composition of various food groups consumed by various income quintiles to analyze the factors affecting food production and consumption diversity in Pakistan. Time series data w.e.f. 1971 to 2023 is used, employing a multifaceted analytical approach, including descriptive statistics, trends in growth rate, HIES based estimates, and projections, and preparation of food balance sheets. The research paper evaluated that thirteen out of twenty selected food items are identified as pivotal for sustaining growth. Comparative analysis of Household Integrated Economic Surveys (HIES) across income quintiles reveals notable shifts in consumption patterns. Projections for 2030 and 2050 indicate a decline in wheat and rice consumption, contrasted by increases in the intake of potatoes, fruits, chicken, fish, milk, eggs, and vegetables. Food balance sheets helped in assessing that apples, beef, chilies, onions, sugar and tomatoes are underscoring significant disarrays. This paper recommends a balancing approach in policies for food security of Pakistan. The findings of this research shall improve the understanding of the policy practitioners of the country about food security management.

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1. Introduction

Since independence, Pakistan has been striving to attain, and maintain universal food, and nutritional security for its burgeoning population as one of the core objectives of all agriculture-related policies, programs, and strategies. In other words, Pakistan attaches high priority to achieving food, and nutritional security for its population. Therefore, the Ministry of National Food Security and Research (MNFSR) was established by Pakistan on 26th October 2011. The food security policy aimed to address the four dimensions of food security in Pakistan seeking the enhancement of universal food security. However, challenges of food security are multifaceted, encircling various factors. Diversification in agriculture plays an important role as emphasized by Ahmad and Farooq (2010) that such practice can help in addressing the inconsistency in food production, and supply.The definition of food security by World Food Summit has highlighted the complication of integration in economic access, the conditions of health, and cultural type of factors (Pinstrup-Andersen, 2009). This wide-ranging perspective specifies that food security is about having enough food along with accessibility,

nutritional adequacy, and appropriateness of cultural. In the face of these definitions and frameworks, Pakistan is continuously facing the challenges of food security. It is required to re-evaluate the current agriculture practices, and revise the food security policy to address these challenges in a better way (Dyrka, 2023). This study fetches a fresh viewpoint by concentrating on the usefulness of Pakistan's food security management using a comprehensive analysis of availability, and access of food. It drives outside traditional valuations by investigative patterns of food consumption that food is either scarce or abundantly produced (McGenity, Crombie, & Murrell, 2018). Our approach aims to provide an understanding of the disarrays in food security, and its usefulness in Pakistan.

The objectives include examining the regional growth trends in the per capita availability of selected food items, and the trends in the composition of selected food group consumed by various income quintiles to analyze the factors affecting food production, and consumption diversity in Pakistan. This objective search for understanding that how production levels are correlating with consumption-patterns, whether there exist disarrays that could influence food security(Rivza, Bikse, & Brence, 2015). For identifying and highlighting the disarrays within Pakistan's existing food security policies the goal is to detect specific food items that may need re-evaluating or fine-tuning for food security, overall. This may involve evaluating the policy to addresses how well each food item may fall short (Saint Ville, Hickey, & Phillip, 2017). By achieving such objectives, the study is aiming to provide empirical insights to refine Pakistan's approach to attaining food security.In this research paper, the structure of study is organized in such a manner to provide a systematic and clear presentation of this research. Abstract at page (01), offers a concise summary of the objectives, its methodology, and findings of the research. Introduction (page 2 to 3) is presenting the research problem, its objectives, and significance of study. The Literature Review at page 3 to 5 is further divided into subsections, like Historical Evolution of Food Security at page 3, Integration of the Broader Dimensions are at page 4, Emergence of the Comprehensive Metrics are at page 4, while Contemporary Issues, and Gaps are at page 4, with Need for the Current Study which, collectively provide the comprehensive overview of relevant literature, and it identifies the gap at page 5. The Methodology is detailed in pages 5 to 7, outlining the research design, and method of Trend Analysis using Semi-Log model at page 5-6, Food Balance Sheets at page 6), and Economic Access Using HIES at page 6 to 7, the Novel Approach to Food Balance Sheets is at page 7, and its Modifications are also at page 7. Result, and Discussion (page 7-12) section, with its sub-sections like Economic Access, and Consumption Trends (page 9-10), and Disparities, and Implications of Food Security at page 10, these are presenting, and interpreting the findings of this study. Finally, Conclusion, and Policy Recommendations are at page 12. References are covered within page 13-16 to list all cited sources, and at the end Appendices from page 17 to 19 are providing the supplementary material.

2.   Literature Review
The addressing of food security evolved expressively over decades, reflecting the growing thoughtful of complex factors affecting the pillars of food availability, its accessibility, utilization, and sustainability. This literature review traces the progress in the food security concepts highlighting the gaps that emphasize the need for this study.

2.1.   Historical Evolution of Food Security Concepts
At first, the focus centered on food security to ensure adequate availability of food. Historically, definitions have emphasized the position of food production, and its stockpiling to prevent its shortages. Handy (1985)was the first one to address the basic need for food safety, and sufficiency, providing the groundwork for further food security research. Similarly, Benson, Clay, and Green (1986)has explored implications of the food production systems on its overall security, emphasizing that food production alone is not sufficient for effective management systems.

2.2.   Integration of Broader Dimensions
As the research progressed, researchers came to recognize that food security includes more than its availability; it may also involve food accessibility, and its utilization.Oshaug (1985)extended the concept by incorporation of a nutritional balance, with the argument that food security has to ensure the right kind of food to meet dietary needs, too. Such broadened perspective was vital for understanding that both quantity and quality aspects are important for food security.

2.3. Emergence of Comprehensive Metrics

At the end of 20ᵗʰcentury, research scholars began to integrate the food security framework further. For example, Alderman and Garcia (1994) underscored the role of socio-economic factors like governance, and economic stability, being critical components of the food security underscoring that an effective management of food security requires strong governance structures, and economic policies to guarantee practical food accessibility for all segments of the population, not just based on hypothetical conceptualization.Ahmad and Farooq (2010)have further expanded the scope of food security emphasizing that only wheat production should not be the focusing point for food sufficiency, diversification in agriculture is the clarion call to mitigate the risks associated with food production, and supply.

2.4. Contemporary Issues and Gaps

The foundational ideas in recent literature have continuously been constructed on exploration of the contemporary issues like climate change, challenges of governance, and the gender empowerments having the impact on the food security. There are some critical gaps in the understanding of the management of food security, having some practical implications for such factors. However, extensive research has been conducted on the climate change, and its effects on the agriculture because there is always exist the need for more focused studies on the changes impacting the food security at household levels (Alderman & Garcia, 1994; Oshaug, 1985).

2.5. Need for the Current Study

Although there is improvement made in the research on food security, a prominent gap exists in the evaluation of current policies that how effectively these can address the availability of food, and its access especially in the context of Pakistan. The novelty of this research lies in its multifaceted approach to analyzing food security. It examines the trends in food security in Pakistan, and investigate the consumption status of selected food items for both abundance, and scarcity. The aim of this study is to provide a more nuanced understanding of the policy disarrays (Busbarat, 2020). The present approach is expected to produce valuable insights that could enhance policy outcomes, and provide some refinements in the food security strategies. More precisely, some substantial researches have addressed various dimensions of food security, but there is a need for targeted study that can assess the empirical application, having useful impact on food security. This study is addressing this gap and focusing on a more comprehensive understanding of food security management, and policy.

3. Methodology

This study proposed an integrated methodology combining some established tools, and novel approaches providing an analysis that is comprehensive for food security in Pakistan. It includes a semi-log trend model for trend analysis (Tiamiyu, Kolo, Adewale, & Ugalahi, 2014), using food balance sheets for assessing food availability, and requirements(Juanda, Sartika, & Utari, 2022), and incorporating Household Integrated Economic Surveys (HIES) for economic access analysis (Awan, Bilgili, & Rahut, 2023)This section describes modifications made to existing approaches (Kaur & Verma, 2022). All definitions of annual variables are adapted from the FAOSTAT [1] on FBS, and it's Glossary. However, old methodology of the FAO has categorically been defined along with construction details of data sets called FBS & SUA[2] list.

3.1. Trend Analysis Using Semi-Log Trend Equation

A semi-log model has been used to analyze the trends in food security of Pakistan for the period w.e.f. 1971 to 2023. It is a statistical tool, standard for examining long-term changes in the data over time. This semi-log trend model is represented by Gujarati (2004), and used for the purpose of fitting the trend based on well-known formula of compound interest as follows:

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[1]FAOSTAT data centersoffer complimentary access to the food, and agriculture data.It includesdetails of variables on crops, and livestock, etc., for 245 or more countries, and territories. The database is spanningall FAO regional groupings with effect from 1961 to latest available year.

[2]Supply Utilization Accounts (SUAs) are providing detailed overview of selected country's food supply patterns for the reference period.

$$Yt = Y0 * (1 + r)t \tag{1}$$

In equation (1) Y_0 is the value of the variable Y at its initial level, Y_t is the value of Y at time t, and, r is the compound growth rate of Y. Manipulating (1), by taking log on both sides we have:

$$ln\,Yt = ln\,Y0 + t * ln\,(1 + r) \tag{2}$$

Let, $a = ln\,Y_0$, and $\beta = ln\,(1 + r)$ then

$$ln\,Yt = \alpha + \beta\,t \tag{3}$$

Adding the error term, we have

$$ln\,Y = \alpha + \beta t + \varepsilon \tag{4}$$

Where *Y* is the time series data on any variable, *t* is the time trend term, *a* is the constant coefficient, and *ε* is error term. The slope coefficient *β* measures the relative change in *Y* for a given absolute change in the value of explanatory variable *t*. This is a linear regression model like others. It differs only because the dependent variable has logarithmic form, and independent variable is "time". Further, it is semi logarithm model as only dependent variable is in the shape of logarithm where, slope measures the relative change in the dependent variable Y for a given change in the independent variable. If we multiply the relative change in *Y* by 100, we get the percentage change or growth rate in *Y*, an absolute change in variable *t*. The slope coefficient *β* measures the instantaneous rate of growth. This method allows for the examination of exponential trends in food security variables. Usage of this model follows an established practice for the trend analysis in the food security related research (Box, Jenkins, Reinsel, & Ljung, 2015; Gujarati, 2004).

3.2. Food Balance Sheets for Comprehensive Assessments

An identity reflecting the Food Balance Sheet (FBS) is Supply ≡ Utilization, where Total Supply or Utilization = Production + Import – Export – Change in Stock - food – Feed- Seed – Food Processing – Tourist Consumption – wastages – Residuals. FBS are designed to assess food availability, its consumption, and distribution at the national level. It provides detailed data on the food production, import, export, and food consumption. For this study, the food balance sheets (FBS) are collected, and constructed from the Food, and Agriculture Organization's (FAO) database, and analyzed to determine the adequacy of selected food items' supply. The methodology used for construction of FBS is followed by using the standard procedures outlined byFAO Food and Agriculture Organization (2020). Novel aspect of this study is an approach that is modified for assessing the availability, and requirements of selected food items, incorporating dynamic adjustments based on some dietary guidelines, and population growth projections.

3.3. Economic Access using Household Integrated Economic Surveys (HIES)

The economic access aspect of food is analyzed using Household Integrated Expenditure Survey (HIES) that provide data on the household income, their expenditure, and consumption patterns. HIES data allows us the evaluation of the economic access to food using comparison of household food expenditure with their income levels, and the poverty thresholds. HIES methodology includes a detailed sampling procedure, and collection of data using the techniques described by Pakistan Bureau of Statistics (Pakistan Bureau of Statistics, 2022). For the micro-underpinning aspect of our research, the development of food requirement will be a fundamental focus. This will be achieved through the utilization of data derived from the Household Income and Expenditure Surveys (HIES) provided by the Pakistan Bureau of Statistics, Government of Pakistan. Alternatively, the Food and Agriculture Organization (FAO) Database for food balance sheets may be employed to gather pertinent information. The concept of "requirement" encompasses various facets, including food for direct consumption, feed for livestock, losses in the supply chain, other uses of food items, processing needs, and seed requirements for cultivation. This study has modified the standard approach by incorporating some updated income thresholds, and food expenditure patterns for better reflection of the current economic conditions.

3.4. Novel Approach to Food Balance Sheets

The present study introduces a novel approach for the construction of food balance sheets by integrating the real-time data adjustments for the availability, and assessmentsof requirements. Traditional methods are typically using static data, our study incorporates dynamic elements, like recent dietary guidelines of our selected food items, and population projections for provision of a more accurate image of the current food security status (Chrimes, Kuo, Moa, & Hu, 2017).

3.5. Modifications to Existing Methods

Unlike conventional analyses of food balance sheets, there are some dynamic adjustments that are used in the historical data. This study has incorporated these adjustments based on current dietary guidelines of our selected food items, and projected population changes (Gyurkovics & Levita, 2021). The data has also been converted to the same base year by adopting a splicing procedure (Hill & Fox, 1997)using old FAO methodology of FBS (1971-2013) as well as its new methodology of FBS (2010-2022), respectively. The updated income thresholds have been developed for the analysis of economic access, using published HIES data related to current income thresholds, and expenditure patterns to reflect on recent economic shifts(Kumar & Patel, 2022). Based on the combination of these methods, our study aims to provide an up-to-date and comprehensive analysis of the food security in Pakistan. Further researches to reproduce such studies can follow the methodologies outlined here, by use of specified data sources, and applying such modifications to the existing approaches.

4. Result and Discussion

The study examines food security in Pakistan, utilizing data from diverse sources such as the Pakistan Bureau of Statistics, State Bank of Pakistan, Pakistan Economic Survey, and Food and Agriculture Organization. Detailed analyses are presented for key food items, including wheat, rice, potato, butter/ghee, oils, milk, eggs, chilies, pulses, beans, fruits (banana, apples, citrus),onions, sugar, tomatoes, vegetables, chicken, beef, freshwater fish, mangoes, and tea. Our selected food groups are comparable to that of some South Asian food baskets. For example, food items selected are almost the same while, making a comparison with (Alae-Carew et al., 2019)detailed study on food consumption baskets of South Asian country. The commonality of the food items of this research work has been extracted in Figure 1 below in the appendix which shows that the percentage of cereals will become more prominent and higher (43%) if it includes both wheat (32%) and rice (11%). Meat, and milk both being dairy items have 26% of consumption. Eggs are having a share of 10%. While sugar, and pulses are showing equal percentages i.e. (8%). The minimal percentage as compared to all items of consumption is for vegetables (5%).

Economic access analysis is conducted using the HIES (various editions) along with estimation from 1971 to 2023, and forecasting for 2030, and 2050, highlighting expenditure patterns across different quintiles. Notable findings include an increase of 5.4% in wheat production in 2023 attributed to government policies. Comparing the results of HIES 2018-19, and our estimates for 1971-2023, along with forecast for 2030, and 2050, its seems that households in 1st quintile were consuming more quantities of wheat, rice, pulses, vegetable, oil/ghee, and sugar while, households pertaining to the 5thquintile spent mainly on milk, fruits, meat and outdoors like hotels and restaurants during 2018-19. Thereafter, a decrease in the consumption of wheat, and rice as per our estimates for 1971-2023, along with forecast for 2030, and 2050 (Figure 2below in the appendix). On the other hand, an increase is observed in the consumption of potatoes, and fruits like apple, banana, and mangoes (Figure 2 & 3)below in the appendix. Chicken, and fish consumption is also increasing (Figure 4below in the appendix). Dairy products' consumption demand is growing (Figure 5below in the appendix). Pattern of tomatoes, onions, and other vegetables is up-word, showing increase in their consumption (Figure 6below in the appendix). The results indicate that in 2018-19, households in the lowest quintile (1stquintile) had a higher consumption of staple foods such as wheat, rice, pulses, vegetables, oil/ghee, and sugar. In contrast, households in the highest quintile (5thquintile) allocated a larger portion of their expenditure towards dairy products, fruits, meat, and dining out at restaurants (Stobiecka, Król, & Brodziak, 2022). By comparing the 2018-19 Household Integrated Economic Survey (HIES) data with estimates for 2022-23 and forecasts for 2030 and 2050, we observe a significant shift (Awan, Bilgili, & Rahut, 2023).

It is observed over time that there is a decrease in the consumption of cereal crops of wheat, and rice (Figure 2 below in the appendix)that is suggesting a potential decline in the dependence on such staples(Arimoto et al., 2023). On the other hand, it is observed that there is an increase in the consumption of potatoes (Figure 2 below in the appendix), and fruits (comparatively high for apples, and bananas as per Figure 3 below in the appendix), and lessen increase is observed for mangoes (Figure 3 below in the appendix)that has also been observed (Dhiman et al., 2022), further for chicken (Figure 4 below in the appendix)we observed that it has been consumed with an increasing rate (Pasitka et al., 2022) while, fish (Figure 4 below in the appendix)is showing a lessen increase in its consumption similarly, dairy products of milk and eggs (Figure 5 below in the appendix) are being consumed with an increasing rate (Stobiecka, Król, & Brodziak, 2022).

4.1. Economic Access and Consumption Trends

Positive compound growth rate calculated from semi-log models' analyses demonstrate a surplus in their availability (Cobb & Seale, 2020)for several key food items. Out of our selected twenty food items for this research, thirteen food items are indicating a sustainable position of surplus amount. These food items include wheat, rice, potatoes, beef, chicken, fish, eggs, milk, sugar, onions, banana, citrus(oranges), and mangoes (Table 1).These positive growth rates suggest that our selected food items are meeting, or exceeding demand, contributing to surplus availability. For example, wheat, rice, sugar, milk, and bananas all show positive growth(Table 1), suggesting that our selected commodities are meeting, or exceeding current demand levels. Specifically, wheat and rice(Table 1)below have shown the growth rate of 3.89, and 2.98, respectively, with higher r^2 values indicating a strong predictive accuracy (Boden et al., 2023; Veltman, Flowers, Van Andel, & Schranz, 2018). The model for dairy products like milk also revealed that the growth rates is high (Meek, Noble, & Breastfeeding, 2022), and similarly the model for eggs (Vlaicu, Panaite, & Turcu, 2021) is robust, reflecting an increasing demand, and availability. These trends are aligned with the rising consumption observed in the recent years (Klein et al., 2018).

Table 1: Semi-Log Model Results for Selected Food Items

Food Item	Model	Growth Rate	t-Statistic	r^2
Wheat	$\hat{Y}=2.165 + 0.69Wheat\_1 + 0.76t - 0.526t\_1$	3.89	(6.88) (0.000)	0.98
Rice	$\hat{Y}=2.68 + 0.69Rice\_1 + 0.129t\_1$	2.98	(5.53) (0.000)	0.85
Sugar	$\hat{Y}=2.03 + 0.64Sugar\_(-1) + 1.17t - 0.89t\_1$	3.36	(6.26) (0.000)	0.94
Milk	$\hat{Y}=1.003Milk\_1$	9.07	(1673) (0.0005)	1.00
Banana	$\hat{Y}=2.65 + 0.57Banana\_1 - 2.49t + 2.3t\_1$	2.71	(1673) (0.0005)	1.00
Potatoes	$\hat{Y}=0.92Potatoes + 0.81t - 0.62t\_1$	7.32	(16.1) (0.000)	0.92
Chicken	$\hat{Y}=0.96Chicken\_1 + 0.84t$	8.12	(49.4) (0.000)	0.97
Beef	$\hat{Y}=1.006Beef\_1$	9.14	(1091) (0.000)	0.99
Eggs	$\hat{Y}=0.87Eggs\_1 + 0.022t$	6.41	(41.7) (0.000)	0.96
Onions	$\hat{Y}=0.97Onions\_(-1) + 61.98t - 62.3t\_1$	8.13	(67) (0.000)	0.98
Oranges	$\hat{Y}=285.7t + 0.69Oranges\_1 - 78.4t\_1$	3.38	(6.8) (3.15) (-3.11)	0.85
Mangoes	$\hat{Y}=1.002Mangoes\_1$	9.15	(92.9) (0.000)	0.99
Fish	$\hat{Y}=1.18t - 0.80Fish\_1$	6.3	(7.68) (2.04)	0.92

Notes: Author's estimates of trend analysis. Here, t-Statistic are values presented in the parentheses; while, r^2 are indicating the coefficients of determination.

4.2. Disparities and Food Security Implications

Analysis of the disarray in the availability, and requirement of selected food items has been provided in Table 2 (below) that underscores some significant disparities, and challenges. For instance, onions, and tomatoes have experienced periods of disarray, where availability has fallen short of its requirements as observed in certain periods. This is indicating the potential issues in the production stability, or market dynamics (Torres et al., 2023). Similarly, beef has been showing occasional shortages, while citrus, and oranges are generally meeting the demands with minimal deficits. These findings are emphasizing the need for addressing these disparities by using the targeted policy interventions. Developing of coherent trade policies, improving the forecasting mechanisms and supporting the farmers with education, and technological access are the crucial steps for stabilizing the food availability. This analysis also highlighted the importance of integrating nutrition policies, and conducting of comparative

analyses with worldly trends[3]for enhancing the food security (Ngqangashe, Goldman, Schram, & Friel, 2022).

Table 2: Disarray in Availability (A), and Requirement (R) in 000, tones

Year	Chilies		Apples		Onions		Sugar		Tomatoes		Beef	
	A	R	A	R	A	R	A	R	A	R	A	R
1971	42	64	103	13	247	492	2062	914	0	99	300	288
1972	52	68	103	18	250	460	1931	843	0	111	306	267
1973	57	68	117	23	174	465	2260	869	0	117	318	277
1974	50	70	123	28	240	487	2515	909	0	126	322	292
1975	52	71	114	34	303	509	2030	947	0	136	324	307
1976	79	73	121	38	322	529	2640	989	0	146	329	322
1977	78	75	129	43	328	549	2885	1028	0	156	333	337
1978	81	77	116	49	278	568	3127	1070	0	167	335	351
1979	98	79	114	32	367	606	2543	1153	0	178	340	388
1980	109	81	118	37	365	631	2794	1175	86	190	380	402
1981	106	83	125	42	372	653	3423	1203	92	203	394	416
1982	100	85	125	47	418	676	4038	1234	100	216	407	430
1983	104	87	132	51	399	700	3371	1262	118	230	421	444
1984	97	90	136	56	458	725	3277	1293	127	244	443	459
1985	96	92	197	71	490	750	3208	1299	130	260	466	477
1986	99	94	201	79	458	774	2793	1445	150	275	546	492
1987	92	85	196	94	528	814	3819	1436	148	314	574	532
1988	84	89	204	96	570	867	3768	1541	162	331	602	511
1989	74	93	201	102	680	919	3369	1592	179	348	632	531
1990	126	98	43	107	631	970	3771	1645	194	366	667	550
1991	101	101	53	99	698	1009	4309	1686	214	379	696	568
1992	137	105	62	158	797	1059	4068	1924	238	395	731	575
1993	75	109	78	219	862	1106	3927	2172	243	410	768	583
1994	141	116	83	222	889	1181	4647	2284	254	436	807	762
1995	108	117	80	215	1038	1203	4308	2169	277	441	847	697
1996	138	121	93	207	1114	1250	4990	2143	309	456	717	670
1997	141	125	92	275	1133	1295	4524	2033	314	471	827	595
1998	141	128	121	337	1066	1335	4423	2105	328	486	846	392
1999	140	142	139	407	1113	1519	4136	2180	337	541	867	180
2000	121	141	150	344	1593	1627	6185	2196	284	559	885	291
2001	174	142	139	303	1492	1690	5574	2222	273	575	906	370
2002	96	140	152	207	1376	1787	4793	2221	299	596	928	525
2003	95	143	145	289	1374	1801	5461	2299	305	620	949	554
2004	93	144	161	344	1414	1802	5180	2342	415	634	977	572
2005	88	148	151	459	1806	1829	4385	2435	435	665	1002	610
2006	116	134	156	321	2048	1635	7152	2431	470	651	1305	364
2007	64	137	156	319	1991	1771	6290	2540	510	645	1350	381
2008	140	140	155	316	2075	1923	6282	2657	579	639	1383	399
2009	196	143	63	328	2023	1904	4706	2699	631	693	1421	415
2010	184	155	99	338	1732	1895	4887	2753	550	776	1524	428
2011	170	149	64	353	1857	1868	5791	2802	659	852	1562	446
2012	67	152	153	317	1794	2109	5411	2796	817	872	1600	477
2013	143	144	116	434	1667	2123	4253	2863	842	911	1639	498
2014	150	135	153	556	1620	2146	6030	2930	884	952	1676	519
2015	149	149	160	578	1527	2194	5690	3067	836	1071	1725	495
2016	138	166	129	612	1642	2286	4310	3269	826	1218	1785	477
2017	137	166	193	644	1779	2415	5527	3346	637	1286	1839	490
2018	146	164	313	662	1882	2494	7351	3365	718	1320	1910	494
2019	126	157	183	688	1920	2573	6431	3339	788	1371	2126	493
2020	112	176	186	682	1902	2747	5652	3646	959	1284	2172	514
2021	120	181	184	710	1773	2762	7079	3732	886	1328	2265	510
2022	142	181	168	738	1556	2840	7817	3815	971	1375	2351	506
2023	77	189	152	792	1224	3016	8046	4030	1000	1467	2475	518

Source: Author's own contribution based on FAO Database, various editions of Pakistan Economic Survey, and the HIES published in PBS.

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[3]The author has worked on worldly trends in his Ph.D. thesis (2023).

5.   Conclusion and Policy Recommendations

The complex nature of food security in Pakistan has comprehensively been analyzed in the present study. The trends are observed from 1971 to 2023 indicating significant shifts in the availability, and requirements of some selected food items. The study is reflecting that both growth, and disparities are observed in our food system. The data revealed a noticeable change in the dietary patterns, through an increase in the consumption of diverse food items like chicken, dairy products, fruits, and potatoes, while a decline in the consumption of staple foods such as wheat, and rice. These shifts are indication of the evolving dietary preferences, and potential areas of disarray in the food production, and consumption. These findings highlighted increase in the consumption of some selected food items, like fruits, and dairy products that are aligned with the observed trends in growth, suggesting a positive shift towards a more varied, and nutritious diet. On the other hand, this study also identified significant disparities in the availability, particularly with items such as beef, onions, and tomatoes that have shown periodic shortages. These disparities are pointing underlying disarrays in food production, distribution, and market dynamics that are required to be addressed for ensuring a stable food supply.Based on these results, it is recommended that the policymakers should adopt a balanced, and consolidative approach for sustainable food security. Strengthening of the agricultural research, and development is required to mitigation the observed disarrays. For the sake of improving productivity of the key food items, diversification in crops production will be helpful. In order to support sustainable agricultural practices, prioritized investment in technology, and education for farmers is required. The periodic shortages, and imbalances identified in this study can be addressed by improvement in the forecasting mechanisms, and development of a more efficient food trade, and distribution networks. This may include regulating the markets to stabilize the prices, refinement of the trade policies, and ensuring consistent availability of the essential food items. Continuous monitoring mechanism for the consumption trends, and adapting of related policies is crucial. This may include updating of the dietary guidelines, and relevant food security strategies to reflect on the evolving consumer preferences, and cultural changes. Implementation of these recommendations can help in better alignment of Pakistan's food security policies with its current needs, and future projections, thereby enhancing the overall sustainability, and resilience of its food system. This approach can contribute to sustainable development goals, and also helpful in achieving the broader, and improved public health.

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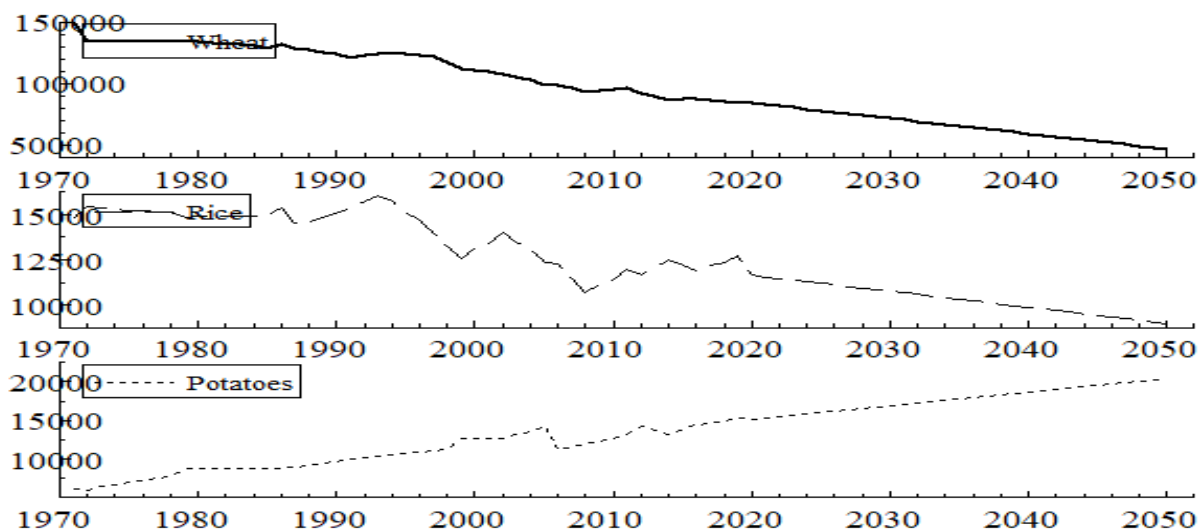
Appendices
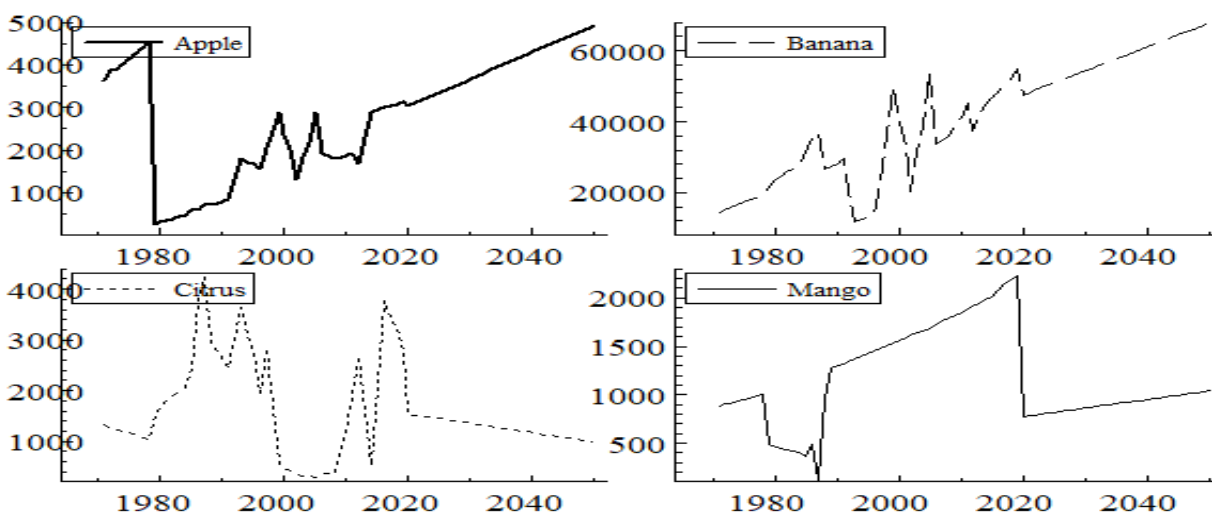**Figure 1: South Asian Consumption of Consistent Food Items**
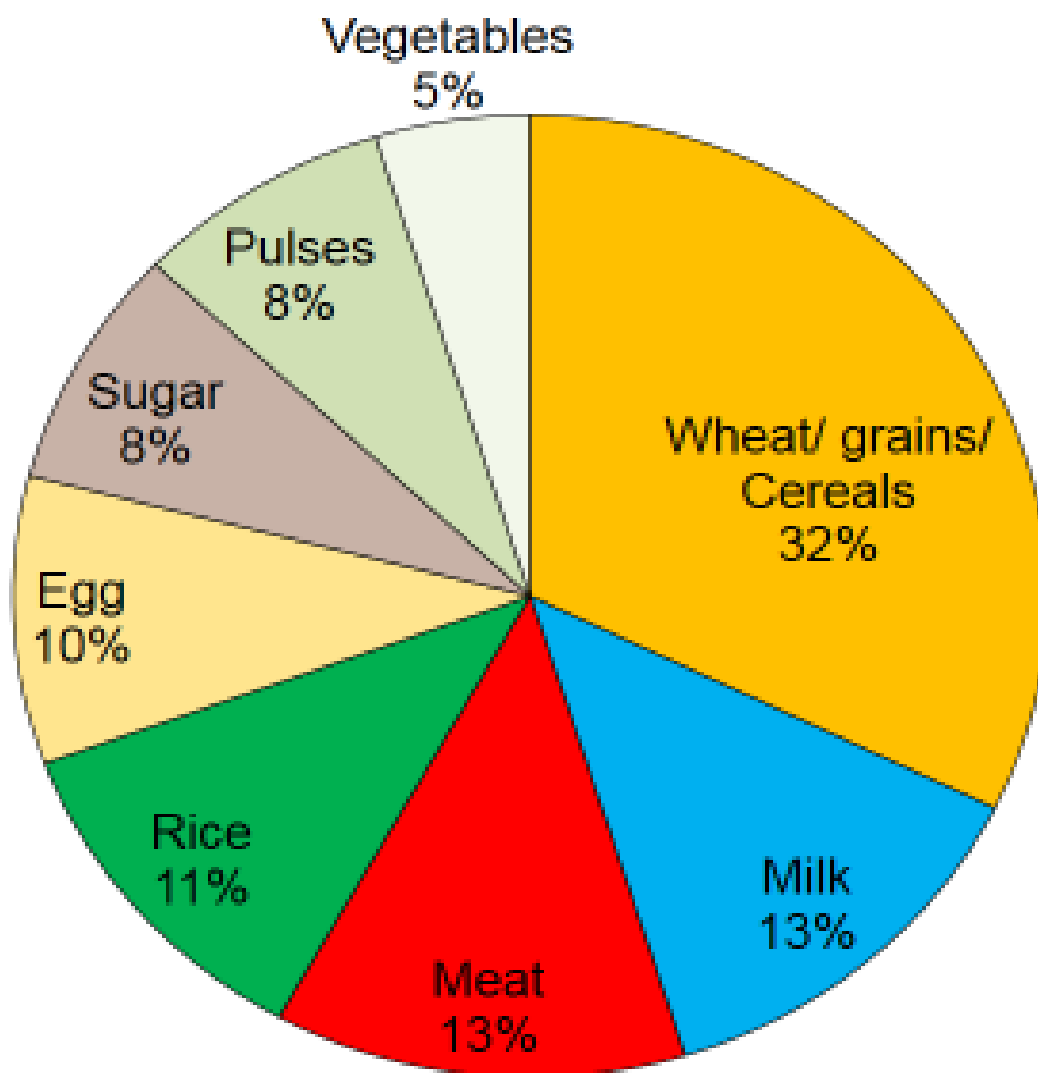
Source: Author's own contributions based on Carmelia Alae-Carew et al (2019).

Figure 2: Annual Consumption of Cereal Crops (Wheat, Rice, and Potatoes)
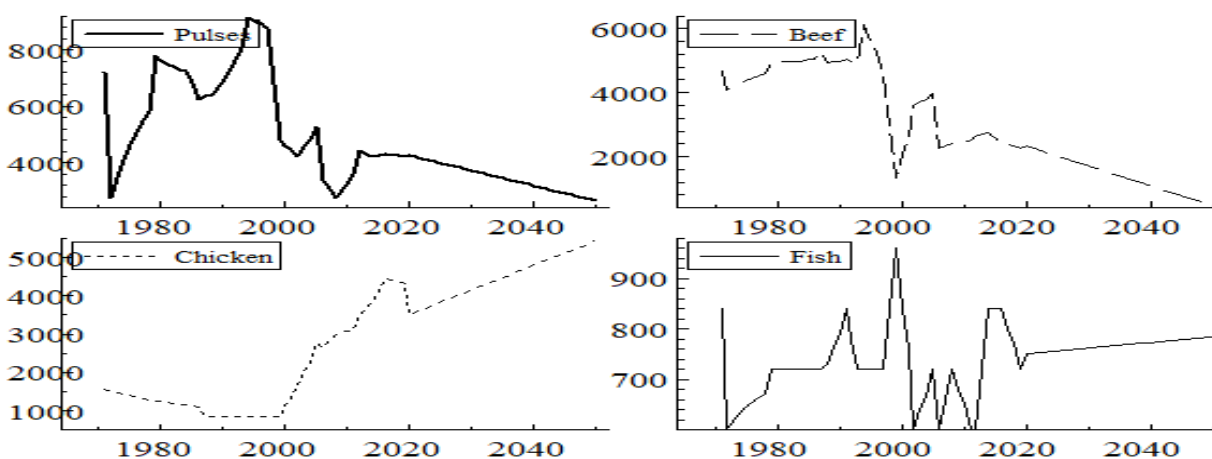

Source: Author's own contribution based on FAO Database.
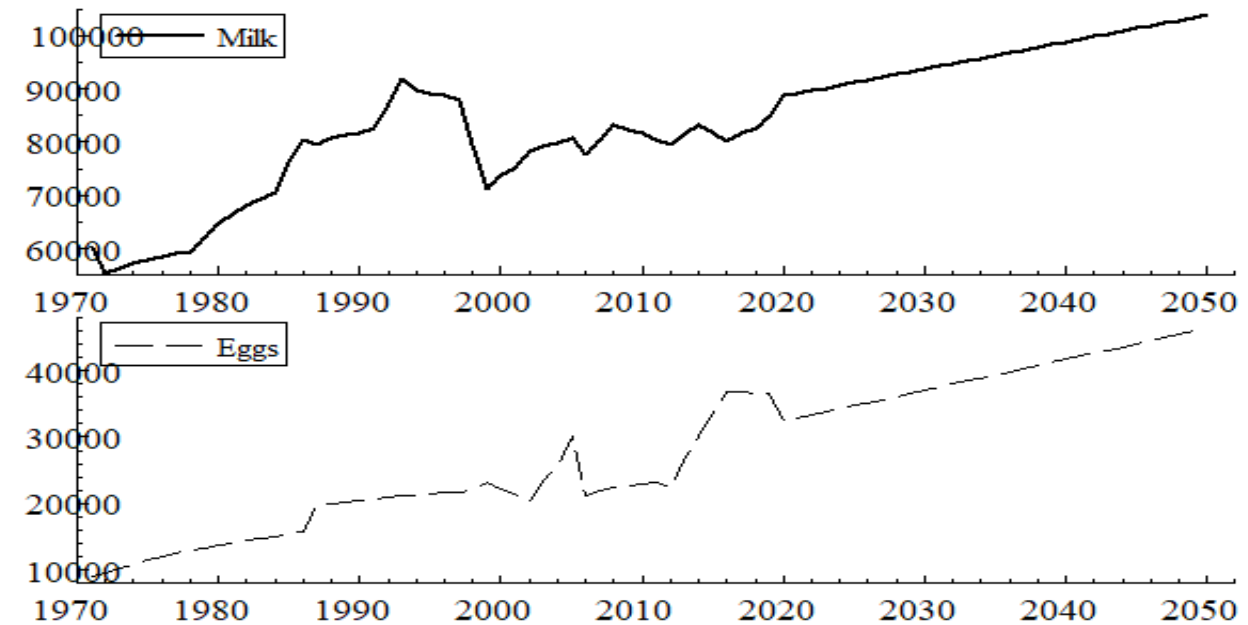
Figure 3: Annual Consumption of Fruits

Source: Author's own contribution based on FAO Database.

Figure 4: Annual Consumption of Foods (Pulses, Beef, Chicken, and Fish)
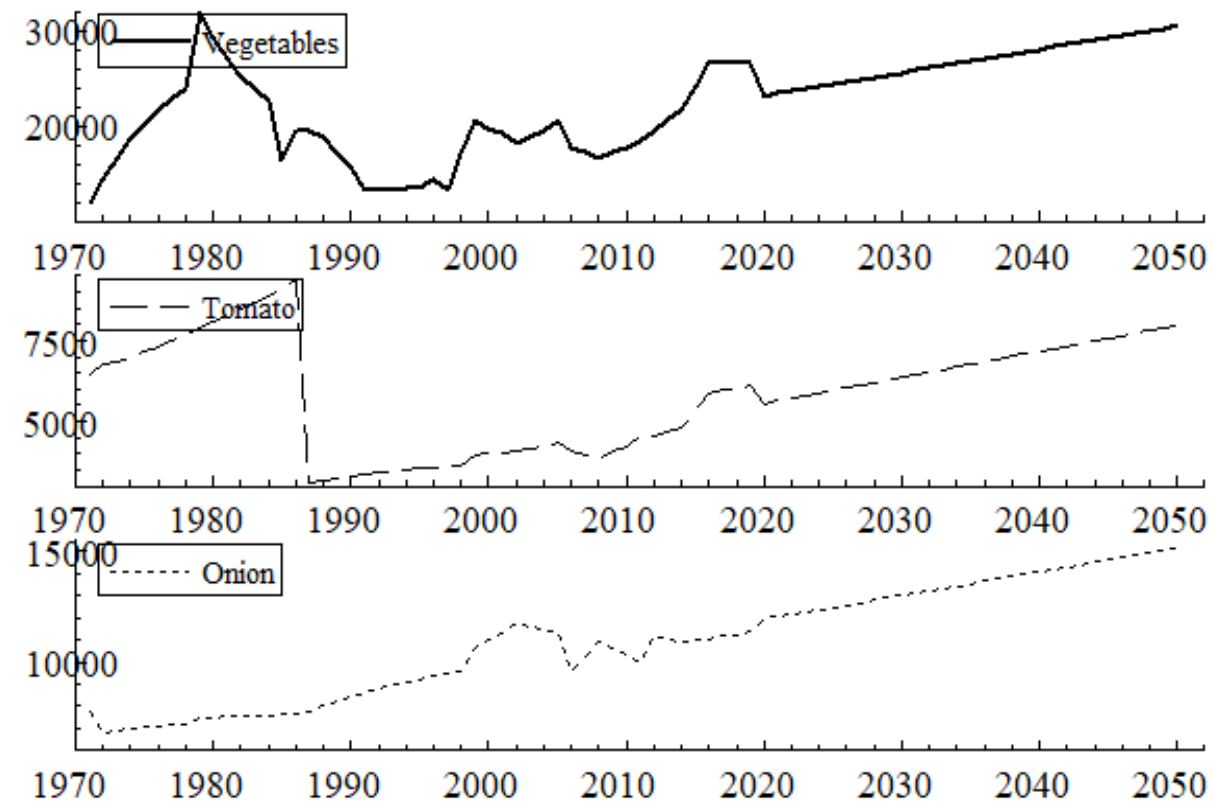

Source: Author's own contribution based on FAO Database

Figure 5: Annual Consumption of Dairy Items (Milk, and Eggs)

Source: Author's own contribution based on FAO Database

Figure 6: Annual Consumption of Vegetables

Source: Author's own contribution based on FAO Database