An economic analysis of the expenditure elasticity of food and non-food commodities groups in Egypt "a case study in Gharbia Governorate"

Dr. Hanan Mohamed Mahmoud Bahgat[1], Dr. Naglaa Elsaid Ahmed Shaban[2*]

[1](Researcher, Agricultural Economics Research Institute, Agricultural Research Center, Egypt)
[2](Researcher, Agricultural Economics Research Institute, Agricultural Research Center, Egypt)

Abstract:
The research aims to study the flexibility of spending for the various categories of food and non-food commodities. The results of the research showed the change in spending related to food and food and non-food behaviors and attitudes since the outbreak of the Corona virus, as some commodities were transformed from luxury commodities to semi-essential commodities during the spread of the pandemic in a sample of rural areas, represented in fruit groups, health care and detergents in both the first and third categories, While it included oils and means of communication in the second category, and some commodities were transformed from semi-essential commodities to luxury commodities for clothing groups and other non-food commodities in each of the first and second categories, and the education group shifted from necessary to semi-essential commodities in the third category, as well as fruit groups, meat, dairy products, health care and detergents from semi-essential goods to essential goods in the second category. As for the urban sample, during the spread of the pandemic, some commodities were transformed from luxury goods to semi-essential goods, represented by health care and detergents in the second category, while other non-food commodities, means of communication and health. Care and detergents from semi-essential to luxury goods in the first category, while the second category includes groups of basic monthly expenses, means of transportation and means of communication, and the third category includes oils, transportation and education categories, and sugar and tobacco commodities have been transformed from essential commodities to luxury commodities in the second category, While health care and other non-food goods have been transformed from semi-essential goods to essential goods in the third category during the pandemic. The research found the need to take into account the consumption behavior of the family in proportion to its total income in light of the Corona pandemic and the high prices of some commodities, and the need to conduct future studies on external shocks such as the Corona pandemic and its repercussions on the economic and social conditions of low-income families.
Keywords: *Corona virus, Spending, income, The expenditure elasticity, Consumer behaviors, Food and non-food commodities.*

I. Introduction

The World Health Organization (WHO) declared the novel coronavirus (COVID-19) to have become a global pandemic on March 11, 2020 (world). WHO, 2020a), which was first reported in the Chinese city of Wuhan in late December 2019. The rapid spread of the associated disease (COVID-19) has led to restrictions on global movement and severe changes in civic and social activism. A large proportion of the world's population has suddenly become confined to their homes, with reduced social contact and frequent information about increasing numbers of infections and deaths, resulting in drastic changes in daily habits and emotional well-being (Lami, E. et al., 2022). To limit the spread of the virus, many governments have imposed nationwide lockdowns. More than half of the world's population has been forced into quarantine (Meo et al., 2020).

The Egyptian Government has declared a state of emergency and taken appropriate measures, to reduce the spread of the Corona virus through social distancing and to raise awareness for members of the Egyptian society not to mix with others outside the scope of their families, and to close the borders between governorates and schools, a widespread curfew for the population with the temporary closure of some commercial activities, the Egyptian authorities have announced the number of confirmed cases of the virus in the world and Egypt since its appearance until December 31, 2021, the number of cases all over the world has reached about (288.32) million confirmed cases, with about (253.65) recoveries cases, about (5.45) million cases of death, meanwhile the number of confirmed cases in Egypt reached about (385.58) thousand confirmed cases, about (320.56)

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thousand recoveries cases, about (21.75) thousand cases of death (Information, Support and Decision – Making center in the Egyptian Cabinet, 31/12/2021).

Individuals have been also severely exposed to economic uncertainty related to job losses, asset market volatility, and future economic growth (Altig, et al. 2020). And these factors have substantially influenced consumers' decision-making related to labor, financial behaviors, and consumption (Dzielinski, 2012). During the prolonged the COVID-19 pandemic, there is a growing body of evidence that individuals around the globe are changing their lifestyle-related behaviors to adjust to the new conditions (Keister, LA., Benton, & Moody, 2016). COVID-19 has had a considerable effect on the global economy by driving a drastic decline in consumers' overall spending compared to the previous year (Byrne, et al. 2020), (Coibion, et al. 2020). The magnitude of the decline has been closely associated with the number of new daily COIVD-19 cases and deaths, and the severity of the spread in specific areas where consumers live or work (Coibion, et al. 2020), (Chetty, et al. 2020). However, the economic impacts of the pandemic on consumer spending have varied greatly across spending categories. For instance, spending in service sectors such as travel, transport, and accommodation have plummeted (Coibion, et al. 2020), (Hall, et al. 2020), (Dunn, Hood, & Driessen, 2020). While expenditures on household supplies and utilities have increased as people have spent much more time indoors (Mitchell et al., 2020). Despite the substantial drop in overall spending, there has been explosive growth in online transactions but a decrease in in-store sales (Dalgleish, 2020), (Barua A. & Levin D. 2020). This disparity in spending changes across categories implies that individuals are adjusting their lifestyle-related behaviors in response to the current crisis.

In terms of a dietary-related lifestyle, few studies have explored how food-related spending and dietary behaviors and attitudes have changed since the COVID-19 outbreak. Most studies have analyzed spending and transaction data at an aggregate or at the individual level, making spending on grocery shopping, food delivery and dining the most investigated items related to consumers' dietary lifestyle in existing studies. While there has been a dramatic decline in spending on most items after the outbreak, spending on groceries and food delivery increased significantly compared to previous years (Hall, et al. 2020), (Baker et al., 2020). The food categories consumed have also changed, leading to changes in consumer food consumption patterns, such as increased consumption of items such as frozen food and canned food and decreased consumption of alcohol and dairy products (Janssen, 2021), (Chenarides, 2020). Interestingly, grocery spending initially increased sharply when COVID-19 cases began to rise and dropped slightly afterward, confirming that consumers were stockpiling items or they had panic buying behaviors (Hall, et al. 2020), (Dunn, Hood, & Driessen, 2020), (Chronopoulos DK, Lukas M. & Wilson JOS. 2020).

The results showed that the monthly household expenditure before the widespread of the pandemic was more than that during the widespread of the pandemic in the three categories and the total sample in rural areas of Gharbia Governorate in Egypt and the difference reached about 7.7%, 2.8%, 4.1%, 1.1% respectively, as for the urban sample, with the increase in the first and second categories, and the total urban sample reached about 1.6%, 1.1%, 0.6%, while the monthly family spending during the pandemic increased more than before the pandemic in the third category by about 2.5%, which shows that the higher income categories especially in the urban areas weren't much affected with the consequences of corona pandemic, The value of Cohen (d) indicates that the size of the effect caused by corona pandemic on the three categories of the household income per month and the total sample of the rural areas was large, while the size of the effect on the sample of the urban areas was middle regarding the monthly income in the first and second income categories and the total sample of the urban areas and it was large in the third category of the urban areas. While, the size of the effect of corona pandemic on the monthly household expenditure in the first, third categories and the total sample of the rural areas was middle and the effect in the second category was small and the size effect of the pandemic on the monthly household expenditure in the sample of the urban was small, large, middle and middle respectively in the three categories and the total sample of the urban (Bahgat, & Shaban, 2022).

Changes in diet also occurred, such as changes in the intake of fruits and vegetables, and the type and amount of exercise changed, but health behavior deteriorated (Naughton et al, 2021). Consumer food shopping behaviors changed substantially in the U.S. amid the spread of COVID-19 in 2020 (Chenarides, Grebitus, Lusk, & Printezis, 2021). The threats of disruptions to the supply chain and fears of food scarcity were associated to changes in acquisition behavior, such as, impulsive or obsessive buying (Islam et al., 2020). The vaccine rollout is ongoing, and no antiviral treatment currently exists for COVID-19. Following a healthy diet during the pandemic could help individuals strengthen their immune system and overall wellbeing (Muscogiuri et al., 2020). In the early days of the pandemic, the WHO published nutritional guidance that recommended consuming fresh vegetables, fruits, pulses, and whole-grain foods to obtain adequate dietary fiber (WHO, 2020b). High consumption of fruits and vegetables is one fundamental of a healthy diet (WHO, 2005). However, market data have shown that the initial shock of the pandemic caused people to buy food with a long shelf life, such as canned and frozen items, ultra-high-temperature milk, pasta flour, and eggs; sales of fresh and perishable foods (e.g., fruits and vegetables) declined (Bracale & Vaccaro, 2020). The Food and Agriculture

Organization (FAO) (2020) also reported that household purchases of long-shelf-life foods and less perishable foods increased at the start of the pandemic (FAO, 2020).

II. RESEARCH PROBLEM

The research problem is represented in the restrictions imposed by social distancing, most of the commercial activities in the Egyptian society are closed, it led to a reduction in supply and demand for commercial activities in most sectors, This lock down was among the harshest in the world as measured either by ratings in the Oxford Tracker (Hale et al., 2020), which greatly affected employment and jobs and the situation became more difficult to practice the daily life of the Egyptian society, this led to a decline in purchasing power, an increase some in the prices of food and non-food commodities, a decrease in savings, and an increase in burdens on low-income families, which led to a change in the consumption pattern of the family on the food and non-food commodity groups, for these reasons, it is necessary to study the effects resulting from the outbreak of the Corona pandemic on the income and consumption expenditure of the Egyptian family regarding groups of food and non-food commodities.

III. GOALS OF THE RESEARCH

The research aimed to study the behavior of households in rural and urban areas in Gharbia Governorate by estimating the functions and expenditure elasticity of 14 groups of food and non-food commodities before and during the outbreak of the novel corona virus pandemic, and follow-up on changes in consumer spending for each commodity group since the outbreak of COVID-19.

IV. METHODOLOGY AND DATA SOURCES

The research relied on both descriptive and quantitative statistical analysis methods this is done by using some statistical analysis tools, as the estimation of the expenditure functions of the different food and non-food commodity groups, before and during the outbreak of the Corona virus pandemic, by the expenditure-expenditure method. The estimate was done using the statistical analysis program SPSS. The functions under study were estimated in the double algorithmic form due to it's advantages the most important one of them is obtaining the elasticity from it in addition to it's agreement with different economic and social criteria, and using the mathematical averages and percentages in order to show the relative importance of the food and non-food commodity groups under study. The research relied on two sources of data, the first of which is the published and unpublished secondary data from the information center in Gharbia Governorate in addition to the preliminary data that was collected a multi-phase stratified questionnaire form in the rural and urban areas of Gharbia Governorate before and during the widespread of corona virus.

V. Research sample description

The research relied on the preliminary data that was collected using a form that was prepared especially for this research through multistage stratified sample as the first stage was chosen randomly while the second stage was chosen purposive sample from the study population the data was collected every month for 24 months and the study includes 2 periods the first period is that before the appearance of corona pandemic from (1\2\2019 - 31\1\2020) and the second one is during the widespread of corona pandemic from (1\2\2020 - 31\1\2021).

i. Random sampling method was used to choosing the sample items based on the relative importance of the number of families in the rural and urban areas of Gharbia Governorate centers, the total number of families in the rural and urban areas of Gharbia Governorate reaches about 939.99, 405.21 thousand families, that represent about 69.88%, 30.12% of the total number of families in the governorate that reaches at about 1.345 million families respectively, also the average number of family members in rural and urban areas reached 3.88, 3.7 members respectively, the total number of inhabitants in the rural and urban areas of Gharbia Governorate reaches about 3.65, 1.50 million people, that represent about 70.87%, 29.13% of the total number of inhabitants in the governorate which reaches about 5.15 million people respectively (Gharbia Governorate, Egypt, 2019).

A two of the centers of Gharbia Governorate were chosen according to the relative importance of the number of families and the number of people and they are Almahala Alkobra and Tanta centers and the number of families in the two centers reached about 325.34, 356.79 thousand families respectively, while the number of people in both of them reached about 1.36, 1.23 million people, the geometric mean of both Almahala Alkobra

and Tanta centers reached about 49.99%, 49.89% of the total sample, thus the number of the respondents in each center was about 192 families of the total number of respondents, which the law set about 384 views[1].

The biggest villages in rural areas as well as the biggest areas in the cities of the urban areas have been chosen according to the relative importance of the number of families in both Almahala Alkobra and Tanta centers. A random sample has been chosen from the families in the villages and cities through concerning the distribution of the sampled items on the chosen villages and cities in Almahala Alkobra and Tanta centers, using the geometric mean[2] of Almahala Alkobra and Tanta centers, the number of views of Almahala Alkobra center was distributed to be 27, 18, 28, 101, 18 views in Abou Ali Alkantra village, Saft Torab village, Nasser city, Alemam Alhossieny city and Almansey Sarhan city respectively, while in Tanta center the number of views was 38, 27, 88, 39 views in Mahallet marhoum village, Seberbay village, Sigar city and Mahmoud Abou Shanab city.

ii. was chosen purposive sampling as the study population was divided into 3 categories according to the total income of the family per month in rural and urban areas (villages and cities) in Almahala Alkobra and Tanta centers in Gharbia Governorate, the number of families in the rural and urban areas reached about 110, 274 families, that represent about 28.6%, 71.4% of the total sample that reaches about 384 families, the first category included the families with an income <5000 L.E[3], while the second category included the families with an income ranging from 5000 < 9000 L.E, the third and final category included the families with an income more than 9000 L.E. Fig. (1) indicates that the number of the families in the rural areas of the research sample in the first, second and third categories is reached about 52, 30, 28 families, that represent about 13.5%, 7.8%, 7.3% of the total sample, while the number of families in the urban areas of the research sample in the first, second and third categories was about 170, 64, 40 families, that represent about 44.3%, 16.7%, 10.4% of the total sample in Gharbia Governorate.
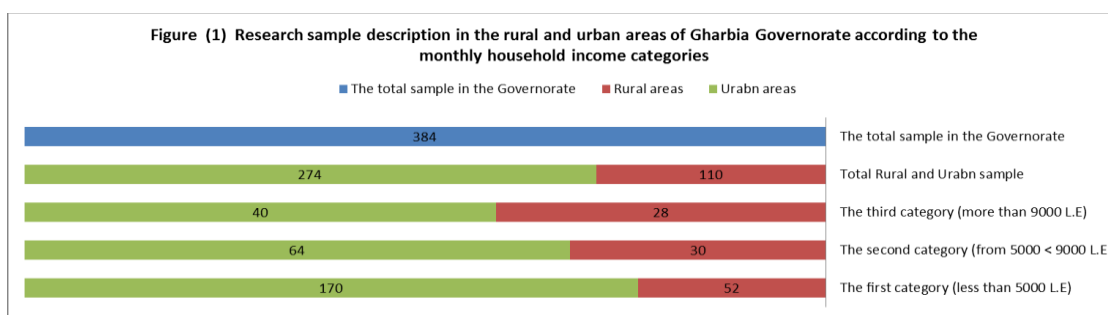
Source: collected and calculated from the data of the research sample in Gharbia Governorate.

VI. RESEARCH RESULTS AND DISCUSSION

1. Distribution of the research sample in Gharbia Governorate

Table (1) shows the numerical and relative distribution of the total sample in Gharbia governorate according to the studied variations regarding **the social status** it was clear that 93.2% married, 6.3% widower, 0.5% divorced respectively, with regard to **the gender** of the respondents, it became clear that the percentage of both males and females at about 96.6%, 3.4% respectively, the table also shows the distribution of the research sample individuals according to **the age of the head of the family**, which represents 8.6% for individuals less than 40 years old, while the percentage of the people whose ages range between 41-50 years old reached 35.9%, as for the percentage of people whose ages range between 51-60 years old of 41.7%, finally the percentage of people who are over 61 years old reached 13.8% of the total research sample.

Given that the consumption is closely related **the number of family members** the research was sure to know the number of family members, whereas the family size reached about 1894 individual in the sample under study, including is about 569 individual in the rural areas and about 1325 individual in the urban areas of

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[1]- Arkin, Herbert (1982), Law: $n = \dfrac{P(1-P)}{(SE \div Z) + [P(1-P) \div N]}$

Whereas:

n: indicates the number of respondents.

N : indicates the size of the community.

SE : indicates error rate = 0.05.

Z : refers to the standard level corresponding to the indication level 0.95= 1.96.

P : refers to the percentage of availability of the feature and neutrality =0.50.

[2] -Geometric mean= $\sqrt{\text{the relative importance of the number of families} \times \text{the relative importance of the population}}$

[3] -L.E: Egyptian pounds.

Gharbia Governorate, **the average size of the family** in Gharbia Governorate has reached about 5 members, the families were divided according to the number of family members in each family, it was clear that the families that consist of 5 members were ranked first followed by the families that consist of 6 members or more then the families that consist of 4 members and finally the families that consist of 3 members by about 39.6%, 27.3%, 25.8%, 7.3% respectively of the total sample.

Table no 1: The numerical and proportional distribution of the total sample in the rural and urban areas of Gharbia Governorate according to the studied variations:

Descriptive variables	Rural No.	Rural %	Urban No.	Urban %	Total sample No.	Total sample %
1- Social status						
Married	98	89.1	260	94.9	358	93.2
Unmarried	--	--	--	--	--	--
Widower	11	10.0	13	4.7	24	6.3
Absolute	1	0.9	1	0.4	2	0.5
2-Gender						
Male	107	97.3	264	96.4	371	96.6
Female	3	2.7	10	3.6	13	3.4
3- The age of the head of the family						
40 years and under	8	7.3	25	9.1	33	8.6
41-50 years old	42	38.2	96	35.0	138	35.9
51-60 years old	47	42.7	113	41.2	160	41.7
61 years and old	13	11.8	40	14.6	53	13.8
4-Distribution of the number of family members						
3 people	3	2.7	25	9.1	28	7.3
4 people	27	24.5	72	26.3	99	25.8
5 persons	42	38.2	110	40.1	152	39.6
6 or more people	38	34.5	67	24.5	105	27.3
total family size	569	-	1325	-	1894	-
average family size	5.17	-	4.84	-	5	-
The number of family workers	306	-	658	-	964	-
5-Education level of the head of the family						
Literacy	14	12.7	35	12.8	49	12.8
middle school	21	19.1	27	9.9	48	12.5
Middle Certification	38	34.5	102	37.2	140	36.5
High qualified	29	26.4	86	31.4	115	29.9
Master's	2	1.8	10	3.6	12	3.1
PhD	6	5.5	14	5.1	20	5.2
Total	110	100	274	100	384	100
6-The number of family members in education						
Elementary	57	26.8	136	28.5	193	28.0
Preparatory	49	23.0	95	19.9	144	20.9
High school	33	15.5	78	16.4	111	16.1
Technical Diploma	29	13.6	62	13.0	91	13.2
technical Institute	2	0.9	21	4.4	23	3.3
University	43	20.2	85	17.8	128	18.6
Total	213	100	477	100	690	100
7-Profession of the head of the family						
I. Government employee (fixed salary						
government employee	52	29.9	122	70.1	174	100
II. unstable salary						
Craftsman	21	21.6	29	15.3	50	17.4
Driver	14	14.4	8	4.2	22	7.7
supermarket worker	5	5.2	19	10.0	24	8.4
coffee worker	7	7.2	10	5.3	17	5.9
farmer work	28	28.9	33	17.4	61	21.3
Restaurant	1	1.0	13	6.8	14	4.9
Commercial activity	14	14.4	55	28.9	69	24.0
Daily	7	7.2	23	12.1	30	10.5

Descriptive variables	Rural No.	Rural %	Urban No.	Urban %	Total sample No.	Total sample %
8- changing income						
lower income	85	77.3	149	54.4	234	60.9
increase income	7	6.4	28	10.2	35	9.1
fixed income	18	16.4	97	35.4	115	29.9
9-Reasons for changing income						
precautionary measures	64	20.4	127	21.8	191	21.3
Breakdown	31	9.9	44	7.5	75	8.4
Decreased demand for activity	40	12.8	48	8.2	88	9.8
Employer cut wages	8	2.6	10	1.7	18	2.0
Project paused	11	3.5	19	3.3	30	3.3
Work in less days	55	17.6	111	19.0	166	18.5
Work less hours	63	20.1	119	20.4	182	20.3
discontinuous work	41	13.1	105	18.0	146	16.3
total	313	100	583	100	896	100
10-Did any of the family members stop working during the corona period?						
yes	43	39.1	76	27.7	119	31.0
no	67	60.9	198	72.3	265	69.0
total	110	100	274	100	384	100
11-Did you receive a state subsidy while you were away from work?						
yes	5	4.5	7	2.6	12	3.1
no	105	95.5	267	97.4	372	96.9
12-Do you depend on what you grow or what you raise at home?						
yes	21	19.1	48	17.5	69	18.0
no	37	33.6	133	48.5	170	44.3
sometime	52	47.3	93	33.9	145	37.8
13-Were some quantities of non-essential goods dispensed with when their prices increased?						
yes	88	80.0	199	72.6	287	74.7
no	22	20.0	75	27.4	97	25.3
14-Are you rationalizing your consumption of goods during this period?						
yes	93	84.5	187	68.2	280	72.9
no	17	15.5	87	31.8	104	27.1
15-The system for purchasing your needs of food commodities before the virus?						
daily	52	47.3	90	32.8	142	37.0
every 3 days	25	22.7	77	28.1	102	26.6
weekly	32	29.1	93	33.9	125	32.6
Monthly	1	0.9	13	4.7	14	3.6
16-The system for purchasing your needs of food commodities during the virus?						
daily	8	7.3	20	7.3	28	7.3
every 3 days	41	37.3	86	31.4	127	33.1
weekly	56	50.9	150	54.7	206	53.6
monthly	5	4.5	18	6.6	23	6.0
total	110	100	274	100	384	100

The total number of sample members in the rural (110) and in urban areas (274).
Source: The results of the research sample data in Gharbia Governorate.

The educational level of the head of the family: it was clear that the highest percentage was that of the graduates with intermediate school qualification 36.5%, followed by 29.9% high qualification, while the literacy recipients and those with middle school degrees represent about 12.8%, 12.5% respectively, meanwhile those with masters and doctorate degrees represent 5.2%, 3.1% respectively of the total sample.

The sample results also indicated that **the number of family members of the interviewees in different educational stages** from the beginning of the primary stage, preparatory, general secondary, diploma, technical institute and collage represent about 28%, 20.9%, 16.1%, 13.2%, 3.3%, 18.6% respectively.

Regarding the variable **profession of the head of the family** the number of people **with a fixed salary** (employees in the governmental sector or those who have a pension) about 147 heads of household, while the number of people with a non-fixed salary reached about 287 heads of household, as they work in several activities such as: craftsman, driver or people who work in a supermarket, cafe, farm, restaurant or those who are engaged in a commercial activity or day to day work with a percentage of 17.4%, 7.7%, 8.4%, 5.9%, 21.3%, 4.9%, 24% respectively of the total sample.

On evaluating the effects of corona pandemic on the total research sample in Gharbia Governorate the results in table no (1) showed a 60.9% decrease in the family income while those whose income increased represent 9.1%, from the opinions of the interviewees it was clear that 31% of the total sample one of their family members stopped working, it's also clear from the opinions of the interviewees that the most important causes of the decrease in income is because of precautionary methods and also because some people stopped working, the activity demand reduction, the decrease of the income, the suspension of the project, working for fewer days and hours and intermittent work with a percentage at about 21.3%, 8.4%, 9.8%, 2%, 3.3%, 18.5%, 20.3%, 16.3% respectively of the total sample, it was also clear that 3.1% only of the total sample were subsidized by the country during the wide spread of corona pandemic.

The research sample responses showed that the percentage of those who rationalized their commodity consumption during the widespread of corona virus reached about 72.9%, while the percentage of those who dispensed with some unnecessary commodity amounts is about 74.7% of the total sample mean, while the percentage of those who relied on what can be planted or raised at home is about 18% only of the total number of the families of the interviewees, the interviewees took the following positions on the difference of how they buy their needs of food commodities especially during the widespread of corona pandemic that people who buy their needs daily, every 3 days, weekly and monthly represent 7.3%, 33.1%, 53.6%, 6% respectively of the total research sample.

2. Studying the expenditure elasticity of the different commodity categories in the rural and urban areas of Gharbia Governorate before and during the appearance of corona pandemic:

Regression analysis was used to estimate the relationship between total monthly household expenditure (as an independent variable) (y) and expenditure on (14 groups) of food and non-food commodities (as dependent variable) (E), in rural and urban areas of Gharbia Governorate during the period during the pandemic **as an average of the period (1\2\2019 - 31\1\2020)** and during the widespread of the pandemic **as an average of the period (1\2\2020 - 31\1\2021)**, using the double-Logarithmic form to represent all the commodity categories as it's easy to calculate the expenditure flexibility from the double logarithmic function (DL) as the estimated regression coefficient equals the expenditure flexibility (ni), consistently as one of the characteristics of the logarithmic function.

$E_i = F(y)$ .... (Yassin, F. J., 2008).

Whereas: (y) is the average total expenditure, (E) is the average household expenditure on the group (i) which includes:

E_1: average household expenditure on cereals and their products.

E_2: average household expenditure on vegetables.

E_3: average household expenditure on fruits.

E_4: average household expenditure on oils and fats.

E_5: average household expenditure on meats (red, white and fish), dairy and eggs.

E_6: average household expenditure on sugar and tobacco (subsidized and unsubsidized sugar, desserts, honey, soft drinks, cigarettes and tobacco).

E_7: average household expenditure on other food commodities (garlic, onion, other food expenses and food expenses outside the house).

E_8: average household expenditure on the means of communication (landline, mobile and internet).

E_9: average household expenditure on other non-food commodities.

E_{10}: average household expenditure on the means of transport.

E_{11}: average household expenditure on clothes and fabrics.

E_{12}: average household expenditure on health care and detergents (medical check-ups, treatment, masks, gloves, hand sanitizers, disinfectants and all kinds of detergents).

E_{13}: average household expenditure on education and it's appurtenances and private lessons.

E14: average household expenditure on necessary monthly expenses (housing rent, water, electricity, gas, sanitation, garbage).

From the two tables no (2, 3) it's clear that the estimates that have been reached have passed all economic and statistical standards, concerning the economic criteria represented in the sign and size of the assessed constants, it was found that the marginal slope of all the assessed functions is within the economically acceptable limits, that are restricted to zero to one, it was also found that the value of the expenditure elasticity of the commodity groups are more than zero, this indicates that they are regular commodities and this agrees with the economic logic, because the analysis of function was based on the commodity groups and not the individual commodities, the statistical tests proved the significance of the estimates at the level of significance 1%, 5% for most of the functions in the rural and urban areas before and during the pandemic, both with respect to the significance of the parameters of the function or with respect to the significance of the function as a whole, according to the statistical values of (F), (T).

Can be the classification of the commodities according to the expenditure elasticity of demand (Mohamed, M. H. M., Diab, Y. A-H., & Al-Shuwaikh, D. H., 2019) in the following way:

• Inferior goods: those goods whose demand elasticity is less than zero, whereas it has negative flexibility.
• Necessary goods: those whose elasticity ranges between zero and 0.5.
• Semi necessary goods: goods whose elasticity ranges between more than 0.5 and less than 1.
• Luxurious goods: those goods with a demand expenditure elasticity of more than one.

2.1 The expenditure elasticity for each commodity group in the rural areas of Gharbia Governorate before and during corona pandemic:
A- First income category (1500 < 5000 L.E) in the rural areas of the Governorate:

Table no (2) shows the logarithmic expenditure function in the rural areas of Gharbia Governorate for the first income category (less than 5000 L.E), as it was found that value the expenditure elasticity coefficient of each of the commodity groups of cereals and their products, vegetables, oils, meats, dairy products, means of communication in addition to means of transport, education and necessary monthly expenses, was less than 1 before and during the appearance of the pandemic and these commodity groups classification as semi necessary commodities, which means that the rural population is they are approaching their saturation level, the change in the expenditure flexibility on each of means of communication, means of transport, education and it's appurtenances and private lessons can be due to the precautionary measures, imposing lockdown, the measures taken to limit transportation (partial ban), closing cafes and celebration halls, decreasing work days of family members in Egyptian society, as well as closing schools for some educational stages and universities and turning to distance learning (internet) and attending only to take the semifinal and final exams in some educational stages during the spread of the pandemic to limit it, which lead to the decrease of the expenditure on the means of transport, education and private lessons.

From the value of the expenditure elasticity coefficient of the commodity groups of sugar, tobacco and other food commodities, it's clear that it was more than 1 before and during the pandemic where it's classification as one of the luxurious goods, which shows the lack of saturation with those goods, while the expenditure flexibility on the two groups of fruits and health care was more than 1 before the pandemic then decreased to less than 1 during the pandemic, which means the conversion of the **commodities** in those groups from luxurious goods into semi necessary goods during the pandemic, consequently the families approach the partial saturation level of these commodity groups, the table also shows that the expenditure flexibility of other non-food commodities and clothes, was more than 1 during the pandemic, while it was less than 1 before the pandemic in this groups and turned of from semi necessary goods before the pandemic into luxurious goods during the pandemic, which indicates the lack of saturation of goods in these groups before the pandemic in this category, while it reaches partial saturation during a pandemic.

It's also worth mentioning that the Egyptian Government provides support for some food commodities through the smart card (the ration card) by which the citizen can have subsidized bread directly from the bakeries without a maximum limit in addition to sugar, oil and rice, also the person who doesn't use their whole amount which is five loaves for each person per day, can have the difference of the bread points in the form of ration goods or he can buy other goods from the grocer's, so from estimating the value of the expenditure elasticity coefficient of the commodity groups of sugar, tobacco and other food commodities it's clear that it's from the luxurious goods, also the commodities group of oils and cereals and their products was from the semi necessary goods as this income category (1500 to less than 5000L.E) depends more on the ration goods.

The change in the expenditure flexibility of the health care and detergents group during the widespread of corona pandemic can be due to the increase in the expenditure directed to this group for examination, treatment, buying face masks, gloves, sanitizer, and different kinds of detergents as the health care of Egyptian family members especially those with chronic diseases, who are likely to get infected by following the instructions of the world health organization to decrease the spread of the virus and preserving public health
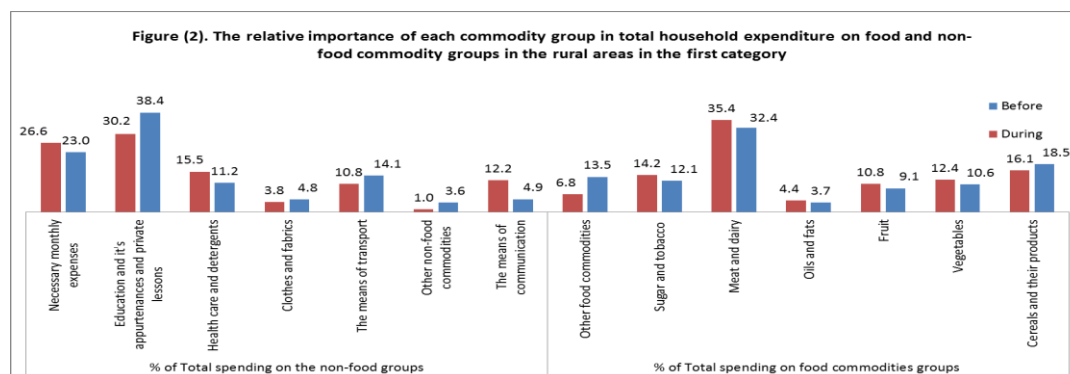
among the individuals of the society and decrease the infection with it.

Table no 2: Double logarithmic expenditure functions of the family in the rural of Gharbia Governorate before and during the emergence of the Corona pandemic (value in L.E):

Commodity group	Period	First category				Second category				Third category			
		N1=b1	Specific average spend	%of total family spending	%of total spending on commodity groups	N1=b1	Specific average spend	%of total family spending	%of total spending on commodity groups	N1=b1	Specific average spend	%of total family spending	%of total spending on commodity groups
Cereals and their products	Before	0.870	444.2	18.5	11.0	0.647	502.6	14.6	8.9	0.719	605.4	15.0	8.6
	During	0.722	371.7	16.1	9.9	0.643	477.4	12.8	8.9	0.736	557.1	14.4	8.6
Vegetables	Before	0.934	254.3	10.6	6.3	0.684	450.5	13.1	8.0	0.628	451.4	11.2	6.4
	During	0.811	285.6	12.4	7.6	0.613	492.4	13.2	9.2	0.965	513.4	13.3	7.9
Fruit	Before	1.211	219.2	9.1	5.4	0.773	418.0	12.2	7.4	0.523	406.6	10.1	5.8
	During	0.945	249.3	10.8	6.6	0.328	490.8	13.1	9.1	0.744	447.8	11.6	6.9
Oils and fats	Before	0.605	88.5	3.7	2.2	1.154	144.7	4.2	2.6	1.194	199.7	4.9	2.8
	During	0.947	100.8	4.4	2.7	0.600	100.5	2.7	1.9	1.465	150.2	3.9	2.3
Meat and dairy	Before	0.631	778.0	32.4	19.2	0.796	1102.4	32.1	19.5	0.492	1606.6	39.7	22.7
	During	0.639	819.2	35.4	21.7	0.466	1470.4	39.3	27.3	0.460	1575.5	40.8	24.3
Sugar and tobacco	Before	1.337	289.9	12.1	7.2	1.669	395.8	11.5	7.0	2.399	374.1	9.2	5.3
	During	2.138	327.2	14.2	8.7	1.886	559.1	14.9	10.4	3.065	388.2	10.1	6.0
Other food commodities	Before	1.289	324.8	13.5	8.0	1.177	423.5	12.3	7.5	2.153	400.7	9.9	5.7
	During	2.009	157.2	6.8	4.2	2.929	149.6	4.0	2.8	2.354	225.6	5.8	3.5
Total spending on food commodities group	Before	0.999	2398.9	100	59.3	0.943	3437.5	100	60.8	0.995	4044.4	100	57.2
	During	0.999	2310.9	100	61.3	0.813	3740.3	100	69.6	0.974	3857.7	100	59.5
The means of communication	Before	0.503	81.3	4.9	2.0	1.021	211.5	9.5	3.7	0.926	194.5	6.4	2.8
	During	0.998	177.6	12.2	4.7	0.694	172.8	10.6	3.2	0.805	300.2	11.4	4.6
Other non-food commodities	Before	0.818	59.5	3.6	1.5	0.633	58.7	2.6	1.0	4.548	161.4	5.3	2.3
	During	1.217	14.1	1.0	0.4	4.486	13.9	0.9	0.3	1.229	78.9	3.0	1.2
The means of transport	Before	0.849	233.0	14.1	5.8	0.509	418.4	18.9	7.4	0.631	443.3	14.7	6.3
	During	0.868	157.2	10.8	4.2	0.703	196.0	12.0	3.6	0.970	341.9	13.0	5.3
Clothes and fabrics	Before	0.612	79.4	4.8	2.0	0.714	132.2	6.0	2.3	2.861	171.9	5.7	2.2
	During	1.192	55.1	3.8	1.5	2.597	34.4	2.1	0.6	1.175	142.3	5.4	2.2
Health care and detergents	Before	1.342	184.1	11.2	4.5	0.578	238.1	10.7	4.2	1.133	293.2	9.7	4.1
	During	0.996	226.8	15.5	6.0	0.466	433.7	26.5	8.1	0.948	645.6	24.6	10.0
Education and it's appurtenances and private lessons	Before	0.830	633.0	38.4	15.6	1.015	777.2	35.0	13.7	0.417	1208.0	39.9	17.1
	During	0.894	440.4	30.2	11.7	2.527	425.4	26.0	7.9	0.638	544.0	20.7	8.4
Necessary monthly expenses	Before	0.974	379.5	23.0	9.4	0.621	383.3	17.3	6.8	1.035	552.9	18.3	7.8
	During	0.979	389.1	26.6	10.3	0.549	360.1	22.0	6.7	0.845	576.0	21.9	8.9
Total spending on the non-food groups	Before	0.985	1649.9	100	40.7	1.117	2219.4	100	39.2	0.988	3025.2	100	42.8
	During	1.003	1460.2	100	38.7	1.272	1636.2	100	30.4	1.013	2628.9	100	40.5
Total monthly family spending	Before	4048.8			100	5656.9			100	7069.6			100
	During	3771.2			100	5376.5			100	6486.6			100

Source: The results of the research sample data in Gharbia Governorate.

Figure (2): Shows the increase in the relative importance of the monthly expenditure groups in the rural for the first income category of each of vegetables, oils, meats, dairy products, means of communication and the necessary monthly expanses, the sugar and tobacco, fruits and healthcare and detergents from the total household expenditure from about 10.6%, 3.7%, 32.4%, 4.9%, 23%, 12.1%, 9.1%,11.2% before the pandemic to reach 12.4%, 4.4%, 35.4%, 12.2%, 26.6%, 14.2%, 10.8%, 15.5% respectively during the pandemic. While the relative importance of the monthly expenditure on groups of cereals and their products, means of transport and education, other food commodities, other non-food commodities and clothes from the total household expenditure decreased from 18.5%, 14.1%, 38.4%,13.5%, 3.6%, 4.8% before the pandemic to has about 16.1%, 10.8%, 30.2%, 6.8%, 1%, 3.8% respectively during the pandemic.
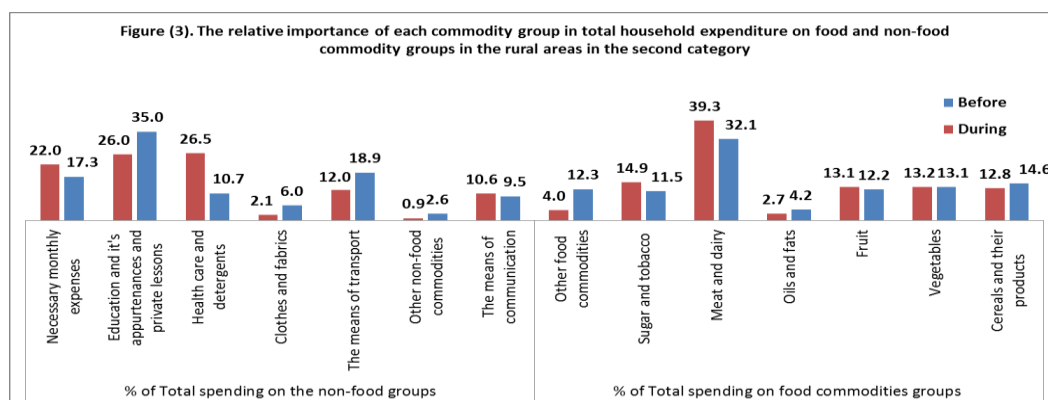

Figure (2). The relative importance of each commodity group in total household expenditure on food and non-food commodity groups in the rural areas in the first category

B- Second income category (5000 < 9000 L.E) in the rural areas of the governorate:

From table no (2) it was found that the value of the expenditure elasticity coefficient for each of the commodity groups of cereals and their products, vegetables, means of transport and necessary expenditures per month was less than 1 before and during the pandemic, these groups are classification as semi necessary goods which means that the rural population is nearly saturated with it, by observing the expenditure elasticity of each of the sugar, tobacco, other food commodities and education groups it was clear that, it was more than 1 before and during the pandemic, so they were classification as luxurious goods which shows the lack of saturation with these commodities, the table also shows that the expenditure flexibility of the oils and means of communication was more than one before the pandemic, while it was less than one during the pandemic, as it changed from luxurious goods into semi necessary goods, which indicates the lack of saturation with the goods in these groups, while it reaches the partial saturation during the pandemic, on the other hand it's clear from the expenditure flexibility of groups of the fruits, meats, dairy products, health care and detergents in this category in the rural areas was less than one before and during the pandemic, it changed from semi necessary goods into necessary goods, it was also clear from the table that the expenditure flexibility of the two groups of non-food commodities and clothes was less than one before the pandemic and it increased to be more than one during the pandemic, whereas it changed from semi necessary goods into luxurious goods.

It's worth mentioning that despite the diminishing of the household expenditure in the second income category (5000 to less than 9000 L.E) during the appearance of corona pandemic, however, there are some commodity groups whose expenditure percentage increased such as vegetables, fruits, meats and dairy products, with the aim of resort to healthy food and strengthening maintain the immunity system, which leads to limiting of corona virus, in addition to the change of the consumers taste and the change in the income of most families in the Egyptian society, the impact of this change was reflected on the items of the food and non-food consumption expenditure leading to the change in the consumption patterns of the Egyptian family.

Figure (3): Indicates on the relative importance of the monthly expenditure groups in the rural for the second income category of both the vegetables, necessary monthly expenditure, sugar and tobacco, means of communication, fruits, meats, dairy products, health care and detergents increased were about 13.1%, 17.3%, 11.5%, 9.5%, 12.2%, 32.1%, 10.7% before the pandemic to has about 13.2%, 22%, 14.9%, 10.6%, 13.1%, 39.3%, 26.5% of the total household expenditure during the pandemic in rural, While there has been an obvious decrease in the relative importance of the monthly expenditure on cereals and their products, means of transportation, other food commodities, education, oils, non-food commodities and clothes from the total expenditure of the family is about 14.6%, 18.9%, 12.3%, 35%, 4.2%, 2.6%, 6% before the pandemic to has about 12.8%, 12%, 4%, 26%, 2.7%, 0.9%, 2.1% during the pandemic in rural areas respectively.
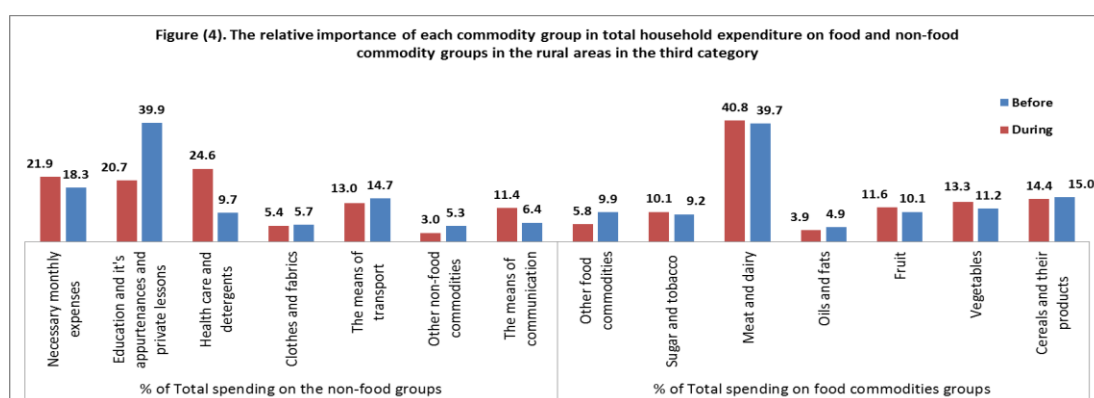

Figure (3). The relative importance of each commodity group in total household expenditure on food and non-food commodity groups in the rural areas in the second category

C- Third income category (more than 9000 L.E) in the rural areas of the governorate:

From table no (2) it was found that the value of the expenditure elasticity coefficient was less than 1 before and during the appearance of the pandemic in each of the commodity groups of cereals and their products, vegetables, fruits, means of communication and means of transport, these commodity groups are classification as semi necessary goods, which means that the rural population approaches the saturation level of it. By considering the expenditure elasticity of the two groups of health care, detergents and essential monthly expenses, it was found that it was more than 1 before the pandemic, which is why this group was classification as luxurious commodities, which shows the lack of saturation with these goods, while their expenditure flexibility decreased to be less than one during the widespread of the pandemic, so they became semi necessary commodities, which means that the rural population of this category approaches the saturation level with these commodities, and from the value of the expenditure flexibility coefficient of the meats and dairy products group it's clear that it was less than 1 before and during the pandemic as it's classification as necessary commodities,
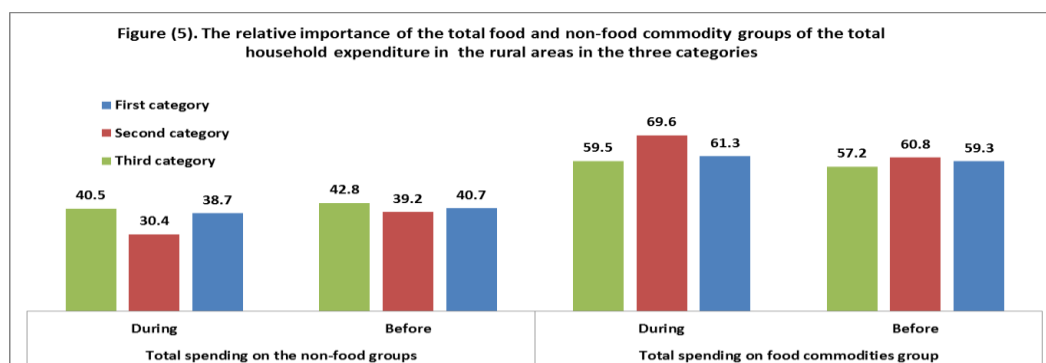
which shows the lack of saturation with these commodities. Meanwhile, it was clear that the expenditure flexibility on the education group was less than 1 before and during the pandemic, as it was converted from a necessary commodity before the pandemic into a semi necessary one during the pandemic. By studying the expenditure elasticity of the oils, sugar, other food and non-food commodity and clothes groups, it was found that it was more than 1 before and during the widespread of corona, which is why these commodities groups were classification as luxurious commodities, that shows the lack of saturation with these commodities.

Figure (4): Shows the increase in the relative importance of the monthly expenditure groups in the rural for the third income category of the commodity groups of vegetables, fruits and means of communication, health care and detergents, essential monthly expenses, meats and dairy products, sugar and tobacco from about 11.2%, 10.1%, 6.4%, 9.7%, 18.3%, 39.7%, 9.2% of the total household expenditure before the pandemic to reach 13.3%, 11.6%, 11.4%, 24.6%, 21.9%, 40.8%, 10.1% respectively during of the pandemic, While the relative importance of the monthly expenditure of the groups of cereals and their products and means of transport, education, oils, other food and non-food commodity and clothes decreased is about 15%, 14.7%, 39.9%, 4.9%, 9.9%, 5.3%, 5.7% of the total household expenditure to reached 14.4%, 13%, 20.7%, 3.9%, 5.8%, 3%, 5.4% respectively during of corona pandemic.

Figure (4). The relative importance of each commodity group in total household expenditure on food and non-food commodity groups in the rural areas in the third category

D- The total food and non-food commodity groups of the total household expenditure in the rural areas in the three categories:

Figure (5) shows the relative importance of the total monthly household expenditure in the rural in the three income categories for the food and non-food commodity groups, as it shows an increase in the total expenditure on the food commodities group in the first, second and third income categories from about 59.3%, 60.8%, 57.2% before the pandemic to reach 61.3%, 69.6%, 59.5% respectively, of the total household expenditure during the spread of the Corona pandemic. While the relative importance of total spending on the group of non-food commodities in the rural in the three income categories decreased from about 40.7%, 39.2%, 42.8% of the total household spending before the pandemic, to reach 38.7%, 30.4%, 40.5% respectively, during the Corona pandemic.

Figure (5). The relative importance of the total food and non-food commodity groups of the total household expenditure in the rural areas in the three categories

2.2 The expenditure flexibility of each commodity group in the urban areas of Gharbia governorate before and during corona pandemic:

A- The first income category (1500 < 5000 L.E) in the urban areas of the governorate:

From table no (3) it's clear that the expenditure elasticity on the commodity groups of cereals and their products, vegetables, fruits, oils, meats and dairy products, means of transport and essential monthly
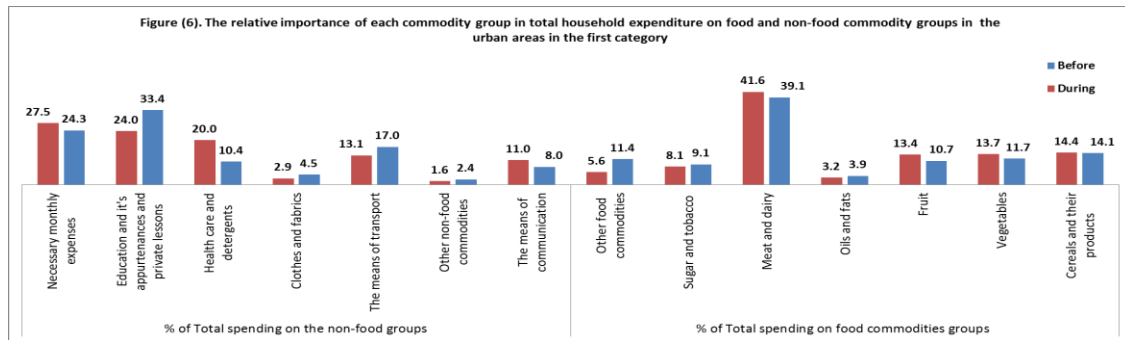
expenditure, was less than 1 before and during the appearance of the pandemic and these groups are classification as semi necessary commodities, which means that the population of the urban areas approaches the level of saturation with these commodities. The table also shows the expenditure flexibility of the sugar, tobacco and other food commodity groups as well as clothes and education groups and it was more than 1 before and during the appearance of the pandemic, they are classification as luxurious commodities as they can be reduce or decommissioned. Meanwhile, the expenditure flexibility of the groups of other non-food commodities, means of communication, health care and detergents has changed from semi necessary commodities before the pandemic into luxurious commodities during the pandemic.

Figure (6): Indicates on the increase in the relative importance of the monthly expenditure in the urban for the first income category of each of the groups of cereals and their products, vegetables, fruits, meats and dairy products, essential monthly expenses, the health care, detergents and means of communication of the total household expenditure were about 14.1%, 11.7%, 10.7%, 39.1%, 24.3%, 10.4%, 8% before the pandemic to reached 14.4%, 13.7%, 13.4%, 41.6%, 27.5%, 20%, 11% respectively during the pandemic. While this percentage decreased in groups of oils, means of transport, sugar and tobacco, other food commodity groups, clothes, education and other non-food commodities is about 3.9%, 17%, 9.1%, 11.4%, 4.5%, 33.4%, 2.4% before the widespread of the pandemic to reach 3.2%, 13.1%, 8.1%, 5.6%, 2.9%, 24%, 1.6% respectively during the widespread of corona pandemic.

Table no 3: Double logarithmic expenditure functions of the family in the urban Gharbia Governorate before and during the emergence of Corona pandemic (value in L.E):

Commodity group	Period	First category				Second category				Third category			
		N1=b1	Specific average spend	%of total family spending	%of total spending on commodity groups	N1=b1	Specific average spend	%of total family spending	%of total spending on commodity groups	N1=b1	Specific average spend	%of total family spending	%of total spending on commodity groups
Cereals and their products	before	0.804	331.1	14.1	8.2	0.307	322.5	10.0	5.2	0.689	303.5	6.9	3.5
	during	0.844	339.1	14.4	8.9	0.438	330.8	10.2	6.1	0.654	332.8	7.4	4.3
Vegetables	before	0.922	274.1	11.7	6.8	0.235	309.1	9.6	5.0	0.587	342.0	7.8	4.0
	during	0.693	321.7	13.7	8.4	0.402	371.2	11.5	6.9	0.729	407.7	9.1	5.2
Fruit	before	0.973	250.6	10.7	6.2	0.661	308.8	9.6	5.0	0.758	394.9	9.0	4.6
	during	0.688	316.4	13.4	8.3	0.625	387.8	12.0	7.2	0.677	473.7	10.6	6.1
Oils and fats	before	0.693	91.9	3.9	2.3	0.856	112.8	3.5	1.8	0.875	184.9	4.2	2.2
	during	0.760	74.2	3.2	1.9	0.823	95.3	2.9	1.8	1.014	137.9	3.1	1.8
Meat and dairy	before	0.625	918.4	39.1	22.9	0.784	1503.8	46.8	24.4	0.668	1886.6	42.9	22.0
	during	0.587	979.2	41.6	25.7	0.794	1552.0	48.0	28.7	0.719	2085.2	46.5	26.8
Sugar and tobacco	before	1.791	212.6	9.1	5.3	0.357	243.6	7.6	4.0	2.065	718.8	16.4	8.4
	during	1.854	189.8	8.1	5.0	1.287	340.5	10.5	6.3	1.960	778.9	17.4	10.0
Other food commodities	before	1.623	267.8	11.4	6.7	1.521	409.2	12.7	6.6	2.348	564.6	12.8	6.6
	during	1.449	132.9	5.6	3.5	1.171	156.3	4.8	2.9	2.782	263.9	5.9	3.4
Total spending on food commodities group	before	0.948	2346.5	100	58.4	0.745	3209.8	100	52.1	0.982	4395.3	100	51.2
	during	0.869	2353.2	100	61.7	0.746	3234	100	59.7	0.923	4480	100	57.7
The means of communication	before	0.562	133.3	8.0	3.3	0.850	260.7	8.8	4.2	1.005	304.2	7.2	3.5
	during	1.267	160.5	11.0	4.2	1.311	267.8	12.3	4.9	1.001	356.7	10.8	4.6
Other non-food commodities	before	0.851	40.1	2.4	1.0	1.960	103.3	3.5	1.7	0.621	127.5	3.0	1.5
	during	1.856	22.8	1.6	0.6	1.081	55.1	2.5	1.0	3.861	69.0	2.1	0.9
The means of transport	before	0.951	283.6	17.0	7.1	0.896	413.2	14.0	6.7	0.839	717.4	17.1	8.3
	during	0.992	191.2	13.1	5.0	1.122	242.3	11.1	4.5	1.323	423.6	12.9	5.5
Clothes and fabrics	before	1.171	75.0	4.5	1.9	1.868	121.3	4.1	2.0	1.215	358.7	8.5	4.2
	during	1.168	41.8	2.9	1.1	3.357	47.6	2.2	0.9	2.642	92.9	2.8	1.2
Health care and detergents	before	0.722	173.5	10.4	4.3	1.278	350.5	11.9	5.7	0.660	504.8	12.0	5.9
	during	1.157	291.8	20.0	7.7	0.978	442.3	20.3	8.2	0.496	659.4	20.0	8.5
Education and it's appurtenances and private lessons	before	1.326	558.9	33.4	13.9	1.466	1121.5	37.9	18.2	0.726	1116.6	26.6	13.0
	during	1.564	350.4	24.0	9.2	1.542	553.0	25.4	10.2	1.065	597.0	18.1	7.7
Necessary monthly expenses	before	0.717	406.6	24.3	10.1	0.906	584.8	19.8	9.5	1.396	1067.8	25.4	12.4
	during	0.805	402.4	27.5	10.6	1.095	572.8	26.3	10.6	1.111	1091.7	33.2	14.0
Total spending on the non-food groups	before	1.054	1671.0	100	41.6	1.243	2955.3	100	47.9	1.023	4197.0	100	48.8
	during	1.209	1460.8	100	38.3	1.306	2181.0	100	40.3	1.097	3290.3	100	42.3
Total monthly family spending	before	4017.5			100	6165.1			100	8592.3			100
	during	3814.0			100	5415.0			100	7770.2			100

Source: The results of the research sample data in Gharbia Governorate.

Figure (6). The relative importance of each commodity group in total household expenditure on food and non-food commodity groups in the urban areas in the first category

B- Second income category (5000 < 9000 L.E) in the urban areas of the governorate:

The table (3) shows that the expenditure flexibility of the groups of fruits, oils, meats and dairy products was less than 1 before and during the pandemic, so the families in this category approach the partial saturation level of these goods as the commodities in these groups represent semi necessary ones, as for the expenditure elasticity groups of other food and non-food commodity, the clothes, education it was more than 1 before and during the pandemic as it represents luxurious goods, which shows the lack of saturation with such goods for the families in this category in urban areas. Moreover, the expenditure elasticity of the both groups of cereals and their products and vegetables indicates that they are necessary goods before and during the pandemic, which means the increase of the saturation level of both, while the sugar and tobacco group changed from necessary commodities before the pandemic into luxurious commodities during the pandemic, nevertheless. It has also been shown that the expenditure flexibility of the health care and detergents group has changed from luxurious commodities before the pandemic into semi necessary commodities during the pandemic, which indicates the lack of saturation with the commodities in this group for the families before the pandemic. As for the groups of essential monthly expenses, means of transport and means of communication it has been converted from semi necessary commodities before the pandemic into luxurious commodities during the pandemic.

Figure (7): shows the increase of the relative importance in the urban for the **second** income category of fruits and meats and dairy products, cereals and their products, vegetables, sugar and tobacco, healthcare and detergents, the essential monthly expenses and means of communication of the total household expenditure from 9.6%, 46.8%, 10%, 9.6%, 7.6%, 11.9%, 19.8%, 8.8% before the virus to reach 12%, 48%, 10.2%, 11.5%, 10.5%, 20.3%, 26.3%, 12.3% respectively during the widespread of the pandemic. While the relative importance of the expenditure of oils, food and non-food commodity, the clothes, education and means of transport decreased were about 3.5%, 12.7%, 3.5%, 4.1%, 37.9%, 14% from the total household expenditure before the pandemic to reached 2.9%, 4.8%, 2.5%, 2.2%, 25.4%, 11.1% respectively during the pandemic.
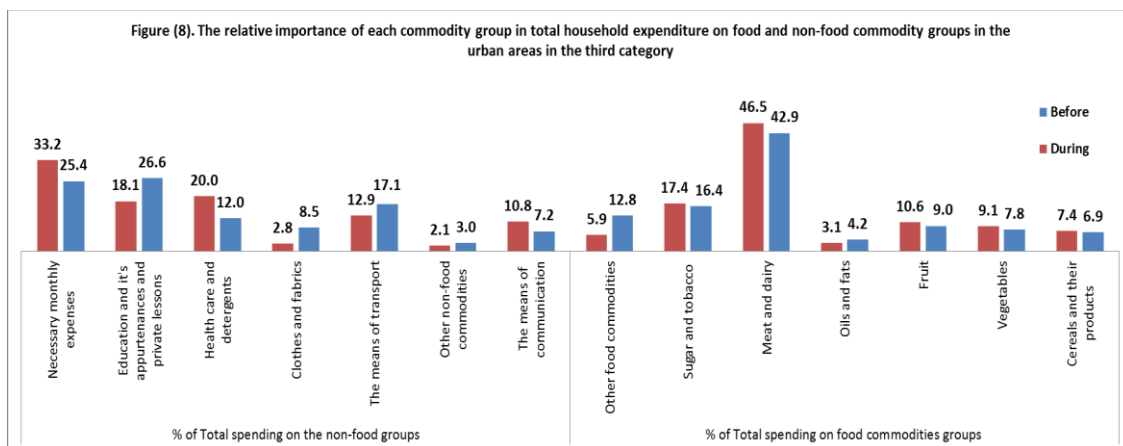

Figure (7). The relative importance of each commodity group in total household expenditure on food and non-food commodity groups in the urban areas in the second category
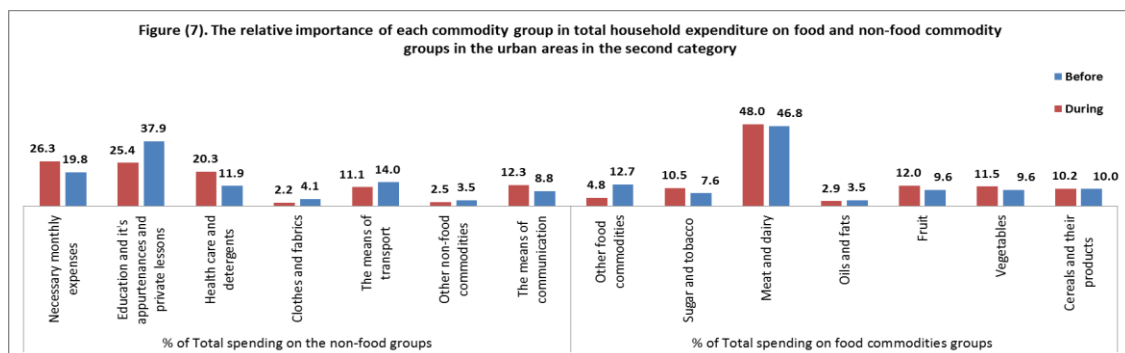
C- Third income category (more than 9000 L.E) in the urban areas of the Governorate:

From table no. (3) it's clear that the expenditure elasticity of the groups of cereals and their products, vegetables, fruits, meats dairy products was less than 1 before and during the pandemic, so the families of this category in the urban areas approach the partial saturation level where they represent semi necessary commodities before and during the pandemic. Based on the same table it's also clear that the expenditure elasticity of the groups of sugar, tobacco, other food commodities, means of communication, clothes in addition to the essential monthly expenses was more than 1 before and during the pandemic, so these commodity groups are classification as luxurious commodities, it can be noticed from the expenditure elasticity of the groups of oils, means of transport and education that the commodities in this groups has changed from semi necessary commodities before the pandemic into luxurious commodities during the pandemic, while the expenditure

flexibility of the health care and detergents group as well as the other non-food commodity group as it has changed from semi necessary commodities into necessary commodities, so it's saturation percentage increased during the widespread of the corona pandemic.

  Figure (8): Indicates on the increase in the relative importance of the household expenditure in the urban for the **third** income category of each of the groups of cereals and their products, vegetables, fruits, meats dairy products, sugar and tobacco, means of communication, essential monthly expenses and health care and detergents is about 6.9%, 7.8%, 9%, 42.9%, 16.4%, 7.2%, 25.4%, 12% of the total household expenditure before the widespread of the pandemic to reached 7.4%, 9.1%, 10.6%, 46.5%, 17.4%, 10.8%, 33.2%, 20% respectively during the widespread of the pandemic, while this percentage decreased for other food commodities, clothes, oils, means of transport, education and other non- food commodities is about 12.8%, 8.5%, 4.2%, 17.1%, 26.6%, 3% before the pandemic to reached 5.9%, 2.8%, 3.1%, 12.9%, 18.1%, 2.1% respectively during the pandemic.

Figure (8). The relative importance of each commodity group in total household expenditure on food and non-food commodity groups in the urban areas in the third category

D- The total food and non-food commodity groups of the total household expenditure in the urban areas in the three categories:

  Figure (9): shows the relative importance of the total monthly household expenditure in the **urban** in the three income categories for the food and non-food commodity groups, as it shows an increase in the total expenditure on the food commodities group in the first, second and third income categories from about 58.4%, 52.1%, 51.2% before the pandemic to reach 61.7%, 59.7%, 57.7% respectively, of the total household expenditure during the spread of the Corona pandemic. While the relative importance of total spending on the group of non-food commodities in the **urban** in the three income categories decreased from about 41.6%, 47.9%, 48.8% of the total household spending before the pandemic, to reach 38.3%, 40.3%, 42.3% respectively, during the Corona pandemic.

Figure (9). The relative importance of the total food and non-food commodity groups of the total household expenditure in the urban areas in the three categories
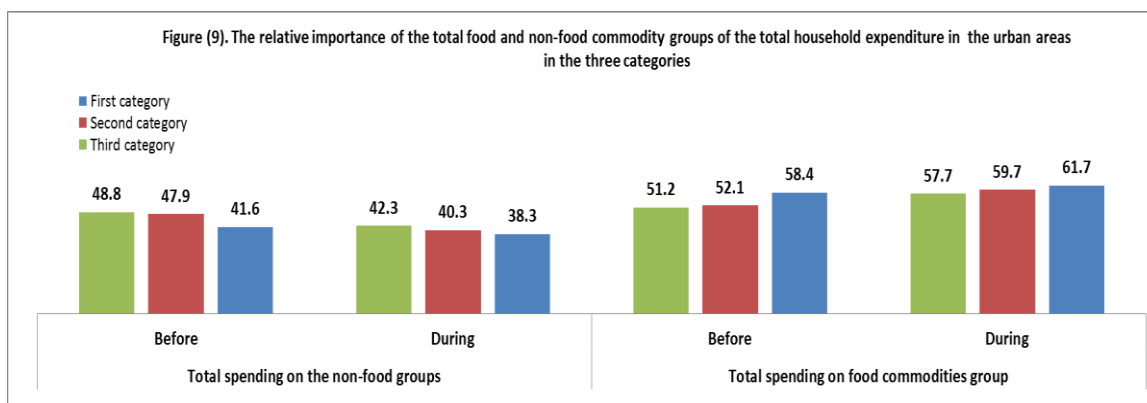
VII.   CONCLUSION OF DISCUSSION

The research aimed to study the behavior of households in rural and urban areas in Gharbia Governorate by estimating the functions and expenditure elasticity of 14 groups of food and non-food commodities before and during the outbreak of the novel corona virus pandemic, and follow-up on changes in consumer spending for each commodity group since the outbreak of COVID-19.

The research relied on both descriptive and quantitative statistical analysis methods this is done by using some statistical analysis tools, as the estimation of the expenditure functions of the different food and non-food commodity groups, before and during the outbreak of the Corona virus pandemic, by the expenditure-expenditure method. The estimate was done using the statistical analysis program SPSS. The functions under study were estimated in the double algorithmic.

The primary data was collected using a multi-stage stratified sample questionnaire, which consisted of two phases, the first is a random sample and the second phase is a purposive sample of the study population. The study includes 2 periods the first period is that before the appearance of corona pandemic from (1\2\2019 - 31\1\2020) and the second one is during the widespread of corona pandemic from (1\2\2020 -31\1\2021).

In determining the relative importance of the number of families and population, two centers in Gharbia Governorate (Al-Mahalla Al-Kubra Center, Tanta Center), were selected for about 192, 192 families out of 384 views, for three income categories of households in rural and urban areas. The first category (less than 5000 L.E) includes 52 families, the second category (5000 to less than 9000 L.E) is about 30 families, and the third category (greater than 9000 L.E) includes 28 families in the countryside, while the number of families in urban areas 170, 64, 40 families of income groups, respectively.

It was found that the groups most affected by the Corona epidemic are those who work in professions with unfixed wages, representing 60.9% of the total number of families in the sample, which amounts to 384 families. The absence of a family member from work at 31% of the total sample, in addition to imposing precautionary measures, some family members stopped working, reduced demand for activity, reduced wages, and reduced working days, and working hours and irregular work, while some families dealt with this decrease through some necessary measures such as: the curtailment of some non-essential goods when their prices rise, some families also depended for their consumption on what that could be grown or what they raise at home or obtain support from the Egyptian government during work stoppage, representing about 74.4%, 55.7%, 3.1%, respectively of the total sample.

By studying the elasticity of spending using the double logarithmic picture to estimate the relationship between the total monthly household expenditure and the expenditure of each group (14 groups) of food and non-food commodities in rural and urban areas in governorate of Gharbia before and during the spread of the Corona pandemic. Where the value of the expenditure elasticity coefficient in the rural sample in the third category showed that the group of meat and dairy products is classified as necessary goods before and during the pandemic, while the semi- necessary goods in the rural sample before and during the Corona pandemic in the first category, which include (groups of grains and their products, vegetables, oils, meat and dairy products, means of communication, means of transportation, education, and basic monthly expenses), for the second category includes (groups of grains and their products, vegetables, means of transportation and necessary monthly expenses), while the third category was (groups of grains and their products, vegetables, fruits, means of communication and means of transport). While the groups classified as luxurious goods before and during the Corona pandemic were the groups of sugar, tobacco and other food commodities in the first category, while in the second category were the luxurious goods groups of sugar, tobacco, other food commodities and education, in the third category were the groups of oils, sugar, tobacco, clothing and other food and non-food commodities.

One of the most important results of the research is the conversion some commodities from **luxurious commodities into semi necessary commodities** during the wide spread of the pandemic in the sample of the rural areas, where in the first category these commodities were (the 2 groups of fruits and health care and detergents), while the second category includes (the 2 groups of oils and means of communication) and the third category includes (the 2 groups of fruits and health care and detergents). Meanwhile, the commodities turned from **semi necessary commodities** into **luxurious commodities** during the pandemic in the first and second categories in the clothes and fabrics group and the other non-food commodities group, the commodities turned from **necessary commodities into semi necessary commodities** during the pandemic in the third category in the education group, while the commodities that turned from **semi necessary commodities into necessary**

commodities during the pandemic were the groups of fruits, meats and dairy products and health care and detergents in the second category.

In rural areas sample, the relative importance of monthly household expenditure increased during the epidemic in the three income categories for each commodity group, namely vegetables, fruits, meat, dairy products, means of communication, basic monthly expenses, health care, detergents, sugar and tobacco, while the relative importance of the groups of grains and their products, transportation, education, other food and non-food commodities, clothing and fabrics decreased, the group of oils increased during the pandemic in the first category and decreased in the second and third categories.

From the value of the expenditure elasticity coefficient in the second category of the urban sample, it was found that the two groups of grains and their products and vegetables are classified as necessary commodities before and during the pandemic, in the first category were semi-necessary commodities before and during the pandemic (groups of grains and their products, vegetables, fruits, oils, meat, and dairy products, transportation, and basic monthly expenses), while the second category includes groups of fruit, oils, meat and dairy products were the third category and include groups of grains and their products, vegetables, fruits, meat and dairy products. While the groups classified as luxurious goods before and during the pandemic in the first category were sugar, tobacco and other food commodities, clothing and education, while in the second category were clothing, education, other food and non-food commodities groups, and in the third category were sugar, tobacco, other food commodities, means of communication, clothing and basic monthly expenses.

In the urban sample, luxurious goods converted to semi necessary goods during the epidemic, health care and detergents were in the second category. While goods that converted from semi- necessary to luxurious goods, it includes commodities during the pandemic in the first category (the group of other non-food commodities, means of communication, health care and detergents), while the second category includes (groups of basic monthly expenses, means of transportation and means of communication), and the third category (groups of oils, means of transportation and education). While the commodities of the second category of the sugar and tobacco group were transformed from necessary goods to luxurious goods during the Corona pandemic. As for the commodities that were transformed from semi- necessary goods to necessary goods during the pandemic, they were in the third category of the health care group, detergents and the group of other non-food goods.

As it turned out, the increase in the relative importance from the total household expenditure in the three income categories of the sample of the urban areas for the groups of the cereals and their products, vegetables, fruits, meats, dairy products, means of communication, essential monthly expenses, health care and detergents, while the relative importance decreased of the groups of oils, means of transport, education, other food and non-food commodities, clothes and fabrics, as it was decreased the relative importance of the expenditure on the sugar and tobacco group decreased during the pandemic in the first category and increased in the second and third categories in the sample of the urban areas in Gharbia Governorate.

Recommendations:

1. We find a sudden and continuous significant decrease in expenditures during the period during the Corona pandemic for non-food commodities in exchange for increased expenditures on food commodities especially for fresh commodities of fruits and vegetables and spend more time at home for meals and less food in restaurants.
2. The consumption behavior of the family must be taken into account in proportion to its total income in light of the Corona pandemic and the high prices of some commodities.
3. Families should take care of healthy foods that strengthen the immune system.
4. The necessity of conducting future studies on external shocks such as the Corona pandemic and its impact on the economic and social conditions of low-income families.

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