BAE
Bio-based and Applied Economics

AIEAA
ASSOCIAZIONE ITALIANA DI ECONOMIA AGRARIA E APPLICATA

Citation: Dehghan, M., Moosavi, S.N., & Zare, E. (2024). Analyzing the impact of government subsidies on household welfare during economic shocks: A case study of Iran. *Bio-based and Applied Economics* 13(4): 387-396. doi: 10.36253/bae-15105

Received: September 8, 2023
Accepted: September 2, 2024
Published: December 31, 2024

Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Editor: Fabio Bartolini

ORCID
MD: 0000-0002-7824-0472
SNM: 0000-0001-5645-1976
EZ: 0000-0002-2787-5507

Analyzing the impact of government subsidies on household welfare during economic shocks: A case study of Iran

Mohammad Dehghan[1,*], Seyyed Nematollah Moosavi[2,*], Ebrahim Zare[3]

[1] *Agricultural Economics, Marvdasht Branch, Islamic Azad University, Fars Province, Iran*
[2] *Department of Agricultural Economics, Extension and Education, Marvdasht Branch, Islamic Azad University, Fars Province, Iran*
[3] *Agricultural Economics, Fars Agricultural and Natural Resources Research and Training Center, Fars, Iran*
*Corresponding authors. E-mail: dehghan191@gmail.com; seyed_1976mo@yahoo.com

Abstract. The study evaluates the effectiveness of Iranian government subsidies for households by comparing the welfare impact of food price shocks with the subsidy payments they receive. This helps us assess the government's efforts to reduce poverty in Iran. The household income and expenditure survey in 2020 was used to calculate compensated price elasticities using the Quadratic Almost Ideal Demand System (QAIDS). Results showed negative and less than 1 own-price elasticities for all food items, with a sensitivity to changes in income greater than one for demand of cereals, cooking oil, and fruits. Then, compensated variations (CV) welfare index was used to evaluate the effectiveness of government support payments in reducing household vulnerability due to food price increases. The results showed that the CV fluctuates between 8.05-80.46 $ under different scenarios. In other words, consumers are in a worse situation in terms of welfare and their expenditure increases. The vulnerability index of low-income households, after applying different food price scenarios, is in the range of 1.46-14.67%, which is reduced to 1.35-14.53% by implementing the cash-targeted subsidy policy. In other words, the effectiveness of the government's subsidy policy of $19 per person could reduce the vulnerability of these households by only 0.14%.

Keywords: poverty, vulnerability, welfare, subsidies, food, demand system.
JEL Codes: D12, D60, I3, I32, Q18.

INTRODUCTION

Social protection programs like subsidies aim to prevent poverty and social crisis and promote justice, even if it means sacrificing some economic efficiency (Barr, 2020). However, poor subsidy payment methods can cause inefficiency and injustice. There is currently a heated debate among economists and policymakers about the link between targeting subsidies and poverty reduction (Amegashie, 2006). Price changes wield considerable influence over resource allocation and consumer behavior, thereby shaping the

implementation of economic welfare policies (Khodaparast Shirazi *et al*., 2018). The surge in food prices, both domestically and globally, has become a pressing global concern (FAO, 2021). Although the COVID-19 pandemic exacerbated the issue by disrupting supply chains and inflating prices further (Elleby *et al*., 2021), the trend of rising food prices predates the pandemic, originating in 2018 (Panzone *et al*., 2021). In Iran, where food accounts for a substantial portion of household consumption, the anticipated impact of food inflation on household welfare is pronounced (Layani *et al*., 2020). Iran's persistent struggle with high inflation underscores the gravity of the situation, with efforts ongoing to identify and address underlying causes (Ilias, 2010). Notably, between 2010 and 2019, Iran witnessed an increase in spending on essential items like food and housing, exacerbating the economic strain on households (Salehi Isfahani, 2020). Despite the reformed social protection policy in Iran, the adverse effects of food price shocks could disproportionately affect low-income households in due to their vulnerable economic structures (Pawlak and Kołodziejczak, 2020).

To contextualize the analysis of price shocks on household vulnerability and welfare across diverse countries, it is imperative to understand the intricate dynamics of consumer behavior and demand systems. For instance, studies utilizing sophisticated models such as Translog, Almost Ideal Demand System (AIDS), and Quadratic Almost Ideal Demand System (QAIDS) offer valuable insights into the responsiveness of consumers to price changes. Take, for example, Deaton and Mulbaer's (1980). There has been a growing body of literature regarding the impact of price shocks on household vulnerability and welfare effects across various countries in recent years (e.g. Aziz *et al*., 2016; Arfini & Aghabeygi, 2018; Adekunle *et al*., 2020; Lugo *et al*., 2022). Karagiannis *et al*.'s (2000) analysis on Greece, Abdulai's (2002) examination of Switzerland, Mazzocchi *et al*.'s (2004) investigation on Italy, Tefera's (2010) exploration of Ethiopia, Ahn *et al*.'s (2018) study on Korea, Yuzbashkandi and Mehrjo's (2020) research on Iran and Abdullah and Mohammed (2023) study on Iraq. Specifically, Ivanic and Martin (2008) and Ivanic *et al*. (2012) researched the correlation between global food price escalation and poverty in low-income countries, considering world and local prices' impact on poverty. Arfini and Aghabeygi (2018) found that increasing food import prices in Italy affected the welfare index by 1061.48 billion USD in the entire food group. The meat group was most affected and the fruit group was least affected. A recent study (Layani *et al*. 2020) found that rising food prices in Iran have a significant impact on rural households, with 10.63% of them falling below the poverty line. Anindita *et al*. (2022) used various methods to examine the impact of price and income changes on demand and welfare in urban Indonesia. They found that households substitute some food items as a coping mechanism. Rossen *et al*. (2022) have conducted a study that examines the effect of price shocks on different household groups based on income and age. Their research found that households with lower income and older individuals experience more significant welfare losses and a decrease in tax burdens compared to lower-income households with younger individuals. These studies provide valuable insights into the demand system and price elasticities of goods and offer useful implications for policymakers and practitioners in the field.

However, these prior studies have solely focused on analyzing the welfare impacts that arise from changes in prices. However, they fail to address a fundamental question: to what extent can the government's welfare policies, such as cash transfers, effectively mitigate the decrease in welfare and prevent households from falling below the poverty line. Therefore, this current research aims to address this research gap by assessing the impact of the Iranian government's subsidy policy for poor households.

In 2017 year, the Iranian government introduced a new social protection program by replacing universal subsidies with targeted subsidies while implementing support policies for vulnerable groups as a way to reduce poverty (Hosseini *et al*., 2017). A subsidy reform program replaced energy subsidies with direct cash payments. Recently, to protect Iranian households from vulnerability caused by price liberalization, the government provides additional subsidies to consumers and eliminates cash subsidies for high-income groups. Although the amount of cash subsidy increased significantly from 2011 to 2019, the share of this cash payment of household average income decreased from 22% to 5%. This Government assistance includes official transfers from the Ministry of Health, Labour and Welfare and Komite Emdad. Although the poor benefited significantly from the monthly transfers, their real value diminished rapidly due to high inflation. The reformed social protection programs are targeted, particularly prioritizing poor households headed by women, using a targeting algorithm developed jointly with the World Bank. Government welfare payments decreased from $35.4 in 2018 to $19.8 per person in 2019 due to economic sanctions and reduced revenue, resulting in less support for people in need (Salehi Isfahani, 2020).

The study calculates the welfare effects of changes in food prices and evaluates the effects of these changes

on the poverty line and the number of poor households in Iran. Unlike previous studies, this research considers the vulnerability index, which has received insufficient attention in assessing the effects of price shocks on consumer behavior.

The paper is divided into distinct sections. Firstly, the theoretical fundamentals and materials, and methods are presented. Secondly, the results of calculating the price and income elasticities of food demand for Iranian households are reported, along with an examination of the effects of various food price increase scenarios. Finally, the fourth section provides conclusions and suggestions.

METHODOLOGY

Data

In this study, to estimate the demand system and calculate the price and income elasticities of food items, the latest cost-income data of 2878 Iranian households supported by the government, which was published by the Iranian Statistics Center, was used. These data include the amount of consumption of each food item and their corresponding price. Also, to estimate the AIDS system, the size of the household, and the education level of the head of the household were used in the estimation of the demand system. Table 1 presents the socio-economic characteristics of the sample under study. The average age of the head of the household in government-supported households is 52.32 years, while the average number of years of education of the head of the household is 5.27 years. The average size of households in the sample was 3.89 individuals. The government-supported households included in the study are categorized as low-income households, with an average monthly income of $53.65. It has been observed that the group of households under consideration here has an average per capita food expenditure of $14.05 per month, which constitutes around 26% of the per capita income.

Table 1. Socio-economic characteristics of the studied households.

Variables	Average
Age of household head (year)	52.32
Education of household head (year)	5.27
Family size	3.89
Per capita Food expenditure ($)	14.05
Per capita income per month ($)	53.65

* Source: Iranian Statistics center in 2020 (1$=208000 Rial).

Welfare analysis

The evaluation of the efficacy of providing subsidies to low-income households is determined by comparing the ratio of the Compensated Variation (CV) index to the per capita income with the ratio of cash subsidies to monthly income (Eq. 1).

$$Vulnerability\ \ index\ \ \text{after}\ subsidy\ \ policy = \frac{CV}{monthly\ \ income} - \frac{\text{cash subsidy}}{monthly\ \ income} \quad (1)$$

Where CV is the household's welfare index as a result of different price shocks. the ratio of the Compensated Variation (CV) index to the monthly income is known as the vulnerability index (Azzam and Rettab, 2012).

$$Vulnerability\ \ index\ \ before\ subsidy\ \ policy = \frac{Welfare\ effects\ of\ \ price\ shock}{monthly\ \ income} \quad (2)$$

By following Khodadad Kashi *et al.* (2005), Arshadi and Karimi (2013) and Layani *et al.* (2020), the 66 percent of the average household food expenditure is defined relative poverty line:

$$\text{Poverty Line}=66\ \text{percent} \times (\text{average food expenditure}) \quad (3)$$

After computing the poverty line, we can divide urban households into two groups: The households that have a food expenditure higher than poverty line (above the poverty line), and the households that have a food expenditure lower than poverty line (below the poverty line). The reason for this is because poverty lines are highly elastic to relative food prices (Bresciani and Valdes, 2007), and changes in food prices result in variations of poverty prevalence. Furthermore, we then compute a new poverty line, after accounting for the rise in food prices (Rodriguez-Takeuchi and Imai, 2013):

$$\text{Secondary Poverty Line= Poverty Line + Welfare Index-Subsidy policy} \quad (4)$$

Different indexes measure welfare changes due to policy implementation. Economic conditions like price changes can affect consumer utility rates. To determine the impact of economic conditions on consumer utility, criteria like Consumers Surplus (CS), Compensated Variation (CV), and Equivalent Variation (EV) are used. We use CV to determine the minimum amount that Iranian consumers are willing to accept to tolerate higher food prices. Studies suggest that the CV is the most suitable criterion for our analysis (Tefera, 2012 and Cranfield

2007). Compensated Variation was utilized in the study, as indicated by research conducted by Azzam and Rettab (2012), Tefera (2012), Layani *et al*. (2020), and Roosen *et al*. (2022).

$$CV = \sum_{i=1}^{n} p_i^0 x_i^0 \left(\frac{dp_i}{p_i^0} + \frac{dx_i^*}{x_i^0} + \frac{dp_i}{p_i^0}\frac{dx_i^*}{x_i^0}\right) \quad (5)$$

Where p_i^0 and x_i^0 correspond to price and quantities before price shock and dx_i^* is the compensated quantity change in demand following the price shock using the compensates elasticities. The percentage change of x_i^* is not available. However, by the total differential of the Hicksian demand functions $x_i^*(.)$ for i = 1, 2,…, N i.e., an approximation of the change is obtained.

$$\begin{aligned}
\frac{dX_1^*}{X_1^0} &= \epsilon_{11}^H \frac{dp_1}{p_1} + \epsilon_{12}^H \frac{dp_2}{p_2} + \cdots + \epsilon_{1N}^H \frac{dp_N}{p_N} \\
\frac{dX_2^*}{X_2^0} &= \epsilon_{21}^H \frac{dp_1}{p_1} + \epsilon_{22}^H \frac{dp_2}{p_2} + \cdots + \epsilon_{2N}^H \frac{dp_N}{p_N} \\
&\cdot \\
&\cdot \\
\frac{dX_N^*}{X_N^0} &= \epsilon_{N1}^H \frac{dp_1}{p_1} + \epsilon_{N2}^H \frac{dp_2}{p_2} + \cdots + \epsilon_{NN}^H \frac{dp_N}{p_N}
\end{aligned} \quad (6)$$

where ε_{ij}^H is the Hicksian price elasticity for i = 1, 2,…, N and j = 1,2,…, N.

To estimate the Hicksian price elasticities as shown in (6), we estimate a QAIDS model for N commodities by imposing the usual restrictions: Adding-up, homogeneity, and symmetry. The QAIDS model developed by Banks *et al*. (1997), which has budget shares that are quadratic in log total expenditure, is an example of the empirical demand systems that have been developed to allow this expenditure nonlinearity.

$$s_i = a_i + \sum_{j=1}^{n} \gamma_{ij} log p_j + \beta_i log\left[\frac{M}{f(p)}\right] + \frac{\lambda_i}{g(p)}\left[log\frac{M}{f(p)}\right]^2 + \delta_i z_i \quad (7)$$

Where S_i is the share of food group i in total expenditure on the N food groups, for i=1,2,..,N; and p_j is a vector of prices; M is total expenditure and Z Vector of statistical variables dependent on household characteristics. Also, *f(p)* is the Laspeyres Price Index defined by $logf(p)^* = \Sigma_i s_i log p_i$.

The restrictions are:

$$\sum_{i=1}^{n}\alpha_i = 1.\sum_{i=1}^{n}\gamma_{ij} = 0.\sum_{i=1}^{n}\beta_i = 0 \quad .\gamma_{ij} = \gamma_{ji} \quad i.j = 1.2\ldots N \quad (8)$$

The formulae for the elasticities in the QUAIDS are given by Banks, Blunbell and Lewbel (1997). They are obtained by first differentiating equation (7) with respect to logM and $logp_j$, respectively, to obtain:

$$\mu_i = \frac{\delta s_i}{\delta log M} = \beta_i + \frac{2\lambda_i}{g(p)} log\left[\frac{M}{f(p)}\right] \quad (9)$$

$$\mu_{ij} = \frac{\delta s_i}{\delta log p_j} = \gamma_{ij} - \mu_i(\alpha_j + \sum_k \gamma_{jk} log p_k) - \frac{\lambda_i \beta_j}{g(p)}\left[\log\left(\frac{M}{f(p)}\right)\right]^2 \quad (10)$$

The expenditure elasticities are then derived as $e_i = m_i/s_i + 1$. The uncompensated or Marshallian price elasticities are given by $e_{ij}^m = m_i/s_i - d_{ij}$, where d_{ij} is the Kronecker delta, which is equal to one when i=j, otherwise $d_{ij} = 0$. Using the Slutsky equation, $e_{ij}^m = e_{ij}^m + s_j e_i$, the compensated or Hicksian elasticities can be calculated and used to assess the symmetry and negativity conditions by examining the matrix with elements $s_i \acute{e} e_{ij}^h \grave{u}$, which should be symmetric and negative semi-definite in the usual way.

Definition food price shocks

There are several methods to define the price increase scenario. The first method is to use previous studies. Another method is to use time series data for food. For this purpose, the price of food taken and the price growth during the studied years were first calculated for each group, and the average rate of change of price growth was calculated and defined as the scenario for food price change. The scenarios of increasing food prices in this study are shown in Table 2. In addition to food price fluctuations, global statistics were also considered according to the Statistics Center of Iran. The first scenario studied is food price changes based on the reports of the Statistics Center of Iran (2021). It can be seen that meat has the highest price fluctuations and vegetables have the lowest price fluctuations. The second scenario in this study is the price fluctuations of food imports to Iran. On this basis, information on food import prices was collected, and the average annual fluctuations in food import prices were used as the basis

Table 2. Different food prices shock scenarios (%).

Food	First scenario	Second scenario	Third scenario	Fourth scenario
Cereals	34	15.31	9.64	6.07
Meat	124.4	16.26	4.33	3.83
Dairy	56.7	15.56	3.63	6.88
Oil and fat	54.4	9.60	26.27	8.22
Fruit	27.5	11.96	9.87	5.38
Vegetables	25.4	30.22	8.22	5.35
Sugar	28.5	19.03	13.15	8.08
Tea and coffee	31	10.09	9.87	5.38

for the price scenario. Finally, the third and fourth scenarios were defined based on the FAO predicted price changes. Accordingly, the food price index reported by FAO was examined for the period 2003-2021. The annual changes in the food price index were calculated, and the average changes in the price index during 2019-2021 were used as the third scenario and the average changes in the price index during 2003-2019 were used as the fourth scenario.

RESULTS

Table 3 displays the average food expenditure and expenditure share of eight main food groups. Cereals have the highest expenditure share, while tea and coffee have the lowest. On average, the expenditure allocated to tea and coffee is $4.50 per month, and the expenditure allocated to cereals is $41.70 per month. Meat has the second-highest food expenditure share among all food groups, accounting for 23.52% of the total expenditure. According to Layani et al.'s (2020) study on urban households, the average monthly expenditure on food indicates that cereals and meat are the top two priorities, with respective spending of $43.69 and $41.01. Additionally, households allocated an average of $4.69 on tea and coffee. A comparative analysis with the current study suggests that these households face challenges in maintaining a healthy nutritional status and are more vulnerable to price fluctuations. These findings highlight the need to address the nutritional inadequacies of these households and to develop interventions that support better dietary practices.

This study focuses on the Iranian agricultural market and aims to measure the impact of price changes on household expenditures. Specifically, we seek to answer the question: How will a price shock in the agricultural market affect the expenses of Iranian households that receive government support? this research explores whether payment of cash subsidies can effectively compensate for the reduction of welfare caused by such price shocks. To address the given query, it is imperative to compute the changes in the consumption patterns of various food products that ensue due to fluctuations in their prices. This can be accomplished by calculating the own-price and cross-price elasticities of the different food categories. The following section presents the results of the price and income elasticities.

Table 3. Average food consumption expenditure and share of food expenditure

Food	Average monthly food expenditure ($)	Food Expenditure Share (%)
Cereals	41.699	29.68
Meat	33.045	23.52
Dairy	16.238	11.56
Oil and fat	8.591	6.12
Fruit	12.506	8.90
Vegetables	16.297	11.60
Sugar	7.600	5.41
Tea and coffee	4.504	3.21

* Source: Iranian Statistics center in 2020 (1$=208000 Rial).

Price and income elasticities of food

After estimating the coefficients of the systems of equations based on the equations presented in the previous section, the price and income elasticities were obtained (Table 4). The compensated own-price and cross-price elasticities of food are shown in Table 4. As can be seen, all compensated elasticities of the studied food are negative as expected, and this is consistent with the behaviour that maximizes the utility of rational consumers.

In terms of absolute values, the highest own-price elasticity is related to oil, and the lowest own-price elasticity is related to dairy. The own-price elasticity of cereals is -0.398%. Therefore, 1% increase in cereal prices, assuming other conditions are constant, can reduce demand for this commodity by 0.398%. The compensated own- price elasticity of meat is calculated as -0.529%. Actually, the demand for meat and cereals are inelastic. It is worth noting that the own-price elasticity of oil and fat is (-0.729%) and the own-price elasticity of dairy products is (-0.006%). In other words, with a 1 % increase in the price of oil and fat (or dairy) assuming other conditions are constant, the demand for this food item decreases by 0.729% (or 0.006%). Own-price elasticity of fruits, vegetables and sugar are very close in terms of absolute value as -0.634 %, -0.608 % and -0.633 %, respectively.

According cross-price elasticities, there is a poor complementary relationship between cereals and other food groups. However, the effect of changes in cereal prices on demand for other foods is more pronounced. This result may be due to the higher importance of cereal for the poor households or the higher expenditures share of cereal. For instance, the effect of rising dairy prices on cereal demand is negative. In other words, with a 1 % increase in dairy prices, the demand for cereals decreases by 0.093 %, and this indicates a complementary relationship between the two prod-

Table 4. Price and income elasticities for each food groups.

	Cereals	Meats	Dairy	Oil cooking	Fruits	Vegetables	Sugar	Tea and coffee
Cereals	-0.398	0.086	-0.093	0.073	0.065	0.016	0.005	0.321
Meats	0.196	-0.529	0.175	0.048	0.084	0.119	0.061	-0.071
Dairy	0.177	0.715	-0.006	0.065	0.203	0.523	0.367	-1.044
Oil cooking	0.285	-0.106	-0.382	-0.729	-0.001	-0.048	-0.082	0.565
Fruits	0.258	-0.026	-0.385	0.021	-0.633	-0.054	-0.060	0.560
Vegetables	0.144	0.199	0.188	0.068	0.069	-0.608	0.068	-0.035
Sugar	0.159	0.236	0.284	0.043	0.088	0.175	-0.633	-0.219
Tea and coffee	0.206	-0.147	-0.429	0.011	-0.071	-0.117	-0.093	-0.243
Income Elasticities	1.303	0.918	0.136	1.210	1.392	0.998	0.774	0.836

* Source: Authors' calculations.

ucts. However, these households add cereals to their food portfolio as a substitute for dairy products. This result is expressed based on the elasticity coefficient of 0.177%. Although other foods are considered meat substitutes for households, the effect of meat price change on the demand for oil and fat, fruit and tea, and coffee is negative and is equal to -0.106%, -0.026% and -0.429%, respectively, and this indicates the complementarity of meat for these food groups. The cross-elasticity between oil and fat and other food groups such as meat, dairy, fruits, vegetables, and sugar are negative and it shows the existence of a complementary relationship between oil and fat with other food. However, the increase in oil and fat prices leads to an increase of 0.048 %, 0.065 %, 0.021 %, 0.068% and 0.043 % demand for meat, dairy, fruits, vegetable, and sugar, respectively. The cross-elasticity of other commodities with oil and fat suggests a substitution relationship between them. The highest substitute for fruit is tea and coffee (cross price elasticity is 0.560). Also, the highest complementary relationship between fruit and dairy products was obtained (cross price elasticity is -0.385). For households supported by the Relief Committee, compensated cross-sectional elasticity of vegetables indicates the existence of a substitution relationship between vegetables and other food groups (except tea and coffee). Indeed, if the decision is made to include foods such as cereals, dairy products, meat, oil and fat in the consumption basket containing vegetables, these foods are added to the poor households' consumption basket as a substitute. The highest and lowest substitution relationships are for vegetables-meat (0.199%) and vegetables-sugar (0.067%), respectively. It is worth to mention that vegetables themselves are considered as a complementary commodity for oil and fat (elasticity - 0.048 %), fruits (elasticity - 0.054 %). In other words, increasing the price of vegetables reduces the demand for oil, fat and fruits. Interestingly, vegetables are considered as a complementary commodity for oil and fat (cross-price elasticity is -0.048 %), fruits (cross-price elasticity is -0.054 %). In other words, increasing the price of vegetables reduces the demand for oil, fat and fruits.

The estimated total income elasticities presented in Table 4 have the expected positive signs in all eight commodities. The values for cereals (e=1.303), oil cooking (e=1.210), and fruits (e=1.392) are much greater than others. This implies a fairly large response of demand for these food groups to changes in total food expenditure. Actually, the demand for cereals, oil cooking, and fruits are elastic with respect to total food expenditure. The estimated income elasticities of meats, dairy, vegetables, sugar and tea and coffee are less than unity, so these goods are fairly inelastic with respect to total food expenditure.

Welfare effects of food price shocks

Evaluating the impact of price shocks on consumer welfare can provide valuable insights into the effectiveness of government support policies aimed at reducing poverty and vulnerability. Table 5 shows the effect of food prices shock on household expenditures. As shown, Under the first price scenario, CV welfare index fluctuates between 0.98-29.15%. The highest CV index is related to meat and the lowest welfare index is related to tea and coffee. The total Compensated variations index in this scenario is 57.28%. In other words, as a result of changes in food prices, the food expenditure of households supported by the government will increase by $80.461. Therefore, if the government-supported households want to choose and consume the same food basket before the price change, their expenditure will increase by 57%. Under the second price scenario, the total wel-

Table 5. Welfare effect of multiple meat price shocks.

Food Groups	Expenditure	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
		CV ($)	CV (%)	CV ($)	CV (%)	CV ($)	CV (%)	CV ($)	CV (%)
Cereals	41.699	14.502	10.32	6.457	4.60	4.079	2.90	2.563	1.82
Meats	33.045	40.947	29.15	5.417	3.86	1.436	1.02	1.279	0.91
Dairy	16.238	9.172	6.53	2.526	1.80	0.568	0.40	1.111	0.79
Oil cooking	8.591	4.642	3.30	0.824	0.59	2.239	1.59	0.702	0.50
Fruits	12.506	3.453	2.46	1.497	1.07	1.229	0.88	0.672	0.48
Vegetables	16.297	4.194	2.99	4.910	3.50	1.334	0.95	0.878	0.63
Sugar	7.600	2.169	1.54	1.441	1.03	0.991	0.71	0.611	0.44
Tea and coffee	4.504	1.381	0.98	0.450	0.32	0.451	0.32	0.242	0.17
Total	140.478	80.461	57.28	23.523	16.74	12.327	8.78	8.058	5.74
Vulnerability index before subsidy policy		14.67%		4.28%		2.29%		1.46%	
Vulnerability index after subsidy policy		14.53%		4.14%		2.15%		1.35%	

* Source: Authors' calculations (1$=208000 Rial).

fare index of Compensated variations was $23.523, which is 16.74% of the baseline food expenditure of households. The CV index of food items in this scenario fluctuates between 0.32-4.60%. With the simultaneous change of food prices based on the third and fourth scenarios, CV welfare index was equal to $12.327 and $8,058 respectively, which is 8.78% and 5.74% of household food expenses in the base year, respectively. The highest CV index in the third scenario is related to cereals (2.90%) and the lowest is related to tea and coffee (0.32%). In the fourth scenario, the welfare index of food items fluctuates in the range of 0.17-1.82%.

The vulnerability index of poor households fluctuates between 1.46-14.67% in different price scenarios. The highest vulnerability index was obtained after applying the first price scenario and the lowest was obtained as a result of the fourth price scenario. Given that the average monthly income of poor households is 548.31$, the total welfare loss due to rising food prices is equivalent to 14.67% of average household income in first scenario, which is an indicator of the vulnerability of households as a result of multiple food price shock. This index decreases to 1.46% in the fourth scenario. In order to support low-income households and establish social justice, the Iranian government pays a cash subsidy of about $19 per person per month to the head of the household's account. The amount of cash subsidy received by the households is equivalent to 0.14% of the average monthly income of the households. In other words, the Iranian government has only been able to reduce the vulnerability of low-income households by 0.14% by implementing this policy. Therefore, after the implementation of the targeted subsidy policy and supporting the low-income groups, the vulnerability index of households will be in the range of 1.35-14.53% in different price scenarios.

Finally, table 6 presents the secondary poverty line after the price increase and the subsidy policy. As can be seen, the secondary food poverty line varies between $26.88-99.29 under the different price shock scenarios. The results show that the subsidy policy was not efficient and some low-income households are still at risk of food poverty. The highest number of households below the poverty line will occur in the first price scenario.

Table 6. Effect of price shock on poverty line.

	Scenario 1	Scenario 2	Scenario 3	Scenario 3
Secondary food poverty line	99.29	42.35	31.15	26.88
% of households above poverty line	37.18	49.57	58	61
% of households below the poverty line	62.82	50.43	42	39

* Source: Authors' calculations.

DISCUSSION

Economic welfare measurement is crucial for policy-making. Demand analysis and consumption patterns help predict future situations. It's crucial to assess the impact of economic policies like subsidies and price changes on food security, health, and consumer welfare. We can gauge their effectiveness by observing consumer behaviour. In this study, an attempt was made to investigate the effectiveness of the policy of paying subsidies to poor households on reducing the vulnerability of poor households. For this purpose, use the household expenditure and Income survey of households supported by the government (under the support of the Komite Emdad) and the QUAIDS model and CV welfare index. The CV showed that the lost welfare of the low-income households in Iran under different price shock scenario. The welfare index of compensated variations of low-income households fluctuates between 8.05-80.46 $ under different scenarios. In other words, consumers are in a worse situation in terms of welfare and their expenditure increases. This finding was also reported by Arfini and Aghabeygi (2018) for Italian consumers and Layani *et al*. (2020) for Iranian urban households. The largest decline in household welfare due to price changes is related to two groups of cereals and meat. The CV index for the cereal fluctuates between 10.32-1.82% under different price scenarios. For meat, CV is between 0.91-29.15%. Roosen *et al*. (2022) showed that a general rise in the value-added meat tax from 7% to 19% leads to a welfare loss of 0.83 euros per household per month in Germany.

Based on the results, the degree of welfare lost by the studied households in 2020 as a result of different price shock scenarios, considered on average about 14.67%, 4.28%, 2.29% and 1.46% of their income in this year. Comparison of the findings with those of other studies (e.g. Layani *et al*., 2020) confirms that the vulnerability of low-income households is more than others. The results indicated that a significant number of households have lower food expenditures than the estimated food poverty line, and they suffer from malnutrition. Therefore, the government's support policies (including the payment of cash subsidies to the head of the household) have not been able to eliminate the vulnerability of low-income households caused by food price inflation, and some of these households are still below the poverty line. The government has tried to play an effective role by supporting vulnerable households with appropriate assistance programs or paying subsidies to offset the impact of price increases. The results of this study show that cash subsidy payments offset only a small portion of the welfare loss. Thus, if the government's goal is to support vulnerable households, regulating the market for these products can play an important role in food security and support implementation.

Iran's goods and services subsidy policy has been criticized for being inefficient despite being a consumer-supportive policy for the past 40 years. The poverty index is still high and standard welfare is not achieved for households. It is costly, potentially distorts the market, and benefits some groups that do not require support. Currently, the Iranian government provides a uniform subsidy to all individuals irrespective of their distinctive characteristics. However, empirical evidence demonstrates that the vulnerability of different individuals varies based on their demand structure. Therefore, undertaking such studies can aid the government in providing targeted subsidies based on the income of each person and minimizing the adverse effects of price shocks. For instance, individuals with lower income exhibit different behavioral patterns than those with higher income. Thus, the subsidy granted to them should be calculated based on their demand and welfare effects. This study is a significant step towards targeted subsidies, reducing governmental resource wastage, and promoting efficient allocation of resources. The current study was conducted on low-income households that are supported by the government, commonly known as relief committee member households. The findings of this study suggest that the government's existing support packages require a redesign to enhance the living conditions of these households. To achieve the desired outcome of improving the livelihoods of these households, policymakers are advised to consider increasing the amount of cash subsidy provided to these individuals. Alternatively, policymakers may also consider implementing sound policies that create stable employment opportunities for these individuals, which may lead to an improvement in their income status.

On the other hand, the demand for various types of meat, cereals, dairy products, and other food products will increase for various reasons, including population growth, which can be met by domestic production or foreign sources. Considering the significant results and effects that changes in global prices can have on household expenditure, the most logical policy is to support domestic production. More specifically, if food production does not keep pace with population growth, per capita food production will decrease as a result. Therefore, increasing demand should be met by increasing food imports or reducing exports, or resorting to both measures, which may affect domestic food prices. The increase in food imports definitely leads to greater dependence on foreign sources. This leads not only to

a financial burden, but also to a number of economic, social, and political problems, including the impact of global price fluctuations on the domestic market. Considering the increasing trend of global food prices in recent years, and taking into account the welfare losses due to this price increase as an indirect tax imposed on consumers, it is possible to accurately identify vulnerable households and pay support. The cost played a more effective role in offsetting the impact of the price increase and supporting them. Given the impact of the rise in food prices on the well-being of the population and the need to respond to the increase in demand for food resulting from the rise in prices and to pay attention to food security, it may be important to improve the quality of people's diets through measures such as increasing the production of appropriate foods and creating diversity in food production, especially for foods that account for a significant portion of household food expenditures.

CONCLUSION

This study set out price elasticities of eight food groups to evaluate the impact of food price changes on Iranian households. Using the Quadratic Almost Ideal Demand System (QAIDS), we investigated how increasing food prices affects the welfare of Iranian urban consumers and the poverty line. The estimated price and expenditure elasticities align with expectations, with own elasticities being negative and expenditure elasticities being positive. The research has also shown that the rise in food prices has led to a decline in the purchasing power of households, resulting in a loss of welfare. The findings of a cost-of-living analysis indicate that the consumer welfare of different scenarios varied between $8.05 to $80.46. This is equivalent to approximately 5.74% to 57.28% of the total food expenditure of eight food groups in 2020. While the impact of food price changes varied across food groups, the majority of households experienced significant difficulties in accessing food due to such price changes. It is noteworthy that after food price shocks, there was an increase in the number of households that fell below the poverty threshold.

Therefore, the government can play a crucial role in supporting the vulnerable households and households below the poverty line, considering the increasing trend of food prices in recent years with appropriate support programs or by paying subsidies to compensate for the effect of the price increase. However, the findings of the present study indicate that the extant cash subsidy payment policy is insufficient to compensate for the decline in welfare resulting from the surge in food prices in recent years. The outcome of such research endeavors can significantly contribute to the policymakers' ability to develop comprehensive and targeted support packages for households susceptible to economic vulnerabilities. By incorporating the results of these studies into their policy formulation process, policymakers can design effective measures to address the needs of vulnerable households and facilitate their economic stability and overall well-being.

However, there are some limitations in the present study that should be considered to make appropriate policy. This limitation is using the main food groups instead of using food separately in this study. Further research can also focus on calculating welfare effect separately for each food item and for different income deciles in order to determine exactly the extent of government support for vulnerable and poor households. The application of price elasticities, segmented by income, age, and education, can provide an accurate framework to determine consumer behavior. Such a framework can facilitate the formulation of effective policy designs, which can be further explored through future research. It is important to note that the simulations conducted in this study were based on cross-sectional data. To gain a better understanding of the long-term effects of food price shocks on poverty levels, future research must utilize panel data and examine poverty dynamics in conjunction with household livelihood strategies.

REFERENCE

1. Abdulai, A. (2002). Household demand for food in Switzerland. A quadratic almost ideal demand system. Revue Suisse D Economie De Statistique, 138(1), 1-18.
2. Adekunle, C. P., Akinbode, S. O., Shittu, A. M., & Momoh, S. (2020). Food price changes and farm households' welfare in Nigeria: Direct and indirect approach. *Journal of Applied Economics*, *23*(1), 409-425.
3. Abdullah, Y. Y., & Mohammed, R. M. (2023). Estimating Demand for Imported Food Categories in Iraq. *Journal of Economics and Administrative Sciences*, *29*(137), 146-159.
4. Aghabeygi, M., & Arfini, F. (2020). Assessing the net import welfare impacts of the rising global price of food in Italy. *Sustainability*, 12(3), 1086.
5. Ahn, Y. J., Baek, U., Lee, B. C., & Lee, S. K. (2018). An almost ideal demand system (AIDS) analysis of

Korean travelers' summer holiday travel expenditure patterns. *International Journal of Tourism Research*, 20(6), 768-778.
6. Amegashie, J. A. (2006). The economics of subsidies. *Crossroads*, *6*(2), 7-15.
7. Anindita, R., Sadiyah, A. A., & Khoiriyah, N. (2022). Income and price elasticities of animal food demand and welfare in Indonesian urban: an application of the LA-AIDS.
8. Arfini, F., & Aghabeygi, M. (2018). *Evaluation of Welfare Effects of Rising Price of Food Imports in Italy* (No. 2038-2018-2968).
9. Arshadi, A. And Karimi, A. (2013). Investigate the situation of absolute poverty in Iran in the years of the first to fourth development plan. *Quarterly Journal of Strategic and Macro Policies*, 1: 35-64.
10. Aziz, S., Yaseen, M. R., & Anwar, S. (2016). Impact of rising energy prices on consumer's welfare: a case study of Pakistan. *The Pakistan Development Review*, 605-618.
11. Azzam, A. M., & Rettab, B. (2012) A welfare measure of consumer vulnerability to rising prices of food imports in the UAE. *Food Policy*, 37: 554-560.
12. Banks, J., Blundell, R. and Lewbel, A. (1997) Quadratic Engel curves and consumer demand. *Review of Economics and Statistics*, 79: 527-539.
13. Barr, N. (2020). *Economics of the welfare state*. Oxford University Press, USA.
14. Blanciforti, L. A., Green, R. D., & King, G. A. (1986). US consumer behavior over the postwar period: an almost ideal demand system analysis. Monographs.
15. Cranfield, J. (2007) The Impact of Food Price Inflation on Consumer Welfare: Application of a Rank Four Demand System. International Food Economy Research Group, University of Guelph, Canada.
16. Deaton, A. and J. Muellbauer. (1980) An Almost Ideal Demand System, American Economic Review, 70: 312-326.
17. Elleby, C., Domínguez, I. P., Adenauer, M., & Genovese, G. (2020). Impacts of the COVID-19 pandemic on the global agricultural markets. *Environmental and Resource Economics*, 76 (4), 1067-1079.
18. Hosseini, S. S., Charvadeh, M. P., Salami, H., & Flora, C. (2017). The impact of the targeted subsidies policy on household food security in urban areas in Iran. *Cities*, *63*, 110-117.
19. Ilias, S. (2010). Iran's Economic Conditions: US Policy Issues. DIANE Publishing.
20. Karagiannis, G., Katranidis, S., & Velentzas, K. (2000). An error correction almost ideal demand system for meat in Greece. *Agricultural Economics*, 22(1), 29-35.
21. Khodadadkashi, F., Heidari, Kh. And Bagheri, F. (2005) Estimation of the poverty line in Iran during the period 1984-2000. Social Welfare Quarterly, 17: 137-163.
22. Khodaparast, J., Ashktrab, n. Nematollahi, z. (2018). The effects of rising food prices on the welfare and poverty of urban households in Iran. *Journal of Agricultural Economics and Development*. 32 (4): 287-298.
23. Layani, G., Bakhshoodeh, M., Aghabeygi, M., Kurstal, Y., & Viaggi, D. (2020). The impact of food price shocks on poverty and vulnerability of urban households in Iran. *Bio-based and Applied Economics*, 9 (1), 109-125.
24. Lugo, M. A., Garriga, S., & Puig, J. (2022). Effects of food prices on poverty: The case of Paraguay, a food exporter and a non-fully urbanized country. *Revista Latinoamericana de Desarrollo Económico*, (37), 7-43.
25. Mazzocchi, M., Stefani, G., & Henson, S. J. (2004). Consumer welfare and the loss induced by withholding information: The case of BSE in Italy. *Journal of agricultural economics*, 55(1), 41-58.
26. Panzone, L. A., Larcom, S., & She, P. W. (2021). Estimating the impact of the COVID-19 shock on UK food retailers and the restaurant sector. *Global Food Security*, 100495.
27. Pawlak, K., & Kołodziejczak, M. (2020). The role of agriculture in ensuring food security in developing countries: Considerations in the context of the problem of sustainable food production. *Sustainability*, *12*(13), 5488.
28. Rodriguez-Takeuchi, L., & Imai, K.S. (2013) Food price surges and poverty in urban Colombia: New evidence from household survey data. *Food Policy*, 43: 227-236.
29. Roosen, J., Staudigel, M., & Rahbauer, S. (2022). Demand elasticities for fresh meat and welfare effects of meat taxes in Germany. *Food Policy*, 106, 102194.
30. Salehi Isfahani, D. (2020). Impact of sanction on household welfare and employment. The SAIS Initiative for Research on Contemporary Iran. Johns Hopkins University, 1-52.
31. Yuzbashkandi, S. S., & Mehrjo, A. (2020). Towards agricultural demand for the main energy carriers in Iran: Application of linear approximate almost ideal demand system (LA-AIDS) analysis. *Journal of the Saudi Society of Agricultural Sciences*, 19(5), 313-318.