Exploring the Factors that affect Household Higher Food Intake Cost and Economic Instability in Pakistan

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Abstract

The current study aims to investigate the factors that influence the higher price of household food intake cost and dietary diversity pattern score in Southern Punjab Pakistan. Food intake cost and household dietary diversity pattern score indicate a family's financial access to a variety of foods to meet their nutritional requirements. The Primary data source was three hundred urban households. A well-structured questionnaire for collecting responses was developed by FAO guidelines. Multivariate Multiple Regression was used to analyze the data. The estimated coefficients of education level, landholding, age and family size all have positive effects on household food intake cost & dietary diversity pattern score while income has a negative effect. The findings of that study indicate that due to covid 19 impacts and economic instability, food price increases and the income level of households decreases and, in that way, they can't easily afford more dietary diversity pattern score. Based on the findings of this study, we can conclude due to the rapid increase in FIC affects urban households' dietary diversity pattern score. In addition, the study offered important policy recommendations to control food prices, and improve household dietary diversity pattern scores and socioeconomic factors that affect urban households.

Keywords: *Household Food intake Cost, Dietary Diversity Pattern Score, Covid 19 Impacts and Economic Instability, Household Socio-economic Characteristics, Multivariate Multiple Regression, Southern Punjab.*

Introduction

Rising prices of food put pressure on lower income households. It increases the likelihood of food insecurity in the upcoming years. In poor developing countries, the main issue faced mostly lower income families and lesser resources to fulfill the basic needs of daily life. Buying daily food items is impossible within a given budget so rising prices are increasing the risk of health-related diseases because people have lower resources to buy daily food items that do not increase the nutritional level of lower income families. Food inflation and food insecurity are alarming problems for upcoming generations (Burki, 2022; Amolegbe et al., 2021).

The Household dietary diversity pattern provides a summary of the foods consumed by individuals. A household approach to a variety of foods is a qualitative level of food intake. There are four crucial components that HDDP relies on stability, availability, accessibility, and usage. Therefore, HDDP refers to food selection methods. That is influenced by ability and tradition and varies from person to person. Numerous studies demonstrated a link between household food security (FS) and socioeconomic status and an increase in HDDP (de pee & Turowska, 2022; Mazenda & Mushayanyama, 2021; McGuire, 2015).

Food accessibility, education, household income, and food characteristics can all have an impact on the Pattern score for dietary diversity in the household. Factors that can affect household dietary diversity Pattern score are food accessibility, education, household income and food characteristics. What, why, and how foods are consumed are all determined by these factors. The term "food openness" refers to both the affordability and accessibility of food. However, food accessibility is also influenced by lifestyle, work environment, and other factors. The term "food characteristics" depicts temperature, shape, color, and flavor all at the same time. A variety of factors, including household income and education, can have an impact on the HDDPS (Chadare et al., 2022, FAO, 2022; Swart et al., 2022; FAO, 2021; Shively & Evans, 2021).

Household dietary diversity is a dynamic phenomenon that beings early in a person’s life and persists throughout that person’s lifetime. Personal constraints, cultural norms and other factors also have an impact on HDDPS. A household's capacity for FS and healthy eating is influenced by the health of its members, their performance in food diversity, and the presence of adolescents. The capacity of the household to ensure FS and adhere to healthy eating habits (Ebenezer, 2022; Ebenezer et al., 2022; Amolegbe et al., 2021).

During the pandemic period of covid -19, the food inflation level increased more rapidly. The working class society's lockdown condition was not allowed to work properly. So, the shortage of products is the main reason for higher food costs. So, access to food during the pandemic was very limited resulting in the food inflation level was increased more than the previous past trend. Resulting in more money spent to purchase a limited amount of food. So, the daily base calorie intake level reduces which does not fulfill the desire for good food. As a result, many families are suffering from severe health problems (Balana et al., 2022; Hoteit et al., 2022; Kundu et al., 2022: Ali, H., & Yasmin, Y. 2019).

Due to a lack of adequate cooking and storage facilities, healthy eating options are limited. We are all aware that food and eating can be a source of family conflict. Social scientists have demonstrated that the distribution of food within a family is unequal and that one influential member's preferences frequently dictate dietary diversity. HDDPS can be influenced by Ideas about what is healthy or good for you (Perira & Oliveira, 2020). Diverse factors influence household food diversity. Commonly consumed foods are simply liked rather than chosen. Therefore, the consumption of a particular food in daily life is linked to taste and smell, regardless of whether the food is enjoyable. For instance, household preferences for purchasing a particular food that lowers cholesterol will rise in response to advertisements in the media. Household food diversity is influenced by numerous socioeconomic factors when it comes to acquiring a particular food that the family enjoys (Bhagtani et al., 2022; FAO, 2022).

Although HDDPS is not entirely determined by liking particular foods. Individual preferences for a particular food in a household are also influenced by circumstances, social culture, economic instability & effects of covid-19. But what people eat is more a matter of personal preference. Diet is a social issue of fundamental importance, as well argued. To understand why people, choose the foods they do, we need to establish food and eating in their respective economic and cultural contexts. There has always been more to what we eat and why we eat than just a matter of nutritional values (Minja et al., 2021; Pakravan-Charvadeh et al., 2021).

The current study's primary objective is to estimate the higher household food intake cost (FIC) and dietary diversity pattern score as well as their determinants, including the household head’s education level, income, land holding, age, family size, and covid-19 effects & economic instability in the urban area of Southern Punjab, Pakistan.

Literature-Review

This section discusses theoretical clarification and the empirical literature. It discusses the characteristics of households, higher food consumption costs, and dietary diversity patterns. Bissonnette et al. (2001) examined dietary diversity behaviors in terms of how food production practices affect the environment. The primary objective of this study is to learn about adolescents' perspectives on DDP. Dietary diversity concepts related to consumption activities & containing both organic food and regionally grown food. The study's questionnaire-based data analysis was conducted on a sample of 651 ethnically diverse senior high school students from urban and suburban areas. To comprehend this, the beliefs, attitudes & perceived social influences as well as perceived behavior control and motivations have been into the expanded theory of planned behaviors. Pearson correlation coefficients and multiple regression analysis are utilized in descriptive statistics. However, the adolescent survey did not show that cognitive and motivational processes work better and are significantly correlated with behavioral intentions, DDP and attitudes. The best way to show social influences is through behavior, but some results require both cognitive and experiential approaches.

Hoddinott and Yohannes (2002) examined household access to food for human well-being. The various factors that influence households' access to food are the subject of this study. Obtaining detailed data on household FS some methods are considered time consuming and expensive such as 24-hour recall data on calorie intakes. Consequently, the household DDS was utilized in this investigation to comprehend household FS. It's a straightforward count of the food groups the family ate in the last 24 hours. For data analysis, this study takes 10 countries that contain both rural and urban sectors and poor & middle-income countries. In all these ten countries data had been collected in different seasons. In this study, a straightforward linear regression analysis is utilized. According to the Finding, there is a correlation between an increase in consumption of one percent, an increase in staple food consumption of 0.5%, and an increase in non-staple food consumption of 1.4% for every one percent increase in DDS. These all result founded in different seasons. This study's findings indicate a positive correlation between DD and household food access. Given the limited resources available for this measure, measuring FS at the household level DD is an effective method for understanding this concept.

Ruel (2003) examined that a healthy diet is always considered an important part of DD. Even though, it is a major issue in developing countries how to measure DD. Therefore, the

primary objective of this study is to bring attention to the problem of DD in developing nations. The study found that developed nations' diets are higher in nutrient-dense foods and had a positive trend when compared to those of developing nations. The household DD is regarded as a useful FS indicator. The daily intake of the poor population contained only staple or starchy foods, but not containing animal products or fruits. It is only composed of plant-based products. So, this study suggested that measuring DD is a major issue in developing countries. In addition, it is emphasized that improvements to the measurement tool are required for improved household sustainable DDS assessment.

Botonaki et al. (2006) analyzed the quality of food that is playing an important role in HDDP. This study demonstrated that when a household's income rises, consumers have a greater preference for high-quality food because high-quality food is safe and healthy. This study indicated that in agriculture, food production different techniques have been used to raise food production. This data was gathered by using primary data. Food quality programs have been developed to increase households' awareness of food quality, which in turn increases their willingness to pay for safe and healthy food. But study data showed negative results because most consumers are not willing to pay to improve food quality. So, in green markets, only those people who paid for good quality foods are interested to increase good quality food products.

Bernell et al. (2006) investigated the various socioeconomic factors affecting household food security. In Oregon from 1999 to 2001, most households suffered severe food shortages. The lack of food security experienced by many households is the primary cause of this problem. This study was analyzed using the multi-variate logit model. According to the Results of this study, population pressure and individual food choices contribute to food insecurity. The cost of housing and the location of the residence are two additional factors that influence a household's FS.

Kennedy (2009) examined DDS to assess micronutrient intake and FS in developing nations. This demonstrated the widespread nature of household FS and micronutrient malnutrition as global public health issues. One-third of the global population is affected due to Deficiencies in micronutrients. Different organizations encourage the collection of information to inform FS, but there is no agreed-upon set of indicators used for nutritional DD assessments. The primary goal of this study is to examine relationships among DD and sufficient intake of micronutrients and also considers outstanding methodological queries that effecting on the

recall period of household characterizing dietary patterns. Using scores for one or seven days, dietary patterns based on food group consumption are also demonstrated. This study indicated that DDS is an appropriate dietary indicator of micronutrients. The DDS can be monitored and valuation tools in national FS and nutrition assessments according to this study recommended.

Sodjinou et al. (2009) examined the dietary habits and socioeconomic characteristics of urban adults in Benin. Twenty-four hours recall period is used in this study. Ten neighbors choose a 200-household household at random. Various food scores are used to estimate the quality of a diet. The two approaches of dietary quality are used in this study first traditional aspect and the second transitional type. The traditional type is related to the upper class of socioeconomic status. It is composed of saturated fat, sugar, and a higher percentage of energy from fat. So, this type is containing a higher level of cholesterol and a lower level of fiber food, but it showed a lower healthfulness score as compared to transitional types. It contains more food items and indicates the best score of both healthfulness and micronutrient adequacy score. This study aimed to prevent chronic diseases of health and improve the dietary score by more uses of fruits and vegetables and lower the risk of micronutrients in daily consumption of food.

Kim et al. (2013) examined consumer attitudes toward a variety of healthy foods. This study demonstrated a strong relationship present between human health and diversified food. The further result suggested that for an active & healthy life and several households have preferences toward different types of food that contain both micronutrients and macronutrients. To comprehend this idea, the least square method was used in this study's data analysis. The finding demonstrated that good nutritious food always contains low fat and considers the higher quality of food. And higher income household mostly prefers this good quality food and rely on it. So, the study showed that senior markets have a greater proportion of healthy meals than non-senior markets.

Musemwa et al. (2013) analyzed a variety of factors that affect families' ability to get enough food in the Eastern Cape of South Africa. This study showed that South Africa had been facing a major problem of rapid increases in food prices. So, the rapid increase in the food price ratio indicated that households had limited access to buy food because the income of the household is not increased rapidly by this ratio yet it increased at a slower rate. In South African countries, this Study identified different factors affecting household access to

sufficient food. For data analysis, this study collected 159 household data through a questionnaire. The study concluded that the unemployment rate was 73.6%, which is considered to be extremely high. The average household size was five members, with sizes ranging from one and thirteen. The average age of household leaders is fifty-five years. Only 83% of households, 61.6%, and 52.8%, keep poultry & livestock. In this study, a dummy variable representing the dependent variable was used in the logistic regression model. And that range lies between 0 and 1. Here it is used because it is easily applicable & helps to interpret the results.

Astemir (2014) examined the relationship between rural household access to food and DD in Ethiopia. This study aims to improve the household's easy access to food in poor income families. The term food security indicates a household's easy access to food. An ordered probit model was used in this study to analyze the data. Panel data from four Ethiopian regions serve as the foundation for this study. A lower dietary diversity score is associated with food insecurity, and a higher DDS is associated with FS, according to the findings of this study. Only 21% of households in Ethiopia are food secure and have a higher dietary diversity score, and 79% of households lack the resources to obtain nutritious food and have lower DDS, according to the study's final findings.

Fahar and Mulyana (2015) examined the relationship between household DD and FS in south Sumatra. It is regarded as a crucial component for improving the individual and national diet quality of households. This study has been designed to improve the DDS of South Sumatra. For data analysis, this study takes seasonal food consumption data of households Sumatra. The findings of this result indicated that the food consumption of Sumatra only contains actual food consumption not comprised of ideal food consumption. Ideal food consumption in food groups indicates healthy, nutritious food and actual food consumption in the food groups indicates only poor nutritious food. So, this study’s findings suggested that FS and household DD are positively correlated.

Parappurathu et al. (2015) examined household DD, diet quality and nutritional standard of households in eastern India, and estimated the positive relationship between DD and FS. This study is based on primary data. Twelve villages in eastern India are selected in this study. This study utilized a multiple regression model to comprehend this idea & identify the factors that influence household DD for this purpose. The study found that higher income families attain a higher DDS and the daily diets of these families comprised good nutritious food as

compared to lower income families. This study, therefore, concluded that various socioeconomic factors have a positive impact on HDD. The study concludes with a policy recommendation to raise DDS among low-income families by improving their socioeconomic status.

Koppmair (2016) analyzed household DD in a rural household in Malawi. And studied the socioeconomic characteristics that affect household DD and farm production diversity. The twenty-four-hour recall period used in this study was chosen. This study takes four hundred and eight households, and mother data and five hundred and nineteen youth data from sixteen districts of Malawi. For data analysis, this study used the household DD formula to estimate the household DDS and poison regression has been used in farm production diversity. DDS and farm diversity was found to have a positive relationship in this study. As a result, the study concluded that lower household DDS is correlated with higher farm production scores and higher farm production scores.

Powell et al. (2017) investigated the determinants of DD and nutrition in Tanzanian households. The study's objective is to identify DD-influencing household factors. A qualitative study has been used to know the score of household DD. This study relied on primary data. This focus group discussion now includes 295 additional households. Focus group discussions and respondent interviews in Tanzania served as sources of information for this study's data collection and analysis. This study found that a variety of socioeconomic factors, including age, education, household size, income, and cultural factors, influence the dietary diversity score of Tanzanian households. But education is considered an important factor to increase the DDS of the household. So, higher educated families showed a higher DDS and vice versa.

Kundu et al. (2021) examined the social economic status of household FS and DD during the pandemic season covid-19 in Bangladesh. Cross sectional data set used to collect household DD score. The method of data collection comes from both online and in-person sources. In total, 1876 households were chosen for this study. After data collection, the result of the study indicated that in some areas of Bangladesh, the DD and FS are very low during the pandemic season covid-19. The reason behind this issue indicates mostly several households have a lower level of education and loss of jobs. During the covid-19 pandemic, 45 percent and 61 percent of households do not have access to the same kind of food or the same amount of food. Before the pandemic, they have good access but after covid a very low score of DD

and FS. Ten percent number of households lost their jobs and closed businesses and a lower occupation level reduce the overall income of families by are estimated seventy percent. The final analysis indicated during the pandemic DD & FS are estimated very lower and brings negative impacts on the income level of the larger number of families.

The literature on the FS and DD is reviewed in this chapter's summary. In urban areas of Southern Punjab, Pakistan, the present research focuses to estimate the higher FIC and HDDPS as well as their determinants, which have an impact on household food consumption costs and food diversity patterns. Therefore, the current study aims to investigate the circumstances surrounding household's higher food costs and lower dietary diversity score patterns.

Materials and Methods

Methodology section describes the data collection methods, including research design, sampling techniques and total size of the sample and data collection. Sections 3.2 and 3.3 show the description of the variables and implemented econometric models.

Data Collection and Methods

The current study relies on primary data collected from the Vehari and Multan district in Southern Punjab. In accordance with FAO (2013) guidelines, a well-structured questionnaire for collecting responses was developed. The last 24-hour recall data on the respondent's intake was suggested by FAO for this study. Information was gathered regarding the socioeconomic features of respondents, including the household heads' education level, income, land holding, head age, family size, and the impact of Covid-19 & economic instability.

Multistage sampling was used in the investigation because this technique allows researchers to collect information on a different number of groups of households to increase the chances of obtaining representative sample data.

At the initial level, Tehsil Vehari and Multan city were chosen for data collection. Ten colonies were chosen at random from urban areas for the second round. 30 respondents were selected at random from each colony during the final stage. As a result, 300 households made up the entire sample size.

Through a series of questions, the interviewer gathered information about the DD score and the higher cost of food intake. Asked these questions by those who are responsible for

preparing, and cooking at home. This study did not take into account mead that was not made at home and consumed outside of the home.

Description Variables

This section explains the description of variables.

Dependent Variable

Food intake cost (FIC)

Food intake cost has been taken in Pakistani rupees in the data. So, the information about the daily food intake cost of the households was collected.

Household dietary diversity Pattern score (HDDPS)

It is a straightforward count of the food groups consumed by all members of the household over a twenty-four-hour period. As a result, the food consumption score and the household's DD score were utilized as indicators of financial access to food. (Mazenda & Mushayanyama, 2021), see table 1.

Table 1

Methods/Estimation of HDDPS

<table>
<tr><td colspan="2">1. HDDPS Indicator Tabulation Plan</td></tr>
<tr><td>1 HDDPS (0-12)
1st we calculated the HDDPS for each household. This HDDPS's value ranges from 0 to 12. the total quantity of various food groups consumed by members of the family. The values from an l will either be "0" or "1"
$\text{sum}(a+b+c+d+e+f+g+h+i+j+k+l)$</td><td>2 Average HDDPS
Secondly, the sample population’s HDDPS is calculated:
$\text{sum}=\left(\frac{\text{HDDS}}{\text{Number of households in total}}\right)$</td></tr>
<tr><td colspan="2">2. The creation of HDDPS by Accumulating 12 food groups</td></tr>
<tr><td colspan="2">The HDDP was calculated using a 12-group classification of food by FAO
To measure the HDDP, FAO classified foods into 12 food groups.
F1 = Cereals, F2 = White tubers and roots, F3 = Vegetables, F4 = Fruits, F5 = Meat,
F6 = Eggs, F7 = Fish and other seafood F8 = Legumes, nuts and seeds,
F9 = Milk and milk products, F10 = Oils and fats
F11 = Sweets, F12 = Spices, con dim ents & beverages
If yes = 1, otherwise = 0</td></tr>
<tr><td>3. Formula of HDDPS</td><td>4. HDDPS classification</td></tr>
<tr><td>$HDDP=\sum_{i=1}^{n} pi \Rightarrow pi = score\ of\ ith\ food\ item.$
$n = 12\ food\ group$
$HDDP\ score\ ranges\ from\ 0-12$</td><td>The FAO (2013) states that there are 3 levels of DDPS
$0\ to\ 3\ Lower\ DD$
$4\ to 5\ Medium\ DD$
$6\ to 12\ Higher\ DD$</td></tr>
</table>

Independent Variables

I. The Head of the Household's Education

The family's head of household went to school for a number of years. Knowing the household head's education at the time of the interview (Kehoe et al., 2021).

II. Income of the Households

Total income indicates the sum of incomes that are earned by all household members from all sources during the last twelve months at the time of the interviews. In the data, the household head's income has been converted into Pakistani rupees. So, the information about the total income of the households was collected.

III. Land Holding

landholding ownership is an important factor in the economy. So, it shows a positive relationship with per capita income (Chegere & Kauky, 2022). In the study, landholding was taken as owned in dummy form, with yes representing ownership and zero representing none.

IV. Age of the Household Head

A social unit that contains several people that are living alone or in grouped form is called a household. The household head is responsible for caring for the family and provides the income source for household maintenance. The head of the household's age was recorded in years at the time of data collection.

V. Family Size of Household

The number of people living in a single house is represented by the family size of the household. This indicates that households with fewer family members have lower FIC & DDSP than households with more family members and higher FIC & DDS (Faharuddin et al., 2022; Shahzad et al., 2021; Quraishi, et al., 2020).

VI. Covid 19 Effect & Economic Instability

In this study, the impact of covid 19 & economic instability on daily life and household FIC and DDPS was taken in dummy form if yes then one otherwise zero.

Econometric Model

The Multivariate Multiple Regression (MVMR) models were utilized in this study because there were multiple outcome variables. The MVMR method is the most effective because of the data's nature (Kundu et al.,2021). To estimate the MVMR model, Stata was utilized. The general form of MVMR model

$$Y_i = B_1 X_{i1} + B_2 X_{i2} + B_3 X_{i3} + ...B_k X_{ik} + \mu$$

Now consider the above equation as a summation.

$$Y_i = \sum_{n=1}^{k} B_n X_{in} + u$$

Where:

- Yi = Predicted variable that is the food intake cost and dietary diversity pattern score
- Xi= independent variables that are household head education, income, landholding, age, family size and covid-19 effect & economic instability.
- B0= intercept and B1…Bk = coefficient of MVMR with observation 1 to k.
- μ= error term

Empirical Results

The interpretation of the empirical results for various economic models is provided in section 4. The descriptive analysis of variables, household sociodemographic data, and correlation matrix utilized in the empirical analysis are presented in Sections 4.1 and 42. The multi-variate multiply model's regression results are discussed in Section 4.3.

Descriptive Analysis and Correlation

Tables 2 and 3 show the descriptive and correlation matrices for every variable used in data estimation.

Table 2

Descriptive-Analysis

Variables	Mean	Std. Dev.	Min	Max
FIC(Y1)	3.823	1.264	1	5
DDS(Y2)	2.387	0.716	1	3
Education(X1)	3.123	0.798	2	4
Income(X2)	5.287	1.453	3	7
Landholding(X3)	0.8	0.401	0	1
Head age(X4)	2.49	0.545	1	3
Family-size(X5)	2.323	0.693	1	3
Covid-19 effects & economic instability (X6)	0.927	0.261	0	1

The household demographic factors and the mean value of higher FIC and DDS variables that are utilized in the model estimation are explained in table 2. The mean values of Y1, 3.823 and Y2 are 2.38 while both least value one and maximum value are five and three respectively. The mean value of X1, 3.123 and X2 are 5.287 while the smallest value two and three and the biggest values are four and seven respectively. The mean value of X3, 0.8 and X4, 2.49 while the lowest value zero and one and the largest values are one and three respectively. The average value of X5, 2.323 and X6, 0.927 while the least value is one and zero and the greatest values are three and three respectively.

Table 3

Correlation Matric

Variables	(Y1)	(Y2)	(X1)	(X2)	(X3)	(X4)	(X5)	(X6)
(Y1)	1.000							
(Y2)	0.826	1.000						
(X1)	0.834	0.713	1.000					
(X2)	0.783	0.681	0.956	1.000				
(X3)	0.736	0.714	0.674	0.662	1.000			
(X4)	0.592	0.490	0.475	0.527	0.496	1.000		
(X5)	0.783	0.671	0.865	0.911	0.607	0.570	1.000	
(X6)	0.427	0.260	0.316	0.338	0.467	0.347	0.409	1.000

Table 3 explains the correlation matrix These coefficient values lie between a positive one and a negative one. Negative one-values indicate a negative perfect relationship with the dependent variable, while zero values indicate no correlation. Positive one-values indicate a positive perfect relationship.The correlation coefficient between Y1(FIC) and Y1 is still one. The value of the correlation between Y1 and Y2 is positive additionally, it indicated that an increase in Y1 is correlated with a one-unit increase in Y2. The positive correlation between the values of X1...X6 and Y1 indicate that there is a relationship between an increase in Y1 and an increase in X1...X6 by one unit.

Table4
Multivariate Multiple Regression Analysis

Variables	**FIC Coefficient**	**DDPS**
(X1)	1.509*** [0.142]	0.480*** [0.110]
(X2)	-0.591*** [0.092]	-0.220*** [0.071]
(X3)	0.767*** [0.120]	0.829*** [0.093]

(X4)	0.428*** [0.075]	0.131** [0.058]
(X5)	0.552*** [0.120]	0.347*** [0.093]
(X6)	0.258* [0.146]	-0.405*** [0.113]
Intercept	-0.969*** [0.201]	0.629*** [0.156]

n=300……Parameter=7		
RMSE=	**0.556**	**0.431**
R2=	**0.812**	**0.645**
F-test=	**209.13** ***	**88.611** ***

Note: * at a significance level of ten percent, ** at a significance level of five percent, & *** at a significance level of one percent; The square brackets indicate standard errors.

The estimates of the coefficient from multivariate multiple regression analysis are shown in Table 4. The respondents' dietary diversity score and the food price cost in Pakistani rupees are the two variables that are explained in this multivariate analysis. And independent variables are Household head education (X1), income level (X2), landholding (X3), head age (X4), total family size (X5), economic instability & impacts of covid 19 (X6). The following assumption has been made to estimate chi square statistics to confirm that the model is appropriate. The alternative hypothesis (H1) states that the independent variables have a significant impact on the dependent variable, while the null hypothesis (HO) states that the independent variables do not affect the dependent variable. The values of Y1's root mean squared error and Y2's R-square are 0.556 and 0.431, respectively, and both parameters are (10). At a 1% confidence level, the p-values for Y1 and Y2 are 0.0000, which is extremely significant. The F-test results are 209.13 and 88.611, respectively. Therefore, we eliminate the HO, resulting in a highly significant final model.

At a level of 1%, the respondent's education has a positive coefficient and is significant. Simply put, we can say that a one-unit increase in the variable X1 (education) would result in an increase of 1.509 and 0.480 in the multivariate log-odds of being in the food intake cost (FIC) and dietary diversity pattern score (DDPS), respectively, assuming that all of the other variables in the model remain unchanged. Musemwa (2013) Kundu et al. (2021) Faharuddin et al. (2022) reported the same outcomes for urban household head education. Education plays a key role in the household dietary diversity pattern. Higher education of household heads indicates a higher FIC & DDSP of households as compared to those household heads with a lower level of education.

At a level of 1%, the household head's income has a negative coefficient and is significant. The multivariate log odds of being in Y1 (FIC) or Y2 (DDPS) order will decrease by 0.591 and 0.220 units, respectively, for every additional unit that variable X2 is increased. The results of urban household head income are in line with Musemwa (2013), Kehoe et al., (2021) and de Pee & Turowska, (2022). Income is considered an important factor in determining household FIC & DDSP. The higher FIC lowers the income level of the household head indicating a lower DDSP. The positive landholding coefficient is significant at a level of one percent, indicating that the log odds of FPC and DDC would rise by 0.767 and 0.829, respectively, for every one unit increase in variable X3. The same results are in line with Kundu et al. (2021) and Chegere & Kauky, (2022). The size of land holding is considered an important factor in determining household FIC & DDSP. Higher land holding indicates higher FIC & DDPS of households.

At a level of one percent, positive coefficients indicate that the head age is significant. Multivariate log odds Y1 and Y2 will rise by 0.131 units and 0.428 units, respectively, for every one percent increase in X4. According to the findings of this study, the household head's age affects higher FIC and DDCP because older people pay more for food because they eat more nutritious meals daily to maintain a healthy lifestyle. The results of urban household head age are in line with Faharuddin et al. 2022 and Kundu et al. (2021).

At a confidence level of 1%, family size has a statistically significant positive impact. Therefore, the log odds would rise by 0.552 and 0.347, respectively, with a one-unit increase in the variable X5, to be in Y1 and Y2 order. The same results of urban households are in line with Faharuddin et al. (2022) and Shahzad et al. (2022). The size of a household is an important factor in determining household FIC & DDPS in urban regions in our sample data we have found that household DDPS varied significantly among different household size groups. Households with smaller family sizes have a smaller FIC & DDPS as compared to those households having a larger family size of household heads present higher FIC & DDPS.S

In FIC Covid 19 effects & economic instability (X6) has a positive coefficient, indicating that a 1% increase in X5 will result in 0.155 units in the multi-variate odds log of being in FIC, and at a level of 10%, it is statistically significant. A negative coefficient in DDPS X6 indicates that a 1% increase in X5 will result in a 0.405 unit decrease in the multivariate log-odds of being in Y2, which is statistically significant at a level of 1%. The same regression

outcomes of urban households are in line with Balana et al. (2022) & Goeb et al. (2022). In determining household FIC and DDSP, the impact of COVID 19 and economic instability is thought to be an important factor. A lower DDPS is indicated by a higher FIC.

Conclusion & Policy Recommendations

This study provides a theoretical framework for identifying various socioeconomic factors affecting household FIC costs and DDPS by using MVMR for data analysis in Southern Punjab. Samples are taken from 300 urban households in district Vehari and Multan city in southern Punjab, Pakistan. According to the main findings of this study, these socioeconomic factors such as household head education level, income, landholding, age, family size and covid-19 effects & economic instability not only affect the FIC and household DDPS in urban areas.

This study found that household heads with higher education levels had higher FIC and DDPS than those with lower education levels. The fact that the household head's income has negative coefficients in our study indicates that a lower DDPS is associated with a higher FIC. Landholding has a positive impact because the larger number of lands is being made able households to pay the cost of daily food intake and in that way, they can easily afford more DDPS of households for a happy healthy life. This study also concluded that age and family size have positive coefficients. And it shows that in older age, they prefer more nutritious food daily diets to maintain a healthy standard of life. For this purpose, they pay the higher cost of food and it also indicates that households with smaller family sizes have a small FIC & DDPS as compared to those households having a larger family size of household heads that present higher FIC & DDPS. Furthermore, this study concluded that due to covid 19 impacts & economic instability, food price increases and the income level of households decreases and, in that way, they can't easily afford more DDPS. Higher FIC and DDPS are significantly impacted by the study's premised policy implications. Pakistan is a developing nation where FS and household DDPS are issued. Food diversity affects the human body positively and maintains a good standard of food security. Food consumed by households containing only single food items and nutrients does not affect the human body positively. Following are policy recommendations to control food prices and increase household DDPS in Pakistan. An efficient market is made by the government to control higher prices of food because in that way we would increase the food choice score of families. After all, the intervention of the government increases the dietary score of food patterns to maintain a healthy standard of life. The control price policy plays an important role to decrease the

prices of food items and it's all possible only through government intervention or the provision of an efficient market. Investment packages should be launched by the government to increase the food choice score of households the contribution of the government increases the income level of households. The subsidy is given to farmers in the form of better types of seeds, and fertilizers that increase the average size of crop production and increase the income level of families in that way we will increase the food choice score pattern of households.

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