DEMAND ELASTICITY OF IMPORTED FOOD ITEMS IN UNITED ARAB EMIRATES (UAE)

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ABSTRACT
This research empirically estimated the demand patterns of food items in United Arab Emirate (UAE) using dated data obtained from FAO and UNCTAD databank. The data spanned for a period of 37 years (1981-2017) and covered information on import quantity, import expenditure and consumer price index (CPI). The collected data were analyzed using both descriptive and inferential statistics-Linear Approximate Almost Ideal Demand System (LA/AIDS) model. The empirical evidence showed dominant effect of milled rice in the budget share of the consumers, thus indicating a low diversification in food spending. In addition, the consumers tend to diversify their diet composition in tandem with an increase in their per capita income. Thus, wide variety of food items are been consumed in the country which is very vital for the nutritional diet status of the people. Furthermore, income effect is stronger than substitution effect in determining the demand for imported food items in the country. Therefore, since most of these commodities are very important as they fulfilled the fundamental needs of the people, thus onus lies on the policymakers to embark on hi-tech agriculture *viz.* intensive production. Doing so will enhance the GDP of the country and would safeguard the food security of the nation as economic vulnerability and economic exploitation of foreign market would be contained.
***Keywords*:** Demand; Elasticity; Food items; Imported; UAE

INTRODUCTION
According to Power (2014), the UAE's population is projected to reach approximately 11.5 million by 2025, thus placing an increased pressure on the country's already strained food and water resources. Food consumption is currently growing at 12 per cent each year and it is predicted that the value of food imports will increase from US$3 billion in 2011 to US$8.4 billion by 2020 to meet this demand. Significant issues with food waste and over-consumption further increase the country's food demand. The demand for processed and western foods increases the country's reliance on food imports. The country relies on imports for its grain (GAIN, 2019), meat, sugar and edible oil needs. Food imports amount to between 85 and 90 per cent of food consumption each year and its main food sources are India, the United States and Brazil. The rising demand for food in the country is important to its long-term food goal.

Food security, however, does not rely solely on the ability to produce food domestically. A strong oil and natural gas industry; and, high levels of national and per capita income means that the country can comfortably afford to maintain trade-based food security. On the Economist Global Food Security Index, the country was ranked 30th in the world. Although, the country has extensive desalination infrastructure and the finances to ensure access to affordable food supplies, its heavy reliance on artificial water and external food sources exposes it to risks arising from volatility in the global food market, geopolitical instability, and environmental threats (Power, 2014).

The steady growth in its population and tourism has created a rising demand for food in the country, thus the need to study the dietary diversity as it is one of the most important ways to ensure a balance of nutrients for people across different age categories. Therefore, in view of the above, the present research aimed at determining the demand elasticity of imported food items in UAE's.

RESEARCH METHODOLOGY
Time series data that spanned for a period of 37 years (1981-2017) and covered import quantity, import expenditure and CPI were used. FAO and UNCTAD data banks were the source of the data and the collected data were analyzed using descriptive statistics and Linear Approximate Almost Ideal Demand System (LA/AIDS) model.

Model Specification
Following Anwarul-Huq *et al.*(2004); Awal *et al.*(2008) Babar *et al.*(2011), using the budget share form, the LA/AIDS model is given below:

$$\omega_i = \alpha_i + \sum_j \gamma_{ij}\, lnP_j + \beta_i ln\left[\frac{X}{P^*}\right] + \varepsilon_i \text{ ……….. (1)}$$

$$lnP^* = \sum_j w_j lnP_j \text{ ………………… (2)}$$

$\omega_i = \alpha_i + \sum_{j=1}^{n=15} \gamma_{ij} lnP_j + \beta_i ln\left[\frac{X}{P^*}\right] + \varepsilon_i$ ……….. (3)

The restrictions on the parameters of the AIDS equation (1) are:
$\sum_i \alpha_i = 1. \sum_i \beta_i = 0. \sum_j \gamma_{ij} = 0, (Addding - up\ condition, Engel\ Aggregation$ …….. (4)
$\sum_j \gamma_{ij} = 0\ (homogeneity\ condition)$ …......... (5)
$\gamma_{ij} = \gamma_{ji} (Symmetry\ condition)$ ………….. (6)
Where, ω_i= budget share of the i[th] commodity (i.e. $\omega_i = P_i Q_i / X$); P_j= is the price of the j[th] commodity; X = total household expenditure on all the food items considered for the study; P^*= stone price index; ε_i= stochastic term, and it is assumed to be zero and has constant variance; α_i= intercept; γ_{ij} = price coefficient; and, β_i= expenditure coefficient. Blanciforti and Green (1983); Awal *et al.(*2008) stated that the model that uses Stone's geometric price index is referred to as the "Linear Approximate Almost Ideal Demand System (LA/AIDS)".
The demand elasticities are calculated as the functions of the estimated parameters and they have standard implications.
The expenditure elasticity ($\in_i$) which measures the sensitivity of demand in response to changes in consumption expenditure is specified as follow:
$\in_i = 1 + \left(\frac{\beta_i}{\omega_i}\right)$ …………………………. (7)
$\in_i = \frac{MBS}{ABS}$ ………………………………. (8)
MBS and ABS means marginal budget share and average budget share, respectively.
Price elasticity is estimated in two ways *viz.* uncompensated (Marshallian) elasticity that contains both price and income effects, and the compensated (Hicksian) elasticity which contain only price effect.
The uncompensated own-price elasticity ($\in_{ii}$) and the cross-price elasticity ($\in_{ij}$) measures how a change in the price one product affects the demand of itself and that of the other products respectively, with the total expenditure and other prices being held constant i.e. *ceteris paribus*. The Marshallian own and cross-price elasticities are shown below (Babar *et al*., 2011):
$\in_{ii} = \left(\frac{\gamma_{ii}}{\omega_i}\right) - (\beta_i + 1)$ ………………….. (9)
$\in_{ij} = \left(\frac{\gamma_{ij}}{\omega_i}\right) - (\beta_i \omega_i / \omega_j)$ ……………… (10)
The Hicksian own and cross-price elasticities ($\in_{ii}^*\ and\ \in_{ij}^*$) which measures the price effects on the demand assuming the real expenditure ($^X/_{P^*}$) is constant is given as follows (Babar *et al*. 2011):
$\in_{ii}^* = \left(\frac{\gamma_{ii}}{\omega_i}\right) + (\omega_i - 1)$ ………………. (11)
$\in_{ij}^* = \left(\frac{\gamma_{ij}}{\omega_i}\right) + \omega_j$ ………………………. (12)

Besides, the compensated price elasticity can be estimated by using $\in_i$, $\in_{ii}$ and $\in_{ij}$, and the permutation is as follow:
$\in_{ij}^* = \in_{ij} + \in_i * \omega_i$ ……………………. (13)
Babar *et al*.(2011) reported that the sign of the estimated $\in_{ij}^*$ indicates the substitutability or complementarily between the destinations under consideration. A commodity pair is denoted as a complement or substitute if their compensated cross-price elasticity is negative or positive respectively.
Based on the value of expenditure elasticity, a food item is classified as a necessity/necessary commodity ($0 < \in_i < 1$), a luxury commodity ($\in_i > 1$) or a Giffen / inferior commodity ($\in_i < 0$).
In absolute term, the demand for a particular commodity is price elastic (inelastic) if the elasticity value of its own-price is larger than unity (less than unity).
The Hicksian elasticity indicates the change in demand for a commodity due to a price variation, when the real expenditure change caused by the aforementioned price variation is compensated by an expenditure variation so that satisfaction/utility is kept constant.
When the objective is to use a tax instrument to limit consumption of a certain item by raising its price to consumers, the value of the price elasticity of demand is the key (Clements and Si, 2015). Below is the formula:
$Required\ price\ increase = \frac{Required\ reduction\ in\ consumption}{Price\ elasticity}$ ……………. (14)

RESULTS AND DISCUSSION

Average and Marginal Budget Shares

The results of thee average budget share showed milled rice to have the highest proportion (0.259) in the expenditure budget among the selected imported food items, then distantly followed by chicken meat (0.168) and thereafter wheat (0.1065) and wheat (0.1064) which had almost close budget shares (Table 1). Therefore, it can be inferred that there is a poor diversification in food spending on imported commodities with one commodity dominating the expenditure system in the studied area. However, it was observed that vegetables and dried fruit had the lowest budget shares *viz.* 0.0045 and 0.003 respectively. Furthermore, the empirical evidence showed milled rice to have the highest (40.9%) marginal budget share, followed by tea (15.14%) and wheat (10.75); while dried fruit had the least (0.32%) marginal budget share (Table 1).
It was observed that the price coefficient of variation for all the commodities with the exception of potatoes were moderate, an indication of a moderate variation in the prices of the imported food items which can be attributed to commodity grading.

Table 1: Average and marginal budget shares

Items	ABS	MBS	ABS%	MBS%
$\omega_{Dry\,Fruit}$	0.003581	0.003244	0.358101	0.324362
$\omega_{Fresh\,fruit}$	0.023211	-0.00367	2.321088	-0.36675
$\omega_{Prepared\,Fruit}$	0.018872	0.023409	1.887223	2.340895
$\omega_{Potatoes}$	0.018561	0.006906	1.856115	0.690573
$\omega_{Vegetables}$	0.004542	0.014639	0.454162	1.463933
ω_{Barley}	0.022621	0.026633	2.262082	2.663279
ω_{Maize}	0.027454	0.041416	2.745426	4.141559
ω_{Beef}	0.02303	-0.00773	2.302975	-0.77257
$\omega_{Chicken\,meat}$	0.167976	0.193625	16.79761	19.36251
ω_{Mutton}	0.067111	-0.1225	6.711081	-12.2504
$\omega_{Fresh\,Cow\,milk}$	0.010314	-0.01961	1.031432	-1.96122
ω_{Rice}	0.259136	0.408971	25.91356	40.89709
ω_{Spices}	0.021887	-0.0317	2.188741	-3.17024
$\omega_{Sugar\,confectionery}$	0.034126	0.029022	3.412645	2.902201
ω_{Tea}	0.106384	0.151355	10.63839	15.13547
$\omega_{Tomatoes}$	0.028946	0.023875	2.894639	2.387455
ω_{Wheat}	0.106508	0.127509	10.65084	12.75093
ω_{Garlic}	0.014916	0.024629	1.491584	2.462877
$\omega_{Limes\,\&Lemons}$	0.014584	0.013153	1.458417	1.315324
ω_{Onions}	0.026239	0.014518	2.623895	1.451771

Source: Authors' own computation, 2020

Note: ω, ABS and MBS means budget share, Average budget share and Marginal budget share.

Estimation of LA/AIDS

The empirical evidence showed the LA/AIDS model to fit the specified demand function as indicated by the diagnostic statistics *viz.* Langrage Multiplier (LM) test statistics for autocorrelation, heteroscedasticity, Arch effect etc. which were not different from zero at 10% degree of freedom. In addition, the likelihood of spurious correlation and regression were absent as evidenced from the parameter estimates, Durbin-Watson statistics and coefficient of multiple determinations. To overcome a singular-variance-covariance, two share equations were dropped and thereafter estimated using the adding-up property as suggested by literatures. The estimates were invariant of which the equation is deleted from the system. The symmetry and homogeneity conditions implied by consumption theory were imposed, thus indicating that the parameter estimates were consistent (Table 2). In view of the above satisfactory conditions, it can be inferred that the parameter estimates of the LA/AIDS model are reliable for future prediction with certainty and reliability.

The coefficient of multiple determinations ranged between 0.6274 to 0.9775 with prepared fruit and beef having the lowest and highest R^2 values respectively. For beef with the R^2 value of 0.9775, it implies that the price and income factors influenced the demand for beef to the tune of 97.75% while chance accounts for the remaining percentage. Likewise, the R^2 value of 0.6274 for the prepared fruits implies that 62.74% variation in the demand for prepared fruit was influenced by the exogenous variables captured in the model while the remaining percentage owed to disturbed economic reality.

The empirical evidence showed intercept coefficients of eight demand equations to be with the plausible margin of 10%, an indication of exogenous growth in the demand for these commodities, independent of movements in income and price factors (Table 3). For the budget shares with positive significant intercepts, it implied that the exogenous growth in the shares of these commodities have increased while for the budget shares with negative significant intercepts, it revealed decrease in the exogenous growth of these commodities. However, the observed decline in the demand for maize, chicken meat, and lemons and limes may be explained by changes in taste.

Table 2: LES/AIDS parameter estimates for food items

Prices	$D_{Dry\ Fruit}$	t-stat	$D_{Fresh\ fruit}$	t-stat	D_{PF}	t-stat	$D_{Potatoes}$	t-stat
$P_{Dry\ Fruit}$	-0.00714	2.49**	-0.0083	0.49NS	0.005467	1.61NS	0.001599	0.55 NS
$P_{Fresh\ fruit}$	-0.00101	0.24NS	0.001461	0.06NS	-0.00132	0.26 NS	0.007969	1.83*
P_{PF}	0.008027	1.78*	-0.01573	0.59NS	0.002294	0.43 NS	-0.00743	1.62 NS
$P_{Potatoes}$	-0.00191	0.69NS	0.005739	0.35NS	0.000823	0.25 NS	0.013416	4.77***
$P_{Vegetables}$	-0.00091	0.35NS	0.001157	0.07NS	-0.00321	1.05 NS	0.003935	1.49 NS
P_{Barley}	0.010472	1.78*	0.028276	0.81NS	0.001184	0.17 NS	-0.00061	0.10 NS
P_{Maize}	0.000784	0.09NS	0.009184	0.17NS	0.014825	1.40 NS	0.000769	0.08 NS
P_{Beef}	-0.0009	0.16NS	0.026915	0.81NS	0.017305	2.61***	0.008227	1.45 NS
P_{ChM}	0.002444	0.26NS	0.002098	0.04NS	-0.0014	0.12 NS	-0.02727	2.81***
P_{Mutton}	-0.00558	0.58NS	-0.11283	1.98**	-0.0126	1.11 NS	-0.01671	1.72*
P_{FCM}	0.011416	1.64*	0.049487	1.19NS	0.005629	0.68 NS	0.014876	2.09**
P_{Rice}	-0.00036	0.06NS	0.043923	1.14NS	-0.00945	1.23 NS	-0.00927	1.41 NS
P_{Spices}	0.003592	1.08NS	0.048265	2.44**	0.004313	1.09 NS	0.001681	0.50 NS
P_{SC}	0.001742	0.30NS	-0.05981	1.74*	-0.00704	1.03 NS	-0.00049	0.08 NS
P_{Tea}	-0.00076	0.14NS	0.008678	0.26NS	0.003702	0.57 NS	-0.00358	0.64 NS
$P_{Tomatoes}$	-0.00325	0.46NS	-0.00756	0.18NS	-0.01631	1.96**	0.005072	0.71 NS
P_{Wheat}	-0.00773	1.36NS	-0.01024	0.30NS	-0.01324	1.96**	0.008078	1.39 NS
P_{Garlic}	0.007236	1.93**	0.052478	2.34**	0.002649	0.59 NS	0.000229	0.06 NS
P_{LL}	-0.01346	1.70*	-0.00606	0.13NS	0.005818	0.62 NS	0.012747	1.58 NS
P_{Onions}	0.001863	0.41NS	0.000175	0.01NS	0.001194	0.22 NS	-0.00228	0.49 NS
Expenditure	-0.00048	0.10NS	-0.04573	1.67*	0.004292	0.79 NS	-0.01363	2.91***
Intercept	-0.02295	0.50NS	0.16243	0.60NS	-0.02366	0.44 NS	0.09454	2.03**
R^2	**0.7199**		**0.8632**		**0.6274**		**0.9293**	
DW	**2.21(0.19)NS**		**2.55(0.58)NS**		**2.45(0.45)NS**		**2.43(0.42)NS**	
Autocorrel.	**2.14(0.14)NS**		**2.02(0.17)NS**		**2.68(0.44)NS**		**1.86(0.19)NS**	
Heterosced.	**3.05(0.80)NS**		**5.33(1.23)NS**		**14.2(0.85)NS**		**10.2(0.97)NS**	
Arch effect	**1.15(0.88)NS**		**25.1(1.41)NS**		**0.61(0.89)NS**		**0.42(0.51)NS**	
CUSUM test	**1.10(0.28)NS**		**3.02(0.91)NS**		**2.06(0.57)NS**		**0.26(0.79)NS**	
Normality	**1.24(0.53)NS**		**18.5(9.4e-5)*** **		**0.61(0.73)NS**		**1.78(0.41)NS**	

Source: Authors' own computation, 2020

Note: *** ** * NS & ( ) means significant at 1%, 5%, 10%, non-significant and probability value, respectively

Table 2: Continued ……………………..

Prices	$D_{Vegetables}$	t-stat	D_{Barley}	t-stat	D_{Maize}	t-stat	D_{Beef}	t-stat
$P_{Dry\ Fruit}$	0.000225	0.07 NS	-0.00067	0.13 NS	-0.00316	0.99	0.001901	0.36

$P_{Fresh\ fruit}$	-0.00075	0.15 ^{NS}	-8.3E-05	0.01 ^{NS}	-0.00132	0.28	0.023971	3.07
P_{PF}	0.001077	0.21 ^{NS}	-0.00708	0.88 ^{NS}	-0.00391	0.78	-0.00794	0.96
$P_{Potatoes}$	-0.00097	0.31 ^{NS}	-0.01091	2.22**	-0.00855	2.79	0.001611	0.32
$P_{Vegetables}$	0.000374	0.13 ^{NS}	0.005896	1.27 ^{NS}	-0.00024	0.08	0.012291	2.59
P_{Barley}	0.00129	0.19 ^{NS}	-0.00161	0.15 ^{NS}	-0.00849	1.30	0.027179	2.53
P_{Maize}	0.003745	0.37 ^{NS}	0.022349	1.40 ^{NS}	-0.01174	1.18	-0.02671	1.63
P_{Beef}	0.001768	0.28 ^{NS}	0.013731	1.38 ^{NS}	0.011303	1.82	-0.01692	1.66
P_{ChM}	-0.00579	0.54 ^{NS}	-0.01206	0.71 ^{NS}	0.019255	1.82	0.003712	0.21
P_{Mutton}	0.003233	0.30 ^{NS}	-0.02058	1.21 ^{NS}	-0.00252	0.24	-0.04722	2.70
P_{FCM}	-0.00605	0.76 ^{NS}	0.018036	1.45 ^{NS}	0.010355	1.34	0.027846	2.18
P_{Rice}	0.003933	0.53 ^{NS}	-0.00944	0.82 ^{NS}	0.000543	0.08	0.017263	1.46
P_{Spices}	0.001972	0.52 ^{NS}	-9.6E-05	0.02 ^{NS}	0.002102	0.57	0.007835	1.29
P_{SC}	-0.00512	0.78 ^{NS}	0.001161	0.11 ^{NS}	-0.00188	0.29	-0.02733	2.59
P_{Tea}	-0.00935	1.49 ^{NS}	0.003489	0.35 ^{NS}	0.015183	2.48	-0.00273	0.27
$P_{Tomatoes}$	-0.00817	1.03 ^{NS}	0.015	1.20 ^{NS}	0.004575	0.59	0.010022	0.78
P_{Wheat}	-0.00707	1.09 ^{NS}	0.005653	0.56 ^{NS}	0.011189	1.77	0.003532	0.34
P_{Garlic}	3.04E-05	0.01 ^{NS}	0.0089	1.33 ^{NS}	0.004299	1.03	0.026666	3.88
P_{LL}	0.001442	0.16 ^{NS}	-0.02196	1.55 ^{NS}	-0.01867	2.12	0.029865	2.06
P_{Onions}	-0.00275	0.53 ^{NS}	-0.00522	0.64 ^{NS}	-0.00527	1.04	-0.01419	1.71
Expenditure	0.008728	1.67*	0.003453	0.42 ^{NS}	0.010068	1.97	-0.05135	6.12
Intercept	0.12888	2.47***	-0.008964	0.11 ^{NS}	-0.210501	4.14	0.17261	2.06
R^2	**0.7120**		**0.6768**		**0.9279**		**0.9775**	
DW	**1.18(2.4e-5)*** **		**2.42(0.41)** ^{NS}		**3.12(0.98)** ^{NS}		**2.32(0.29)** ^{NS}	
Autocorrel.	**1.46(0.27)** ^{NS}		**0.85(0.52)** ^{NS}		**2.80(0.10)** ^{NS}		**1.54(0.33)** ^{NS}	
Heterosced.	**18.7(0.59)** ^{NS}		**21.1(0.45)** ^{NS}		**21.9(0.40)** ^{NS}		**14.08(0.86)** ^{NS}	
Arch effect	**2.73(0.60)** ^{NS}		**2.04(0.56)** ^{NS}		**4.59(0.33)** ^{NS}		**2.49(0.64)** ^{NS}	
CUSUM test	**-0.62(0.54)** ^{NS}		**0.90(0.38)** ^{NS}		**1.91(0.76)** ^{NS}		**-0.83(0.41)** ^{NS}	
Normality	**1.62(0.44)** ^{NS}		**1.39(0.49)** ^{NS}		**2.19(0.33)** ^{NS}		**0.65(0.72)** ^{NS}	

Source: Authors' own computation, 2020

Note: *** ** * ^{NS} & ( ) means significant at 1%, 5%, 10%, non-significant and probability value, respectively

Table 2: Continued ……………………..

Prices	D_{ChM}	t-stat	D_{Mutton}	t-stat	D_{FCM}	t-stat	D_{Rice}	t-stat
$P_{Dry\ Fruit}$	-0.02405	2.18**	0.00822	1.22 ^{NS}	0.002172	0.66 ^{NS}	0.008735	0.26 ^{NS}
$P_{Fresh\ fruit}$	-0.01974	1.20 ^{NS}	0.013589	1.35 ^{NS}	0.00296	0.61 ^{NS}	-0.02452	0.48 ^{NS}
P_{PF}	0.014715	0.85 ^{NS}	-0.028	2.65***	-0.00933	1.81*	0.056706	1.06 ^{NS}
$P_{Potatoes}$	-0.03358	3.17***	0.001056	0.16 ^{NS}	-0.00049	0.15 ^{NS}	0.049567	1.52 ^{NS}

$P_{Vegetables}$	0.004257	0.43 ^{NS}	0.005032	0.83 ^{NS}	0.007629	2.57***	-0.04048	1.32 ^{NS}
P_{Barley}	-0.00362	0.16 ^{NS}	0.020287	1.47 ^{NS}	-0.00287	0.43 ^{NS}	-0.00773	0.11 ^{NS}
P_{Maize}	0.01017	0.30 ^{NS}	-0.01752	0.83 ^{NS}	-0.00205	0.20 ^{NS}	-0.11499	1.09 ^{NS}
P_{Beef}	-0.00215	0.10 ^{NS}	0.028462	2.17**	0.025989	4.07***	-0.1652	2.50***
P_{ChM}	0.110709	3.03***	-0.01702	0.76 ^{NS}	-0.01392	1.28 ^{NS}	0.021588	0.19 ^{NS}
P_{Mutton}	0.031241	0.85 ^{NS}	-0.01549	0.69 ^{NS}	0.001026	0.09 ^{NS}	0.213156	1.89*
P_{FCM}	-0.00078	0.03 ^{NS}	0.005523	0.34 ^{NS}	0.017571	2.20**	-0.17301	2.10**
P_{Rice}	-0.05739	2.31**	0.039111	2.58***	-0.01518	2.05**	0.17848	2.33***
P_{Spices}	-0.00515	0.40 ^{NS}	0.008607	1.10 ^{NS}	-0.00135	0.36 ^{NS}	-0.07638	1.94**
P_{SC}	0.02815	1.27 ^{NS}	-0.03662	2.71***	0.012095	1.84*	-0.0451	0.66 ^{NS}
P_{Tea}	0.0292	1.38 ^{NS}	-0.01855	1.43 ^{NS}	-0.01444	2.29**	-0.09931	1.52 ^{NS}
$P_{Tomatoes}$	0.023152	0.86 ^{NS}	0.010343	0.63 ^{NS}	0.011601	1.45 ^{NS}	-0.01295	0.16 ^{NS}
P_{Wheat}	-0.01388	0.63 ^{NS}	-0.00812	0.61 ^{NS}	0.001769	0.27 ^{NS}	0.015024	0.22 ^{NS}
P_{Garlic}	0.014574	1.01 ^{NS}	0.01694	1.92**	-0.01245	2.90***	-0.02856	0.64 ^{NS}
P_{LL}	-0.03819	1.25 ^{NS}	0.026179	1.41 ^{NS}	0.023111	2.55***	0.088137	0.94 ^{NS}
P_{Onions}	0.003539	0.20 ^{NS}	-0.01195	1.12 ^{NS}	0.007499	1.44 ^{NS}	-0.06683	1.24 ^{NS}
Expenditure	0.023278	1.32 ^{NS}	-0.07553	7.01***	-0.03126	5.96***	0.135619	2.50***
Intercept	-0.70586	4.01***	0.474613	4.42***	-0.057149	1.09 ^{NS}	0.8646206	1.60 ^{NS}
R^2	**0.8987**		**0.9727**		**0.8899**		**0.8212**	
DW	**2.20(0.18)** ^{NS}		**2.57(0.60)** ^{NS}		**2.54(0.56)** ^{NS}		**2.21(0.18)** ^{NS}	
Autocorrel.	**1.03(0.45)** ^{NS}		**1.61(0.31)** ^{NS}		**2.06(0.15)** ^{NS}		**3.34(0.49)** ^{NS}	
Heterosced.	**3.94(0.86)** ^{NS}		**17.5(0.67)** ^{NS}		**20.5(0.48)** ^{NS}		**18.5(0.61)** ^{NS}	
Arch effect	**2.09(0.71)** ^{NS}		**8.35(0.13)** ^{NS}		**0.72(0.94)** ^{NS}		**2.97(0.56)** ^{NS}	
CUSUM test	**-1.01(0.32)** ^{NS}		**-0.28(0.77)** ^{NS}		**-0.14(0.88)** ^{NS}		**0.92(0.36)** ^{NS}	
Normality	**7.96(0.01)****		**0.71(0.70)** ^{NS}		**1.44(0.48)** ^{NS}		**0.57(0.74)** ^{NS}	

Source: Authors' own computation, 2020

Note: *** ** * ^{NS} $^{\&}$ ( ) means significant at 1%, 5%, 10%, non-significant and probability value, respectively

Table 2: Continued ……………………..

Prices	D_{Spices}	**t-stat**	D_{SC}	**t-stat**	D_{Tea}	**t-stat**	$D_{Tomatoes}$	**t-stat**
$P_{Dry\ Fruit}$	0.005635	0.51 ^{NS}	0.001212	0.33 ^{NS}	0.014032	0.60 ^{NS}	0.000195	0.06 ^{NS}
$P_{Fresh\ fruit}$	0.019753	1.21 ^{NS}	0.011588	2.10**	0.004309	0.12 ^{NS}	0.002493	0.55 ^{NS}
P_{PF}	-0.00025	0.01 ^{NS}	0.003772	0.65 ^{NS}	0.029837	0.81 ^{NS}	-0.0027	0.57 ^{NS}
$P_{Potatoes}$	-0.00333	0.32 ^{NS}	-0.00215	0.60 ^{NS}	0.027596	1.22 ^{NS}	-0.00814	2.80***
$P_{Vegetables}$	-0.00861	0.87 ^{NS}	-0.00125	0.37 ^{NS}	0.009767	0.46 ^{NS}	0.000435	0.16 ^{NS}
P_{Barley}	-0.00651	0.29 ^{NS}	0.002123	0.28 ^{NS}	-0.01106	0.23 ^{NS}	-0.00462	0.75 ^{NS}
P_{Maize}	-0.02142	0.63 ^{NS}	0.008578	0.74 ^{NS}	0.103542	1.41 ^{NS}	-0.0021	0.22 ^{NS}

P_{Beef}	-0.02418	1.13^{NS}	0.022299	3.10***	0.041312	0.90^{NS}	0.005633	0.96^{NS}
P_{ChM}	0.038649	1.06^{NS}	0.004915	0.40^{NS}	-0.10231	1.32^{NS}	-0.01503	1.50^{NS}
P_{Mutton}	0.007787	0.21^{NS}	-0.0222	1.80*	-0.00907	0.12^{NS}	0.012057	1.20^{NS}
P_{FCM}	0.016669	0.62^{NS}	0.002808	0.31^{NS}	0.03772	0.66^{NS}	0.003025	0.41^{NS}
P_{Rice}	0.003815	0.15^{NS}	-0.01555	1.87*	-0.11439	2.16**	-0.01042	1.53^{NS}
P_{Spices}	0.008821	0.69^{NS}	0.002644	0.62^{NS}	-0.00328	0.12^{NS}	-0.00937	2.67***
P_{SC}	0.014555	0.66^{NS}	0.0012	0.16^{NS}	-0.02064	0.44^{NS}	0.015077	2.48***
P_{Tea}	-0.02563	1.21^{NS}	-0.00349	0.49^{NS}	0.078026	1.73*	-0.00911	1.56^{NS}
$P_{Tomatoes}$	0.011624	0.43^{NS}	-0.019	2.10**	-0.14676	2.56***	0.027664	3.74***
P_{Wheat}	-0.01289	0.59^{NS}	-0.01914	2.61***	-0.07538	1.62^{NS}	-0.00193	0.32^{NS}
P_{Garlic}	0.003223	0.22^{NS}	0.008	1.65*	-0.05537	1.80*	-4.3E-05	0.01^{NS}
P_{LL}	0.008266	0.27^{NS}	0.006455	0.63^{NS}	0.05232	0.81^{NS}	-0.00556	0.66^{NS}
P_{Onions}	-0.01991	1.14^{NS}	0.004791	0.82^{NS}	0.086124	2.31**	-0.00514	1.07^{NS}
Expenditure	-0.01303	0.74^{NS}	-0.00541	0.91^{NS}	0.043765	1.17^{NS}	-0.00504	1.04^{NS}
Intercept	-0.0580755	0.33^{NS}	0.0715394	1.21^{NS}	0.1239372	0.33^{NS}	0.0845807	1.75*
R^2	**0.7084**		**0.7655**		**0.7650**		**0.9002**	
DW	**2.03(0.78)^{NS}**		**2.29(0.26)^{NS}**		**2.18(0.16)^{NS}**		**2.17(0.16)^{NS}**	
Autocorrel.	**0.29(0.90)^{NS}**		**0.48(0.78)^{NS}**		**0.87(0.53)^{NS}**		**1.95(0.23)^{NS}**	
Heterosced.	**22.9(0.34)^{NS}**		**20.1(0.51)^{NS}**		**28.2(0.13)^{NS}**		**7.60(0.99)^{NS}**	
Arch effect	**6.66(0.15)^{NS}**		**6.52(0.16)^{NS}**		**1.44(0.91)^{NS}**		**2.59(0.62)^{NS}**	
CUSUM test	**0.39(0.70)^{NS}**		**-0.22(0.82)^{NS}**		**0.76(0.45)^{NS}**		**1.87(0.81)^{NS}**	
Normality	**0.54(0.76)^{NS}**		**2.06(0.35)^{NS}**		**6.19(0.04)^{NS}**		**2.24(0.32)^{NS}**	

Source: Authors' own computation, 2020

Note: *** ** * ^{NS} & ( ) means significant at 1%, 5%, 10%, non-significant and probability value, respectively

Table 2: Continued ……………………..

Prices	D_{Wheat}	**t-stat**	D_{Garlic}	**t-stat**	D_{LL}	**t-stat**	D_{Onions}	**t-stat**
$P_{Dry\,Fruit}$	-0.01062	0.39^{NS}	-0.00059	0.20^{NS}	0.002082	1.05^{NS}	0.002854	0.66^{NS}
$P_{Fresh\,fruit}$	-0.04565	1.12^{NS}	0.000446	0.10^{NS}	0.00187	0.63^{NS}	0.003881	0.60^{NS}
P_{PF}	-0.02632	0.61^{NS}	0.005455	1.18^{NS}	-0.0018	0.58^{NS}	-0.01108	1.63^{NS}
$P_{Potatoes}$	-0.01785	0.68^{NS}	-0.00134	0.47^{NS}	-0.00369	1.94**	-0.00678	1.63^{NS}
$P_{Vegetables}$	-0.00072	0.03^{NS}	-0.00097	0.37^{NS}	0.001476	0.83^{NS}	0.004271	1.09^{NS}
P_{Barley}	-0.03768	0.67^{NS}	-0.00205	0.34^{NS}	-0.00536	1.32^{NS}	0.001723	0.19^{NS}
P_{Maize}	0.03923	0.46^{NS}	0.000575	0.06^{NS}	-0.0041	0.66^{NS}	-0.01262	0.93^{NS}
P_{Beef}	0.01401	0.26^{NS}	-0.00711	1.24^{NS}	0.006185	1.61^{NS}	-0.00701	0.83^{NS}
P_{ChM}	0.022267	0.24^{NS}	0.006818	0.70^{NS}	-0.01191	1.82*	-0.02597	1.81*
P_{Mutton}	0.009812	0.11^{NS}	-0.00601	0.61^{NS}	-0.0052	0.79^{NS}	-0.00137	0.09^{NS}

P_{FCM}	-0.06432	0.96 NS	0.003501	0.49 NS	0.005473	1.14 NS	0.014581	1.39 NS
P_{Rice}	-0.03234	0.52 NS	-0.01482	2.23**	-0.00248	0.56 NS	0.003302	0.34 NS
P_{Spices}	0.00792	0.25 NS	-0.00159	0.47 NS	0.002251	0.98 NS	-0.0027	0.54 NS
P_{SC}	0.127359	2.31**	0.002949	0.50 NS	-0.00105	0.27 NS	0.00145	0.17 NS
P_{Tea}	0.047993	0.91 NS	-0.00084	0.15 NS	0.001941	0.51 NS	-0.00045	0.05 NS
$P_{Tomatoes}$	0.07554	1.13 NS	0.002777	0.39 NS	0.003241	0.67 NS	0.012793	1.21 NS
P_{Wheat}	0.128362	2.36**	-0.00482	0.83 NS	0.001076	0.27 NS	-0.00086	0.10 NS
P_{Garlic}	-0.06908	1.92**	0.013939	3.61***	0.004014	1.55 NS	0.00209	0.37 NS
P_{LL}	-0.17403	2.30**	0.007655	0.94 NS	0.019576	3.58***	-0.00363	0.30 NS
P_{Onions}	0.006983	0.16 NS	-0.00153	0.33 NS	0.000804	0.26 NS	0.022436	3.27***
Expenditure	0.019716	0.45 NS	0.009008	1.91**	-0.00095	0.30 NS	-0.01341	1.94**
Intercept	-0.1456739	0.33 NS	-0.0653877	1.39 NS	-0.082158	2.60***	0.179526	2.60***
R^2	**0.8224**		**0.8061**		**0.9350**		**0.8295**	
DW	**2.27(0.25)NS**		**2.37(0.35)NS**		**2.27(0.24)NS**		**1.74(0.01)****	
Autocorrel.	**1.02(0.45)NS**		**0.51(0.76)NS**		**1.31(0.33)NS**		**1.36(0.31)NS**	
Heterosced.	**42.0(0.41)NS**		**10.1(0.97)NS**		**26.4(0.19 NS**		**22.6(0.36)NS**	
Arch effect	**2.98(0.70)NS**		**2.91(0.71)NS**		**4.33(0.36)NS**		**1.45(0.91)NS**	
CUSUM test	**-0.36(0.72)NS**		**-0.40(0.68)NS**		**4.30(0.72)NS**		**0.17(0.86)NS**	
Normality	**4.47(0.10)NS**		**0.15(0.92)NS**		**7.14(0.02)****		**7.24(0.02)****	

Source: Authors' own computation, 2020

Note: *** ** * NS & ( ) means significant at 1%, 5%, 10%, non-significant and probability value, respectively

Expenditure (Income) Elasticity of Demand

Generally, the expenditure elasticity estimates were found to be relatively high for most of the selected imported food commodities and this can be attributed to the economic situation in the country. This revealed the importance of these food items in the diet composition of the populace as they fulfilled their needs. In addition, it can be inferred that many consumers in the country faced tight budgetary constraints with respect to imported commodities.

Of the twenty food commodities considered, fifteen commodities had positive expenditure elasticity while the remaining five commodities had negative income elasticity, thus indicating that the former commodities are normal goods while the latter are non-normal/abnormal goods (Table 3). A good being referred to as abnormal good means that they violate the law of demand i.e. they have an abnormal demand curves. The results showed the expenditure elasticity of six commodities *viz.* dried fruits, potatoes, sugar confectionery, tomatoes, lemons & limes, and onions to be positive inelastic i.e less than unity but greater than zero, hence they are necessary food items. Furthermore, the expenditure elasticity of nine commodities *viz.* prepared fruits, vegetables, barley, maize, chicken meat, rice, tea, wheat and garlic were elastic i.e. greater than unity, implying that they are luxury food items. However, the remaining five commodities *viz.* fresh fruits, beef, mutton, fresh cow milk and spices had their respective expenditure elasticity estimates less than zero, thus implying that they are inferior food items.

Therefore, the expenditure elasticities for fifteen food commodities revealed that if the per capita income increased, the demand for these aforementioned commodities would increase. However, for the necessary commodity, the increase in the demand would be less than the corresponding proportional increase in the income while for the luxury commodity; the increase in the demand would be higher than the corresponding proportional increase in the per capita income. For the inferior commodities *viz.* fresh fruits and beef, an increase in the per capita income would lead to a decrease in the demand for these commodities, and the decrease in the demand would be less than the corresponding proportional increase in the income because they have a negative inelastic expenditure elasticity value. Also, for the inferior commodities *viz.* mutton, fresh milk and spices, an increase in the per capita income would lead to a decrease in the demand for these commodities, and the decrease in their respective demand would be greater than the corresponding proportional increase in the income because they have a negative elastic expenditure elasticity value.

The income elasticity values of milled rice and potatoes been 1.578 and 0.37, the implication of an increase in per capita income by 10% would lead to an increase in the demand for the former and latter by 15.78% and 3.7% respectively. However, for fresh milk and fresh fruits with expenditure elasticity values of -1.90 and -0.158 respectively, the implication of a 10% increase in the per capita income would lead to a decrease in the demand for the former and latter by 19.0% and 1.58% respectively. Given that the supply of barley is fixed, the upward shift of the demand curve will lead to an increase in the equilibrium market prices. Since the own-price elasticity of barley is greater than unity, it is anticipated that the increase in price due to the shift in the demand curve for the barley would result in a decrease in demand by more than the corresponding proportionate price. For a fixed supply for a sugar confectionery, the upward shift of the demand curve will lead to an increase in the equilibrium market prices. Since the own-price elasticity of the sugar confectionery is less than unity, it is anticipated that the increase in price due to the shift in the demand curve would lead to a decrease in the demand for the sugar confectionery by less than the corresponding proportionate price change.

Generally, the selected food items would experience an increase in demand when the per capita income increases in tandem with the overall economic growth of the country. However, in relative terms, if the real income of consumers plummets, less income would be budgeted for these food items. Therefore, it can be inferred that as consumers' expenditures increases and they diversify their diets, they tends to increase their consumption of imported non-staple foods rather than imported staple foods.

Table 3: Expenditure, Marshallian and Hicksian own-price elasticities

Items	Expenditure	Uncompensated	Compensated	Income effect	PP(%PR)
Dry fruits	0.905784	-2.40868	-2.36967	-0.03901	10.37912
Fresh fruits	-0.15801	-0.91729	-0.92353	0.006239	27.2543
Prepared fruits	1.240392	-0.87152	-0.85366	-0.01785	28.68559
Potatoes	0.372053	-0.36829	-0.36022	-0.00808	67.88098
Vegetables	3.223369	-0.91347	-0.90082	-0.01265	27.36802
Barley	1.177357	-1.08603	-1.06311	-0.02292	23.01956
Maize	1.508531	-1.60314	-1.57328	-0.02987	15.59436
Beef	-0.33547	-1.38865	-1.40155	0.0129	18.00308
Chicken meat	1.152694	-0.29707	-0.12134	-0.17572	84.15611
Mutton	-1.8254	-1.1092	-1.1009	-0.00831	22.53874
FCM	-1.90146	-0.662271	-0.641786	0.020485	37.7489
Rice	1.578212	-0.37467	-0.0045	-0.37017	66.72498
Spices	-1.44843	-0.67449	-0.65929	-0.0152	37.0651
SC	0.850426	-0.9614	-0.93066	-0.03073	26.00387
Tea	1.422722	-0.29013	-0.14283	-0.1473	86.16931
Tomatoes	0.824785	-0.03253	-0.00882	-0.02371	768.5822
Wheat	1.197176	-0.263997	-0.383706	-0.11971	94.698
Garlic	1.651182	-0.00135	-0.021493	-0.02284	-
L&L	0.901885	-1.01937	-1.028117	-0.00875	24.525
Onion	0.553289	-0.23936	-0.22275	-0.01661	104.4454

Source: Authors' own computation, 2020

Note: FCM, SC, LL, PP and PR means Fresh cow milk, Sugar confectionary, Limes & Lemons, Protectionist Policy and Price Rise, respectively.

Own-Price Elasticity

Both the uncompensated and compensated own-price elasticity estimates had negative values, thus conform to the *a priori* expectation postulated by the consumption theory. This means that the demand curve of the food items are negatively sloped i.e. moved downward from left to the right. In addition, it can be inferred that the consumers were quite responsive to price changes while adjusting their demand for corresponding commodities.

For the uncompensated elasticity, the consumers' money (nominal) income is held constant while for the compensated elasticity, the real income is held constant. Both the uncompensated and compensated elasticities contain information that is of considerable important to policymakers in understanding consumers' response to price changes that results from policy changes.

In absolute term, fourteen of the food items of the uncompensated own-price elasticity were inelastic i.e. less than unity while the remaining six food commodities were elastic i.e. greater than unity (Table 3). Also, the compensated own-price elasticities of fourteen commodities were inelastic while that of the remaining six commodities were elastic. Therefore, it can be concluded that demand reacts inelastic and elastic to its own-price for the former and latter respectively.

The empirical evidences showed the uncompensated own-price elasticities of fourteen commodities to be less than their corresponding expenditure elasticities, implying that the responsiveness of demand to own-price changes of these conglomerates is much lower than to variations in the total expenditure. However, the remaining six food items had their uncompensated own-price elasticities greater than their corresponding expenditure elasticity values, indicating that the responsiveness of demand to own-price changes of these aggregates is much higher than to variations in total expenditure. Generally, the uncompensated and compensated own-price elasticities showed fourteen and six food commodities to be price inelastic and price elastic, respectively. Furthermore, an evidence of a substantial difference between the uncompensated and compensated own-price elasticities was observed, thus indicating a substantial effect of the income.

The uncompensated elasticity is composed of price/substitution and income effects while the compensated elasticity is concerned with only price/substitution effect. The uncompensated own-price elasticity estimate of demand for dried fruits indicates that if the price of dried fruits falls by 1%, the demand for the commodity would increase by 2.41%. Of this total increase in demand, 2.37% is purely due to price effect i.e. substitution effect as revealed by the compensated own-price elasticity. The income effect due to the price fall accounted for the remaining

0.039% (2.41-2.37) increase in dried fruits demand due to the increase in real income, although the absolute amount of nominal (money) income remained unchanged. The income effect of dried fruit demand was relatively small due to its small share in the consumers' expenditure budget. If an increase in the per capita income by 1% is accompanied by a 1% decline in the price of dried fruit, thus dried fruit demand would increase by 3.32% (2.41+0.91).

For rice, its estimated own-price (uncompensated) indicated that if the price of rice decline by 1% then its demand would increase by 0.375%. Of this demand increase, 0.0045% is purely due to price effect as indicated by the compensated elasticity. The income effect due to the price decrease accounted for the remaining 0.37% rise in the rice demand due to the increase in the real income, although the absolute amount of the nominal income remains unchanged. Furthermore, the finding showed the income effect of rice demand to be relatively large and it owes to large share of this commodity in the consumers' budget. Thus, if the per capita income increase by 1% and subsequently it's accompanied by a 1% decline in the price of rice, then the demand for rice would increase by 1.95%.

The increase in the per capita income represents a shift in the demand curves of dried fruits and rice which normally would lead to an increase in the prices of dried fruits and rice. This is not desireable for UAE which relies mostly on import to feed its population, because it would affect its GDP. However, in determining the resultant equilibrium level of dried fruit and rice consumptions, information on supply elasticity of dried fruits and rice is required.

With the exception of chicken meat and tea, the income effects of change in prices were very little for all the remaining food items as indicated by the estimated uncompensated and compensated own-price elasticities. This is so because the budget shares of these food items in the consumers' expenditure budget were small, hence change in their prices would have minimal effects on the real income. In the case of the aforementioned exceptional commodities (i.e. chicken meat and tea), income effect due to price change is moderate and it owes to their moderate share in the consumers' expenditure budget.

With the exception of beef, it was observed that the estimates of the compensated own-price elasticity of all the food items were lower than the estimates of their respective uncompensated own-price elasticity, thus indicating the overwhelming influence of income effect in determining demand for these imported commodities. In other words, it means that the price responsiveness of these commodities is income-dependent, such that if income is held constant (i.e. income is not a constant in the decision process), consumers would tend to be less responsive to prices. However, for the beef, the compensated own-price elasticity been greater than the uncompensated own-price elasticity revealed the dominant influence of substitution effect over the income effect. Thus, it means that the price responsiveness of these commodities is income-independent, such that if income is held constant, consumers would tend to be more responsive to food prices.

Cross-Price Elasticity

The matrices of both the uncompensated and compensated cross-price elasticities are presented in Table 4. A positive cross-price elasticity indicates that two commodities are substitutes while a negative cross-price elasticity implies that two commodities are complements. The uncompensated cross-price elasticity represents the 'gross' effect and it consists of substitution and income effects while the compensated cross-price elasticity represents the 'net' effect of price change on demand and it consists of only pure price effect.

For the uncompensated cross-price elasticity, the empirical evidence showed that of the 190 cross-price elasticities, 85 elasticity estimates were observed to be negatively signed, indicating that 85 commodity pairs were complement goods while the remaining 105 elasticity values were positively signed, an indication that 105 commodity pairs were substitute goods. For the compensated cross-price elasticity, it was observed that 75 commodity pairs were complements as evidenced by the negative sign of their respective cross-price elasticity values while 115 commodity pairs were substitutes as evidenced by their respective elasticity values which were positively signed. For a commodity pair which are substitutes it implies that an increase in the price of one commodity would lead to an increase in the demand for the alternative commodity; while for the commodity pair which are termed complements, an increase in the price of one commodity would lead to a decrease in the demand of the paired commodity-the commodity pair are joint goods. Therefore, it can be inferred that there is a moderate diversity in the dietary composition of the consumers of imported food items in the country.

The positivity of both the uncompensated cross-price elasticity of demand for barley due to the price change in maize indicated that the two commodities are 'gross' substitute. The maize-to-barley cross-price elasticity estimate been 1.144 indicates that a 1% decline in the price of maize would lead to a decrease in the demand for barley by 1.144%. For the compensated cross-price elasticity, the positive sign of the elasticity estimate (1.168) indicates that the two commodities are 'net' substitutes. Thus, a fall in the price of maize by 1% would lead to a decrease in the consumption of barley by 1.168%. The first decrease in the demand for barley by 1.144% is due to the combined effect of decrease in the price of maize and increase in the real per capita income. While the second decrease in the demand for barley by 1.168% is due to only pure price effect that arose from the decline in the price of maize. The rise in the real per capita income that owed to the decline in maize price (income effect) induced the consumers to increase their demand for barley by 0.024% (i.e., 1.168-1.144).

It was observed that the signs of some cross-price elasticity estimates between the uncompensated and compensated were contrary. For instance, for chicken meat-to-prepared fruits, the uncompensated cross-price elasticity estimate showed the two commodities *viz.* total effect of a change in chicken meat price on the demand for prepared fruits to be a 'gross' complement while the compensated cross-price elasticity indicated the commodity pair to be a 'net' substitute.

However, if information about substitution possibility is needed, the compensated cross-price elasticity is more appropriate than the uncompensated cross-price elasticity given that the latter is very ambiguous. This owes to the fact that the former contained only pure price effect which is required for substitution possibility while the latter encompassed both the substitution and income effects.

Table 4a: Marshallian cross-price elasticity

Items	$D_{Dry\ Fruit}$	$D_{Fresh\ fruit}$	D_{PF}	$D_{Potatoes}$	$D_{Vegetables}$	D_{Barley}	D_{Maize}	D_{Beef}	D_{CM}	D_{Mutton}
$P_{Dry\ Fruit}$	**-2.40868**	-0.20425	0.304999	0.076837	0.046102	-0.03516	-0.16237	0.056215	-0.15854	0.102614
$P_{Fresh\ fruit}$	-0.19503	**-0.91729**	-0.08319	0.391941	-0.27917	-0.01125	-0.0869	0.676097	-0.13549	0.197669
P_{PF}	1.585502	-0.37758	**-0.87152**	-0.33095	0.234546	-0.36688	-0.20673	-0.18276	0.093797	-0.31794
$P_{Potatoes}$	-0.37543	0.170471	0.040849	**-0.36829**	-0.29443	-0.56409	-0.44295	0.070873	-0.22356	0.032152
$P_{Vegetables}$	-0.17843	0.033843	-0.18094	0.183748	**-0.91347**	0.30211	-0.01409	0.324869	0.027322	0.063559
P_{Barley}	2.068022	0.738614	0.061627	-0.01608	0.28524	**-1.08603**	-0.43878	0.732787	-0.02671	0.25954
P_{Maize}	0.156459	0.255496	0.82553	0.088685	0.910089	1.144316	**-1.60314**	-0.66811	0.063691	-0.19112
P_{Beef}	-0.17431	0.726116	0.959962	0.403169	0.364985	0.698361	0.551367	**-1.38865**	-0.01999	0.374159
P_{ChM}	0.496553	0.229664	-0.11532	-1.16062	-1.81344	-0.64628	0.895042	0.300106	**-0.29707**	-0.06566
P_{Mutton}	-1.09357	-2.76012	-0.72562	-0.71715	0.637333	-1.07186	-0.11384	-1.116	0.192131	**-1.1092**
P_{FCM}	2.253584	1.265688	0.312701	0.692136	-1.56529	0.924385	0.517559	0.738538	-0.00674	0.075592
P_{Rice}	-0.04805	1.383905	-0.5859	-0.27966	0.480357	-0.52655	-0.09184	0.76216	-0.41225	0.677852
P_{Spices}	0.711363	1.254936	0.234799	0.095159	0.439535	-0.00994	0.091799	0.241442	-0.03807	0.128101
P_{SC}	0.347121	-1.47275	-0.40276	0.000259	-1.3856	0.055291	-0.11339	-0.66254	0.179139	-0.40432
P_{Tea}	-0.1402	0.339642	0.182464	-0.09988	-2.61138	0.160849	0.714281	0.067366	0.175734	-0.12795
$P_{Tomatoes}$	-0.63834	-0.15813	-0.92067	0.251711	-2.14505	0.765268	0.216481	0.29901	0.147483	0.149276
P_{Wheat}	-1.51497	-0.14364	-0.7657	0.434961	-2.02374	0.272581	0.514299	0.225384	-0.10629	-0.0068
P_{Garlic}	1.42907	1.344967	0.148343	0.019218	-0.02301	0.454614	0.210123	0.711937	0.093486	0.214535
P_{LL}	-2.6551	-0.14226	0.323545	0.593379	0.345868	-1.12955	-0.94787	0.789597	-0.25201	0.321019
P_{Onions}	0.37048	0.039196	0.059667	-0.08605	-0.76769	-0.27322	-0.28156	-0.32889	0.018629	-0.11552

Source: Authors' own computation, 2020

Note: PF, ChM, FCM & LL means prepared fruits, Chicken meat, Fresh cow milk and Limes and Lemons, respectively.

Own-price elasticities are written in bold letter

Table 4a Continued: Marshallian cross-price elasticity

Items	D_{FCM}	D_{Rice}	D_{Spices}	D_{SC}	D_{Tea}	$D_{Tomatoes}$	D_{Wheat}	D_{Garlic}	$D_{L\&L}$	D_{Onions}
$P_{Dry\ Fruit}$	0.216278	0.034312	0.201944	0.034309	0.131844	0.007658	-0.1072	-0.04631	0.215143	0.097312
$P_{Fresh\ fruit}$	0.389328	-0.12735	0.717951	0.32659	0.051981	0.093665	-0.46436	0.006507	0.196692	0.146882
P_{PF}	-0.81442	0.23144	-0.00055	0.107051	0.264218	-0.09092	-0.26674	0.382763	-0.18367	-0.36107
$P_{Potatoes}$	0.017949	0.198778	-0.10779	-0.05615	0.245588	-0.27951	-0.18281	-0.11111	-0.37785	-0.21616

$P_{Vegetables}$	0.719486	-0.17484	-0.30304	-0.0341	0.11145	0.015829	-0.00793	-0.07281	0.152528	0.143985
P_{Barley}	-0.21008	-0.04421	-0.22156	0.06166	-0.10357	-0.15743	-0.38066	-0.16116	-0.55093	0.066077
P_{Maize}	-0.13328	-0.5017	-0.74982	0.240337	1.048703	-0.06967	0.388423	0.028691	-0.42047	-0.41143
P_{Beef}	2.523965	-0.72655	-0.83871	0.622836	0.468861	0.202695	0.13253	-0.53886	0.64143	-0.21637
P_{ChM}	-0.84941	0.003894	1.43946	0.158814	-0.99731	-0.49628	0.192624	0.393625	-1.21266	-0.79684
P_{Mutton}	0.338499	0.860315	0.314544	-0.60167	-0.17773	0.43414	0.081597	-0.48932	-0.52773	-0.00802
P_{FCM}	**-0.662271**	-0.74387	0.595451	0.079312	0.437465	0.107125	-0.64541	0.246048	0.565375	0.490445
P_{Rice}	-0.72892	**-0.37467**	0.243364	-0.39533	-1.18031	-0.32151	-0.36968	-1.2244	-0.23252	0.214758
P_{Spices}	-0.04334	-0.34199	**-0.67449**	0.077382	0.00065	-0.32117	0.073642	-0.13304	0.234809	-0.07739
P_{SC}	1.227507	-0.21316	0.53229	**-0.9614**	-0.1803	0.530853	1.266565	0.189669	-0.10502	0.064422
P_{Tea}	-1.04009	-0.48329	-0.86024	-0.08117	**-0.29013**	-0.29879	0.459551	-0.12802	0.210266	0.031365
$P_{Tomatoes}$	1.160214	-0.07182	0.425032	-0.52156	-1.41207	**-0.03253**	0.749788	0.182034	0.336976	0.438905
P_{Wheat}	0.454354	0.006236	-0.41036	-0.51471	-0.73441	-0.04974	**-0.263997**	-0.41349	0.120753	0.015895
P_{Garlic}	-1.11531	-0.12977	0.120552	0.223461	-0.52273	0.000931	-0.69354	**-0.00135**	0.415254	0.075788
P_{LL}	2.173362	0.370162	0.297303	0.18009	0.468092	-0.19158	-1.74237	0.547112	**-1.01937**	-0.11663
P_{Onions}	0.78322	-0.3023	-0.69139	0.137079	0.860106	-0.17366	0.063917	-0.13039	0.085843	**-0.23936**

Source: Authors' own computation, 2020

Note: PF, ChM, FCM & LL means prepared fruits, Chicken meat, Fresh cow milk and Limes and Lemons, respectively.

Own-price elasticities are written in bold letter

Table 4b: Hicksian cross-price elasticity

Items	$D_{Dry\ Fruit}$	$D_{Fresh\ fruit}$	D_{PF}	$D_{Potatoes}$	$D_{Vegetables}$	D_{Barley}	D_{Maize}	D_{Beef}	D_{CM}	D_{Mutton}
$P_{Dry\ Fruit}$	**-2.36967**	-0.20505	0.311286	0.078723	0.062439	-0.02919	-0.15472	0.054514	-0.1527	0.103116
$P_{Fresh\ fruit}$	-0.15926	**-0.92353**	-0.03421	0.406633	-0.15188	0.035241	-0.02733	0.66285	-0.08997	0.201581
P_{PF}	1.601675	-0.3804	**-0.85366**	-0.32431	0.292098	-0.34586	-0.1798	-0.18875	0.114378	-0.31617
$P_{Potatoes}$	-0.35577	0.167042	0.067772	**-0.36022**	-0.22446	-0.53853	-0.41021	0.063592	-0.19854	0.034302
$P_{Vegetables}$	-0.17488	0.033223	-0.17607	0.185208	**-0.90082**	0.306731	-0.00817	0.323552	0.031847	0.063948
P_{Barley}	2.085659	0.735538	0.085779	-0.00884	0.348002	**-1.06311**	-0.40941	0.726255	-0.00427	0.261469
P_{Maize}	0.174391	0.252367	0.850087	0.055241	0.973904	1.167624	**-1.57328**	-0.67475	0.086511	-0.18916
P_{Beef}	-0.13948	0.72004	1.00766	0.417476	0.488936	0.743635	0.609376	**-1.40155**	0.024334	0.377969
P_{ChM}	0.634637	0.205577	0.073778	-1.1039	-1.32205	-0.46679	1.125013	0.248965	**-0.12134**	-0.05056
P_{Mutton}	-1.01764	-2.77337	-0.62164	-0.68596	0.907555	-0.97316	-0.0434	-1.14413	0.288764	**-1.1009**

P_{FCM}	2.263342	1.263986	0.326064	0.696144	-1.53057	0.937069	0.533811	0.734924	0.005675	0.07666
P_{Rice}	0.164405	1.346844	-0.29497	-0.19239	1.236396	-0.2504	0.261987	0.683477	-0.14189	0.701088
P_{Spices}	0.736933	1.250476	0.269814	0.105662	0.530528	0.023299	0.134383	0.231972	-0.00553	0.130897
P_{SC}	0.379853	-1.47846	-0.35794	0.013704	-1.26912	0.095769	-0.05888	-0.67466	0.220793	-0.40074
P_{Tea}	-0.04642	0.323283	0.310885	-0.06136	-2.27766	0.282743	0.870462	0.032634	0.295075	-0.11769
$P_{Tomatoes}$	-0.6123	-0.16267	-0.88501	0.262405	-2.0524	0.799109	0.259842	0.289367	0.180615	0.152123
P_{Wheat}	-0.16879	-0.15944	-0.64167	0.472164	-1.70143	0.390308	0.665141	0.19184	0.008975	0.00311
P_{Garlic}	1.441599	1.342781	0.162175	0.024365	0.021577	0.4709	0.23099	0.707297	0.10943	0.215905
P_{LL}	-2.64631	-0.14379	0.335575	0.596988	0.377131	-1.11813	-0.93324	0.786343	-0.24083	0.32198
P_{Onions}	0.397676	0.034452	0.09691	-0.07488	-0.67091	-0.23787	-0.23627	-0.33896	0.053239	-0.11254

Source: Authors' own computation, 2020

Note: PF, ChM, FCM & LL means prepared fruits, Chicken meat, Fresh cow milk and Limes and Lemons, respectively.

Own-price elasticities are written in bold letter

Table 4b Continued: Hicksian cross-price elasticity

Items	D_{FCM}	D_{Rice}	D_{Spices}	D_{SC}	D_{Tea}	$D_{Tomatoes}$	D_{Wheat}	D_{Garlic}	$D_{L\&L}$	D_{Onions}
$P_{Dry\ Fruit}$	0.206642	0.042311	0.204673	0.038619	0.140605	0.011838	-0.10113	-0.03794	0.219714	0.100116
$P_{Fresh\ fruit}$	0.314243	-0.06503	0.739217	0.360172	0.081106	0.126235	-0.41709	0.071709	0.232306	0.168731
P_{PF}	-0.84837	0.259619	0.009066	0.122236	0.306043	-0.07619	-0.24536	0.412244	-0.16757	-0.35119
$P_{Potatoes}$	-0.02332	0.233034	-0.09611	-0.03769	0.288247	-0.26161	-0.15682	-0.07527	-0.35827	-0.20415
$P_{Vegetables}$	0.712022	-0.16864	-0.30092	-0.03076	0.098265	0.019066	-0.00323	-0.06633	0.156068	0.146157
P_{Barley}	-0.24711	-0.01348	-0.21108	0.078219	-0.08737	-0.14137	-0.35734	-0.12901	-0.53337	0.07685
P_{Maize}	-0.17092	-0.47045	-0.73916	0.257174	1.019893	-0.05335	0.412125	0.061381	-0.40262	-0.40047
P_{Beef}	2.450846	-0.66586	-0.818	0.655538	0.437482	0.234411	0.178566	-0.47536	0.676111	-0.1951
P_{ChM}	-1.13928	0.244488	1.521559	0.288458	-0.83574	-0.37054	0.37513	0.645343	-1.07517	-0.71249
P_{Mutton}	0.179096	0.99262	0.359692	-0.53038	-0.00379	0.503283	0.181959	-0.3509	-0.45212	0.038367
P_{FCM}	**-0.641786**	-0.72687	0.601253	0.088474	0.375102	0.116011	-0.63251	0.263836	0.575091	0.496406
P_{Rice}	-1.17491	**-0.0045**	0.369679	-0.19587	-0.87031	-0.12806	-0.08888	-0.83712	-0.02099	0.344531
P_{Spices}	-0.09702	-0.29744	**-0.65929**	0.101389	-0.00341	-0.29789	0.107437	-0.08643	0.260269	-0.06178
P_{SC}	1.158797	-0.15613	0.55175	**-0.93066**	-0.16323	0.560658	1.309826	0.249336	-0.07243	0.084416
P_{Tea}	-1.23695	-0.31989	-0.80448	0.006875	**-0.14283**	-0.2134	0.583497	0.042929	0.30364	0.088648
$P_{Tomatoes}$	1.105559	-0.02645	0.440512	-0.49712	-1.3888	**-0.00882**	0.784199	0.229495	0.362899	0.454809

$\boldsymbol{P_{Wheat}}$	0.264223	0.164045	-0.35651	-0.42967	-0.62807	0.032732	**-0.383706**	-0.24838	0.210934	0.07122
$\boldsymbol{P_{Garlic}}$	-1.14161	-0.10794	0.128001	0.235224	-0.52098	0.01234	-0.67698	**-0.021493**	0.42773	0.083441
$\boldsymbol{P_{LL}}$	2.15492	0.385469	0.302526	0.188338	0.515048	-0.18358	-1.73076	0.563126	**-1.028117**	-0.11126
$\boldsymbol{P_{Onions}}$	0.726129	-0.25492	-0.67522	0.162613	0.861879	-0.1489	0.099862	-0.08082	0.112922	**-0.22275**

Source: Authors' own computation, 2020
Note: PF, ChM, FCM & LL means prepared fruits, Chicken meat, Fresh cow milk and Limes and Lemons, respectively.
Own-price elasticities are written in bold letter

CONCLUSION AND RECOMMENDATIONS

It can be inferred that diversification on food spending is low with milled rice dominating the budget of the consumers. In addition, the empirical evidences showed that income effect had more influence in determining demand than the substitution effect as indicated by the uncompensated own-price elasticity which is higher than the compensated own-price elasticity. Furthermore, there is diversification in the diet composition as consumers tend to consume more of non-staple food rather than staple foods if there is increase in per capita income. Therefore, it can be concluded that different food items are been consumed, thus important for the nutritional quality of the country's diet and health of the people. Therefore, income oriented policies should be enhanced as they would aid in sustaining balanced diet. It is advisable that the country should adopt hi-tech agriculture so as to embark on intensive production of most of these food items, thus enhancing their GDP and containing the vulnerability of the nation's economy to external food markets.

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