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Food Insecurity in Pakistan: A Study of Food Wastes in the Hoteling Industry of District Swat

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ABSTRACT

This research study aimed to estimate the damage that is caused every year to food security in the hoteling industry in Pakistan. The target population for this study was the hoteling industry in district Swat and the data was collected from 100 hotels. The data was collected on food wastes in the hoteling industry. Food waste was measured in the form of pre-consumer and post-consumer food wastes. Food waste was measured in kilogram and the average price of 1 kilogram of accumulated food waste was calculated as Rs. 350. The data revealed that the accumulated average food waste in the hoteling industry in district Swat is worth of Rs. 243296800 per year that is equivalent to US $ 1013736 per year. This cost was identified by calculating the average pre and post-consumer food waste in kilogram. The results of this research study revealed that on average 694 tons of food goes to bin every year in district Swat that is far higher than the average food waste in the hoteling industry in Denmark is 288 tons.

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1. Introduction

Pakistan is a South Asian state that highly relies on agriculture sector. The contribution of this sector in the country's GDP is about 24%. More than 70 percent population of the country is either directly or indirectly associated with agriculture sector. Despite of being an agriculture country, Pakistan still spends a huge amount of its budget on the import of agriculture goods. Every year about 3 million tons of wheat is imported from the foreign world to fulfill the domestic demand for wheat (Habib et al., 2018). Similarly, the import of other agriculture goods also inflicts huge cost to the exchequer of the state. One main reason that explains this huge domestic demand for food is the rising population growth rate. In addition, food loss and food waste have been threatening food security in the country. Food security is the state of having access to sufficient nutritious food while insecurity is inaccessibility to or unavailability of sufficient nutritious food for consumption. Though, the agriculture sector is contributing more to the GDP, however, man is still behind the plough to cultivate food. Technology intensive production is still lacking in the agriculture sector that has been negatively affecting per acre yield. Consumption demand has been enormously increasing while supply of food is lacking behind.

The covid-19 pandemic also caused huge damage to trade in goods and services because majority of the states in the world diverted their efforts to humanitarian assistance and adopted stay-at-home policy to curb further spread of this disease. As a result, malnutrition increased among people, particularly children and pregnant women. This malnutrition was basically caused by obstruction in the supply of goods, particularly food material. Those states that were vulnerable to pandemic and natural disasters such as the conflict-hit countries like Pakistan, Yemen, Democratic Republic of Congo, Afghanistan, Venezuela, Ethiopia, Iraq, Syria and Libya

were the chief sufferers. In these countries, poverty and food insecurity were closely associated. Persistent conflicts kept on hindering production activities that resulted in food shortages and famines. Thousands of miles of land that was previously used for cultivation now remained barren due to insecurity and bloodshed, particularly in Afghanistan. Food production level had been decreased up to a greater extent, thereby leaving millions of people without food in the far-flung areas of the developing world. Food that was previously available for consumption could not be founded in the market now. This unavailability of food had contributed more to malnutrition among millions of children and women.

Malnutrition had been negatively affecting people's health and resulted in severe medical conditions. Improper diet, iron deficiency and lack of vitamins and proteins in daily nutrition had been negatively affecting human health. According to Global Hunger Index (2017) an estimated US $70 billion are required for the forthcoming 10 years to meet the global target for iron deficiency. (Pérez-Escamilla, 2017) argued that food unavailability and insecurity had been contributing more to bad health conditions. The consequences of bad health conditions could be founded in the form of vulnerability to diseases, low weight, blood deficiency, laziness and many more symptoms. The research study basically deals with food insecurity caused by food waste in the hoteling industry in Khyber Pakhtunkhwa. In this research study, we measured food wastes in the local hoteling industry with the aim to identify the damage it has been inflicting to food security in the country. In the following passage, a general discussion is carried out on food waste and loss in the world, followed by some facts from Pakistan. In the subsequent passages, a detailed research methodology followed by a comprehensive discussion on food waste along with some quantitative measurements are included.

1.1. Food Insecurity and Nutrition

Nutrition security comprises of sufficient nutrients, proper health care, consumption of enough calories and other essentials such as adequate sanitation and clean water to drink. There is a strong association between availability of food and nutrition security. High nutrition consumption depends upon availability of food. In the developing countries, low nutrition is usually caused by lack of availability of food for consumption. In the developing world, about 56.5% of the population is food unsecured. Lee (2018) argued that low nutrition is not positively associated with food security rather unequal socio-economic conditions have been hindering the access to food and proper nutrition. In this research study, they used average dietary energy requirements derived from the national dietary energy requirements. The average dietary energy requirements are specified for every region. In this research study, they founded that sufficient food is available to feed the existing as well as the future population of about 9.7 billion by 2050, however, socio-economic inequality causes millions of people left without food and millions of them wasting millions of tons of excessive food.

Valerie et al., (2019) conducted a study on the determinants of household's food insecurity in Canada by using Canada Community Health Survey data with a large sample size of 120,909 people. The study used the 18 items with a scale developed by the United States Department of Agriculture. For analysis, multivariable and multilevel logistic regression model was used. Furthermore, households were categorized as food secure, marginally, moderately and food insecure. Moreover, geographic and socio-demographic factors were assessed to identify the severity of food insecurity. The study concluded that households' social assistance, employment compensation, education, main source of income, territory of residents, family structure, aboriginal status was some of the factors that influenced households' food insecurity. Weaver & Hadley (2009) examined the non-nutritional impacts of food insecurity in developing countries. The study disclosed that food insecurity is a complex and multifarious concept. A person can be food insecure, but food sufficient at the same time, similarly, a person can be food insecure, but well nourished. In contrast, if an individual is hungry and food deficient it means that he/she is food insecure. In addition, people's mental, emotional and physical health is being substantially affected by food insecurity in terms of sufferings, hopelessness, weakness, headaches, anxiety, depression, shameful experience in time of social events, sleeplessness, anguish and maternal dry breast due to non-availability of enough food are some of the outward consequences of food insecurity.

The United Nations (UN) sustainable development goals were drafted in 2015 to effectively channelize and guide the world's development towards peoples' prosperity and well-being. However, education, health and water were given right based approach in SDGs. Countries

like Canada, United States and some European states were of the view that access to food could not be considered as a right of the individual. According to these states, the market structure is far efficient for distribution of food commodities than a mechanism based on human rights. Moreover, the international institutions like World Trade Organization, World Economic Forum, International Monetary Fund and World Bank are good enough to effectively meet people food and nutritious needs.

Among the developing countries, Pakistan has also been making efforts to develop measures and strategies to control food insecurity. One of these policy steps was to increase agriculture productivity and improve nutrition status. These initiatives have been taken with the assistance of International Development Organizations to enhance agriculture productivity and improve nutrition status. Similarly, to tackle food insecurity and eliminate hunger, National Zero Hunger Coordination programs were started at national level. Despite of the fact that more than 20.3% of the population in Pakistan are consuming very less amount of calories and are undernourished, however, on the Global hunger Index 2019, Pakistan was ranked 94th out of 117 countries (Hameed & Salam, 2020). Cheema and Abbas (2016) conducted a study on the factors causing food insecurity in Pakistan by applying logistic regression model and using Pakistan Social and Living Standard Measurement data. This study founded that food insecurity in Pakistan was inversely associated with individual literacy, livestock, foreign remittances and female family heads, while positively associated with poverty. Furthermore, it was also founded that poverty was the principal cause of food insecurity. Poverty aggravated food security and resulted in vicious circle in the long run.

Sher et al. (2018) highlighted the elements that influenced household food security in Pakistan. In this study, they used binary logistic regression in which they founded that households' farm income, non-farm income, employment status, education level and livestock were some of the basic elements that were significantly associated to households' food security. While family size, location of food market and physical infrastructure such as transportation and roads were founded to be negatively associated with food security. Both food markets and distance from households' home to road were identified as stimulators of food insecurity. According to (Sleet, 2019), Pakistan is food sufficient country with enormous capability to export surplus food, however, 60% of the population in the country is food insecure. It means that food availability does not ensure food security. Inaccessibility and economic and income inequality are the major barriers to food security. Though, per capita income is high in Pakistan, but the mounting inflation rate has been declining purchasing power of the people. According to Pakistan Economic Survey (2007-8) 20 per cent increase in food prices means an addition of 100 million people into absolute poverty. Comparatively, rural population is more vulnerable to food insecurity than urban households.

Similarly, Hussain & Akram (2008) conducted a study in which they founded that non-serious behavior on the part of the politicians and state departments were discouraging food security chain in Pakistan. State departments that deliver loans to small farmers were based on rigid conditions that discouraged farmers to apply for these loans. In addition, the awareness programs run by the state departments on the use of biofuels, safety net, developing research and learning culture did not produce any positive results. Similarly, natural and man-made disasters had been quite negatively affecting food security in Pakistan. According to (Ishaq, Khalid, & Ahmad, 2018) whenever there occurred any natural calamity such as flood, earthquake, and military war/operation, the risk factor of food insecurity increased. During natural disasters or calamities, the vulnerable farms, industries and population remained the chief sufferers. These circumstances usually get ignited when coupled with adverse state policies, where excessive taxes were imposed on farms products particularly seeds, fertilizers, pesticides and other inputs.

A study was conducted by (Babar) on the impact of socio-economic factors on the households' food insecurity in Pakistan. The data was derived from Household Integrated Income and Consumption Survey and food insecurity was measured by per capita calories consumption. The study highlighted that 70% of the population in Pakistan were taking calories below the threshold level of 2230 kilo calories per day per 12 persons for urban and 2250 kilo calories for rural population. In addition, Baluchistan had been the most affected province where 85% people were food insecure. Unlikely, Punjab, being a food basket for the rest of the country, 70% of the population was food insecure. Sindh and Khyber Pakhtunkhwa were comparatively better where

77% and 55% households were founded food insecure. Pakistan National Nutrition Survey (NNS, 2018) revealed that malnourishment among children less than five years of age had been an enormous challenge. Giving the staggering statistics, about 42.2% children were undersized, 17.7% were lost and about 31% remained underweight. It inflicted about US $7.6 billion to Pakistan economy every year in terms of human loses, expansions of health services and low productivity (WFP, 2015). Thousands of children are under-weight because of their mothers' malnourishment while other neonatal are lost for unknown reasons.

In Pakistan, flour mills, traders, and smugglers are always being blamed for informal transportation of wheat to Afghanistan. In addition, between 2002-04, despite limitations on free trade of wheat, 600 thousand tons of wheat per year has been exported to Afghanistan by Pakistan through both legal and illegal channels. Moreover, (Mehsud, 2019, October 9) described that such unlawful practices create temporary and artificial shortage of wheat in Khyber Pakhtunkhwa. Following the 18th constitutional Amendment, the Ministry of National Food Security and Research ministerial department was established in 2011 for developing agriculture related policies. In addition, in 2018, Pakistan first ever ―National Food Security Policy‖ was formed by the Ministry of National Food Security and Research. The aim of the policy was to alleviate poverty, eradicate hunger, diminish malnutrition, technology dissemination to small farmers, rebranding of prior reforms, provision of agriculture services to the farmers, promotion of private investment, enhancement in agriculture productivity and ensuring of essential food security factors; (a) Food availability (b) Food affordability (c) Food Utilization (c) Food Stability (NFSP, 2018). This policy of the state was a positive step towards food security, however, the prevailing rural-urban disparities and socio-economic inequalities aggravated the situation more. Pakistan Bureau of Statistics recent staggering data revealed that since 2018, general inflation had been reached up to 8.2% in May 2020. This price hike negatively affected people's capability to purchase food and medicines. Moreover, the coordination on the part of the federal and provincial governments to address the problem of food insecurity was very fragile (Lohano, 2020, June 24). Hence, neither agriculture nor land reforms could address the problem of food insecurity in Pakistan, nor external aid and national conferences could produce any changes in food security.

1.2. Food Waste and Food Loss

The rising population growth rate in the world has been enhancing demand for food and energy. Massive production and consumption of food has caused severe threat to food insecurity. There are different stages of food wastes. This comprises of pre-harvest and postharvest, food handling and storage, food processing, transportation, distribution and the final consumption of food. Maximum part of food loss happens at early stages of the food supply due to many factors including inefficiencies, poor infrastructure and limited agriculture technology (Searchinger et al., 2013). According to (FAO, 2013) food loss is the difference between the production and consumption of food or the losses that incur during the production and consumption of food. Decrease in quantity means loss in the weight of a food commodity and reduction in quality refers to the nutritional loss. Resultantly, the food becomes dry and bears less weight. Similarly, food waste is basically edible food but discarded due to oversupply or overproduction. Food waste typically occurs at the retail and final stages of the food supply or food that is ready to consume. The difference between the food loss and food waste is basically the loss of food during the process of production and consumption. In the former process it is loss of food while in the later it is waste of food. Food loss is that food which is not suitable for replenishment or consumption while food waste is edible part of excessive food that is discarded. Both food waste and food loss contribute to food insecurity. Economic and environmental researchers are more anxious about the intensive use of natural resources and its impact on food insecurity. Controlling food waste and food loss can considerably improve food security of those people who are in need of food.

According to (FAO, 2013) one-third of all food grown for people, has been lost or wasted. This wasted or lost food account for about 32 per cent of the world total production of food. This proportion is equal to about 1.3 billion tons of food per year. It means that there incurs a depletion of 1.3 billion tons of food every year that constantly threatens food security. In the North, food waste has been a severe challenge to food security while in the South food loss contributes more to food insecurity than food waste. Food waste among the developed countries reaches to US $936 billion per year (FAO, 2013). This problem becomes doubly precarious when coupled with food loss in the developing countries. Food waste and food loss is a two-side sharp sword that continually erodes food security. The problem becomes even worst when the

environmental and economic costs are included in food waste and loss. Food insecurity does not prevail in the developing countries only rather the developed countries face the same issue. Currently around 14 million people are facing severe food insecurity and malnutrition in Europe (FAO, 2018). In Europe, about 88 million tons of edible food is lost and wasted every year that is equivalent to 173 kg of food waste per year per consumer (Ibid). It means that more than 20% of the total food produced for consumption goes to wastes in Europe. This food would have been digested by millions of people every year who need food. When measured in currency, the total of worth of food waste account to 143 billion Euro annually (European Commission, 2016). Similarly, 11.2 million metric tons of edible food is wasted per annum in Canada (National Zero Waste Council, 2020). This huge amount of food would have been redistributed among the food insecure communities. In the United States of America, the number of food insecure people has increased from 40 million to 54 million which means that one in nine Americans is suffering from hunger, while the worth of disposed-off food reaches to US $161 billion per year (ReFED, 2020).

The same situation prevails in other parts of the world particularly in Central Asia, Russia, China, South and Southeast Asia and the Middle East. Saving only one percent of the global food waste can eliminate the hunger of 870 million people (FAO, 2011). Those who are food insecure can be easily supported across the globe. Nearly, 12 percent of the world population still go to bed without food every night (Ibid). Greater emphasis had been put on controlling food waste in the United Nations General Assembly and controlling food waste was included in the Sustainable Development Goals in 2015, however, this problem remained deliberate and need more attention. In the SDGs both food waste and food loss were emphasized to control food insecurity in the world (UNGA, 2015).

1.3. The Hoteling Industry

In the hoteling industry food waste has two phases; one is pre-consumer and the other is post-consumer phase. In the USA, from 4 to 10 percent of the food purchased by restaurants becomes pre-consumer waste (NRDC, 2017). Similarly, the hoteling industry in the United Kingdom contributes about 0.92 million tons of food waste every year, of which 130,300 tons of food waste occur at food preparation and serving phase (WRAP, 2013). It is estimated that 288,000 tons of food have been wasted every year in the restaurants in Denmark (Shreshta, 2016). In Beijing and Shanghai about 93 grams of food is wasted per meal in restaurants. It means that there occurs 11 kg of food waste per capita per year. In China, total of 44.1 million metrics tons of fresh food in restaurants goes into waste every year (Yang, Bao, & Xie, 2019). In Pakistan, about 36 million tons of food waste takes place in the country every year, while every 6 out of 10 persons are suffering from food insecurity (Dawn, 2020). Among the big cities, Karachi, Lahore and Hyderabad are the leading cities in food wastes. About 40 percent of the total served food in wedding ceremonies goes into wastes.

In Pakistan, huge expenses are usually made on wedding ceremonies. Each wedding ceremony is attended by thousands of people and it is celebrated with great pomp and show. Making more expenses and inviting more people to celebrate the weddings have become a fashion in big cities in Pakistan. Big wedding halls have been established in cities where food is prepared and served in tons. Socio-demographic, economic and psychological factors play a significant role in determining eating patterns of the people. A study was conducted by Witzel, et al., (2015) in which socio-demographic and psychographic factors of food waste were studied. In this study, they founded psychographic factors, such as consumption patterns, consumer actions and thinking process, fashion, motivation and other behavioral changes contributed more to food waste than socio-demographic factors such as age, gender, household size and structure and location.

According to Stuart (2014) high per capita income is positively associated with food waste. In big cities, such as Lahore, Karachi, Faisalabad, Hyderabad, Rawalpindi and Peshawar, the consumption pattern usually changes with change in living standard and income level. People adopt the consumption patterns of the elite class. Even the common people or the middle-income groups also copy the consumption pattern of the elite class that cost too much as compared to their average expenditures. This change in behavior has been resulting in huge expenditures and food waste in Pakistan.

2. Research Methodology

In this research study, we applied quantitative research method. The application of quantitative research method was in line with the objective of this research study. Comparatively, quantitative research method was more adaptable to the type of research questions we investigated in this research study (Jansen and Warren, 2020; Kothari, 2004). The data was collected in the form of pre-tested questionnaire. All the questions were close ended/structured. All the questions, included in the questionnaire were basically about the food wastes measured in kilo gram. All the questionnaires were manually filled in from the owners/managers of the hotels/restaurants situated in District Swat. There were different techniques of measuring food waste but measuring food waste in terms of weighing the pre-consumption and post-consumption waste was comparatively a simple method and did not include any protocols (Xue and Herpen, 2017). The target population of this research study was number of hotels/restaurants located in District Swat. Of these hotels/restaurants, 100 samples were randomly selected. The data was collected only from those hotels/restaurants that were providing food services to people. There was no categorization among hotels selected for data collection because in District Swat there were no five-stars hotels. All hotels in this research study were below three-stars. The hypothesis is given as;

H_1: There is a significant relationship between food waste and food insecurity.

3. Results and Discussion

In Pakistan, food insecurity is constantly aggravated by many factors in which food waste plays a significant role. Depletion caused in food security by food waste is comparatively higher than food loss. The impact of food waste on food insecurity is very high and the degree of this impact is increasing with the passage of time because of the high trend in hoteling and tourism. Since, the hoteling industry is highly profitable in Pakistan, therefore, people are investing more in this industry. This higher trend in hoteling industry has been resulting in huge food waste. Similarly, the consumption pattern of the elite class has attracted more attention than any other factor. The elite class of Pakistan has been spending millions of rupees on celebrating their marriages in big hotels and wedding halls. This trend has also aggravated the problem of food insecurity because tons of food waste occur in these wedding ceremonies where this food is neither donated nor recycled. In this research study, we focused on hotels/restaurants because in the hoteling industry food waste constantly occurs. In this research study, we identified pre-consumer and post-consumer food waste. Food waste was measured in kilogram and the average price per kilogram was calculated to identify per day cost of the food waste.

The table 1 shows details of pre-consumer food waste. Every year 56112 kilogram of pre-consumer food waste occur in 100 hotels, while the average price of one kilogram of food is Rs. 350. The total worth of 56112 kilogram of food at the rate of rupees 350 per kilogram is Rs. 19639200. At current rate the total worth of this food waste is US $81830 per year. In this research study, food waste in the wedding ceremonies was not included. Food waste in wedding ceremonies is comparatively very high that were separated from the normal routine activities. In addition, in spring season the amount of food waste is comparatively higher due to huge inflow of customers in District Swat, therefore, we calculated average food waste that occurs every day and on the basis of per day food waste we calculated average food waste annually.

Table 1: Shows Details of Pre-Consumer Food Waste

Duration	Food Waste in KG	Average Price/kg	Total Worth in Rs.
Per Day	167	350	58450
Per Week	1169	350	409150
Per Month	4676	350	1636600
Per Year	56112	350	19639200

Source: Primary Data

The table 2 shows details of post-consumer food waste. On average 638736 kilogram of pre-consumer food waste occurs in the hoteling industry in district Swat. The total worth of 638736 kilogram of pre-consumer food waste is Rs. 223557600 which is equivalent to US $931490. Comparatively, post-consumer food waste is more than pre-consumer food waste. Usually, pre-consumer food waste is controlled by the owners/managers of the hotels because the cost of pre-consumer food waste incurs to the exchequer of the owner while the cost of the

post-consumer food waste incurs to the customers. The food producer is paid the price for the food they serve to the customers while the waste goes to the bin.

Table 2: Shows Details of Post-Consumer Food Waste

Duration	Food Waste in KG	Average Price/kg	Total Worth in Rs.
Per Day	1901	350	665350
Per Week	13307	350	4657450
Per Month	53228	350	18629800
Per Year	638736	350	223557600

Source: Primary Data

The table 3 shows accumulated food waste. In this table both pre and post-consumer food waste is given in kilogram. On average per day cost of food waste in one hotel is Rs. 7238 while the total price of the food waste in 100 hotels in a day is Rs. 723800. Based on per day cost of food waste in 100 hotels, we calculated the average annual cost of food waste. The average annual cost of food waste in 100 hotels in District Swat is Rs. 243296800 that is equivalent to about US $1013736. This amount of food waste is far higher than the amount of food waste in Beijing.

Table 3: Shows Accumulated Worth of Pre-consumer and Post-consumer Food Waste

Duration	Number of Hotels	Per Hotel FW in Rs.	Total Worth in Rs.
Per Day	100	7238	723800
Per Week	100	50666	5066600
Per Month	100	202664	20266400
Per Year	100	2432968	243296800

Source: Primary Data

It was founded in this research study that pre-consumer and post-consumer food waste has been continuously threatening food security in the country and there is a positive relationship between food waste and food insecurity. We failed to accept the null-hypothesis that there is no relationship between food waste and food insecurity while accept the alternative that the relationship between food waste and food insecurity is positive. It means that constant increase in food waste is positively associated with food insecurity.

The rising trend in hoteling industry is causing huge damage to food security while there is no control or recycling mechanism for this waste. In Denmark, per year food waste in the hoteling industry is 288 tons while in District Swat per year food waste in the hoteling industry is 694 tons including pre-consumer and post-consumer food waste. This food waste in the hoteling industry is comparatively 2.5% higher than food waste in the hoteling industry in Denmark. Similarly, the food waste in the hoteling industry in Beijing is 93 grams/meal while in District Swat per day food waste in the hoteling industry is 2068 kilogram which is far higher than the food waste in Beijing. It means that 2068 kilogram of food waste could be easily distributed in more than 2000 hungry men per day. Saving 694848 kilogram of food waste can satiate more than 600,000 people when one man is served more than 1 kg of food. The findings suggest that control is inevitable to save more food for those who do not have access to nutritious food. Even recycling can save more money provided this food is either fed to cattle of donate to needy people. The current situation in the hoteling industry in District Swat is totally unsatisfactory and it has been continuously causing damage to food security.

4. Conclusion

The findings of this research study revealed that the hoteling industry in Pakistan is comparatively more dangerous to food security than any other industry. Food waste in the hoteling industry is a constant threat to food security. Millions of tons of food waste are dumped into land that cause severe environmental and economic problems for the state. This huge amount of food waste continuously depleting food security. Two factors are worth mentioning that make the situation doubly precarious. Firstly, there is a huge trend among the investors who continuously invest in the hoteling industry with no proper mechanism for food waste recycle or redistribution. Secondly, in Pakistan, every common man tries to copy the consumption pattern of the elite class that has caused huge pressure on the wedding halls in cities and villages thereby resulting in huge food waste. Thirdly, the rising population growth rate has been causing huge pressure on the state to fulfill the rising demand for food. The hoteling industry is expanding

while there is no mechanism for control or redistribution of food waste. Though, this study was conducted in district Swat but the results of this research study revealed some facts that would have severe impact on food security in Pakistan. The entire hoteling industry in Pakistan is constantly threatening food security while neither the government nor the private sector has any recycling or redistribution mechanism. Unless every single investor/owner in the hoteling industry ensures proper recycling of the food waste, this problem would get aggravated more. The depletion in food security is basically a threat to environmental sustainability which needs an immediate solution by socially responsible behavior on the part of every single consumer and producer.

4.1. Theoretical Implications

The findings of this study could be rightly generalized especially in the discipline of food insecurity. The techniques of measurement of food wastes especially the pre-consumer and post-consumer food wastes are adaptable to many countries wherein the same studies were conducted by the researchers including Denmark, China, India and other European countries. In these countries both the pre and post-consumer food wastes were calculated in kilogram and measured in US dollars while in this study the average food waste was calculated both in Pakistani currency and US dollars. The findings of this research study are defective in countries of high mass consumption while adaptable in most of the developing countries. This research study identified more areas for further research in the field of food insecurity by dividing pre-consumer food wastes specifically in those areas that are highly vulnerable to insecurity with the aim to calculate seasonal deficit in production and waste in consumption.

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