

GIS-Supported Assessment of Consumption Habits in Different Periods due to COVID-19

Burcu YILMAZEL, Eskişehir Technical University, Faculty of Engineering, Department of Computer Engineering, byurekli@eskisehir.edu.tr, Eskişehir, Türkiye, ORCID: 0000-0001-8917-6499

Müzeyyen Anıl ŞENYEL KÜRKÇÜOĞLU, Middle East Technical University, Faculty of Architecture, Department of City and Regional Planning, senyel@metu.edu.tr, Ankara, Türkiye, ORCID: 0000-0002-9423-6932

Mehtap ÖZENEN KAVLAK, İstanbul University, Faculty of Open and Distance Education, Department of Geography, mehtapozenen@eskisehir.edu.tr, İstanbul, Türkiye, ORCID: 0000-0002-5369-4494

Ahmet DABANLI, Başarsoft Information Technologies Co., ahmet@basarsoft.com.tr, Ankara, Türkiye, ORCID: 0000-0002-6818-3662

Tuncay KÜÇÜKPEHLİVAN, Başarsoft Information Technologies Co., tuncay@basarsoft.com.tr, Ankara, Türkiye, ORCID: 0000-0001-9054-5984

Arif Furkan MENDİ, HAVELSAN A.Ş., furkanmendi@gmail.com, Ankara, Türkiye, ORCID: 0000-0002-0750-4012

Hasan Tolga ÜNAL, HAVELSAN A.Ş., htunal@havelsan.com.tr, Ankara, Türkiye, ORCID: 0009-0008-6254-0885

Saye Nihan CABUK, Eskişehir Technical University, Institute of Earth and Space Sciences, Geodesy and Geographical Information Technologies Department, sncabuk@eskisehir.edu.tr, Eskişehir, Türkiye, ORCID: 0000-0003-4859-2271

Abstract

The rapid advancement of information and communication technologies has deeply integrated the internet into everyday life, notably transforming shopping habits towards increased online activity. The onset of the Covid-19 pandemic in late 2019 significantly changed consumer behavior and consumption patterns, with the pandemic's spread and government-imposed social distancing measures driving a shift to online shopping. Retailers responded by enhancing their online order handling capabilities, expanding the reach of online shopping. This study investigates the impact of the COVID-19 pandemic on online shopping habits using Geographic Information Systems (GIS), spanning three phases: the pre-pandemic period (10 February 2020 - 1 August 2020), the peak pandemic restrictions, and the "new normal" phase of eased restrictions. Focused on Ankara's online market data, the research compares online shopping trends across these periods. Results align with existing literature, showing an increase in online shopping during the pandemic, with a decline following the relaxation of restrictions. Higher socioeconomic status (SES) groups showed a greater propensity for online shopping, while lower SES groups spent a larger share of their shopping on food. Notably, the highest SES group, Group A, spent 5.94% of their GDP on shopping during the P2 period, with 85% of this expenditure on food, highlighting a stark contrast with other SES groups.

Keywords: Covid-19, Pandemic, Consumer Behavior, Online Shopping, GIS

1. Introduction

Infectious diseases have been affecting humans for a very long time. The type of plague known as the "Black Death", which started in China in the 14th century and spread to the world, is the first global epidemic in human history and caused the death of approximately seventy-five million people. After the Black Plague, the Plague of Seville came, and two million people died between 1647 and 1652. The Spanish Flu caused approximately one hundred million deaths between 1918-1920, and the Asian Flu caused two million deaths between 1957-1958 (Alfani & Murphy, 2017; Jordà, Singh & Taylor, 2020). Declared as a pandemic by the World Health Organization on March 11, 2020, Covid-19 emerged in the Wuhan region of China and spread all over the world. As of May 2021, when this study was completed and vaccination studies were intensified, the total number of cases caused by Covid-19 worldwide exceeded one hundred and seventy million people, and the number of deaths exceeded three and a half million (Worldometer, 2020). The top three countries in epidemic losses are the United States (USA) with approximately six hundred thousand people, India with about three hundred thousand people, and Brazil with about five hundred thousand people.

Although epidemics cause large-scale human losses and permanent health problems, like all natural disasters, they also come to the fore with their economic effects that occur later than other disasters due to the speed of spread of the epidemic. The Covid-19 epidemic, on the other hand, is a multidimensional systemic economic crisis in which demand, supply and financial shocks occur simultaneously (Voyvoda & Yeldan, 2020). While loss of life and permanent health problems caused loss of workforce and human capital, the measures taken and especially the failure of people to enter social environments to protect themselves caused serious macroeconomic problems (Boissay & Rungcharoenkitkul, 2020; McKibbin & Fernando, 2021). The Covid-19 pandemic has profoundly affected economic indicators such as inflation, growth, unemployment, wages, stock market indices, interest rates and exchange rates by creating supply and demand shocks. The financing of the measures taken by the governments and the negative effects on the public budget reinforce the effects of the epidemic negatively (Didier, Huneus, Larrain & Schmukler, 2021). Despite all the measures taken, the economies of many countries have not yet returned to their pre-epidemic levels. One of the reasons why the Covid-19 pandemic is so important to economic performance is its effects on consumer behavior. Due to Covid-19, consumers' daily activity flows have changed as well as their purchasing behavior (Gopinath, 2020; Kaur, 2020). One of the most important of these changes is the intensification of online shopping in general (although there are differences between countries) during the Covid-19 period (Bhatti vd., 2020; Hashem, 2020; Koch, Frommeyer & Schewe, 2020; Leone et al., 2020; Safara, 2020). In April 2020, when social lockdowns were at their highest due to Covid-19, online shopping increased by 96 percent globally, or nearly doubled (Hottenroth, 2020). As one of the world's leading online shopping sites, Amazon's sales in 2014 were only 82.73 billion USD, while its 2020 sales reached 386 billion USD (Kantar, 2020). In addition to the compulsion of curfews, consumers' desire to protect themselves from the contagious effects of the virus and the traditional advantages of online shopping were also effective in this increase. The fact that traditional shopping venues took measures to adapt to online shopping in a short time and the expansion of online platforms also strengthened this trend (Naseri, 2021).

The Covid-19 outbreak has directed customers to online services to provide essential products necessary for the continuation of daily life (Dannenberg, Fuchs, Riedler & Wiedemann, 2020). In the first days of the epidemic, especially the demand for food and health products increased excessively, the limits of credit cards were forced and even stockpiled by borrowing (Baker et al., 2020), the demand for non-essential and luxury goods decreased (Roggeveen & Sethuraman, 2020; Stanciu, Radu, Sapira, Bratoveanu & Florea, 2020). A survey of 961 respondents to reveal food and grocery shopping behaviors in China in January-February 2020 showed that online shopping increased from 11% to 38%, with customers having higher demand for vegetables, rice and meat in the early stages of the epidemic (Li, Hallsworth & Coca-Stefaniak, 2020). A study conducted in the Netherlands revealed that there was an increase in the frequency of purchases of durable foods and frozen products during the closure, and there was no significant change

in the purchases of fruit, vegetables, fish, sweets, snacks and beverages (Poelman et.al., 2021). It reveals that in the first three months of the beginning of the epidemic, food and supermarket expenditures in online shopping in Turkey are the area that has changed the most with an increase of 420% compared to 2019 (e-ticaret, 2020). Güven (2020), underlined the 200% increase in total between March and May 2020 in online shopping in Turkey, and referred to the Pay TR February-March 2020 data to report the increasing demands for different product categories, and said 186% in grocery category, 168% in health, stated that there was an increase of 108% in cosmetics, 69% in books/stationery products and 42% in dried nuts. In the study of Danışmaz (2020), it was found that 64.5% of the participants preferred online shopping during the Covid-19 epidemic in Turkey, the most preferred products were food (61.5%), medical products (8%) and cleaning materials (7%) and clothing and cosmetics are less preferred.

The aim of this study is to evaluate the consumption habits in different periods due to Covid-19 in Turkey with the support of GIS. In this context, the online shopping trends of the people living in the neighborhoods and regions of Ankara with different socioeconomic status during the pandemic period were analyzed. The limited number of studies on the subject specific to Turkey shows that the study is qualified to fill this gap.

2. Material and Method

The characteristics of the study area and the materials and methods used in the study are explained in this section.

2.1. Study area

Ankara, the capital city of the Republic of Turkey, is located in the northwest of the Central Anatolian Region, between 39 and 57' north latitude and 32 and 53' east longitude (Fig. 1). The area of the city is 25706.00 km² and there are 25 districts, 1 metropolitan municipality, 25 district municipalities and 1432 neighborhoods in Ankara (T.C. Ankara Valiliği, 2021a, 2021b). Although it is the largest city in the Central Anatolia Region, it is the second most populous city in Turkey with a population of 5,663,322 according to 2020 data (T.C. Ankara Valiliği, 2021a). The city has a very long history. The first periods of the growth of the city after it became the Capital showed a typical example of modernization and in the following periods, it expanded uncontrollably with the emergence of slum areas similar to other developing regions of the world (Batuman, 2013). This situation has led to the presence of settlement areas with very different socio-economic structures within the city and to diversity in terms of demographics.

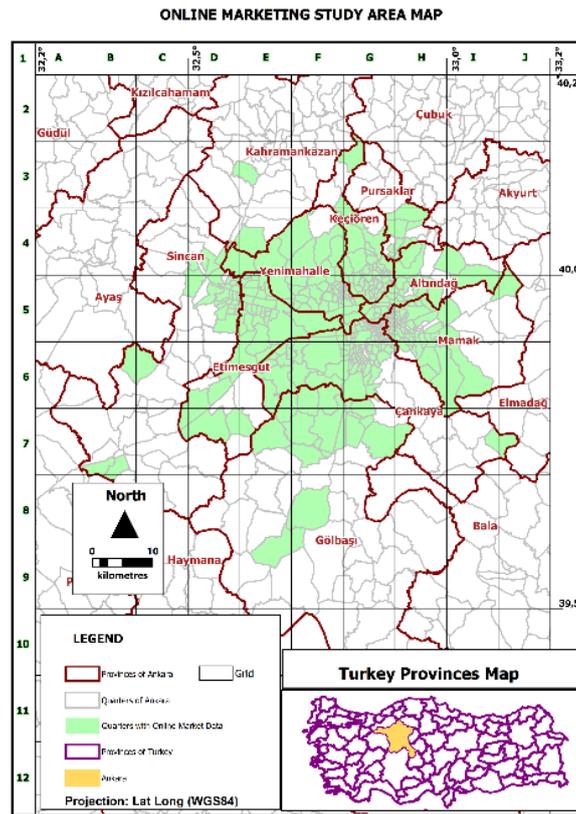


Figure 1. Study area, neighborhoods, districts, and online ordering areas

2.2. Material

Within the scope of this study, Ankara province online market shopping data obtained from Marketyo, which is one of the companies operating in many different provinces of Turkey, which provides multi-channel marketing and e-commerce solutions for local market chains, brings together customers and these markets, is based on. The main feature of the provided data is that it includes three different time periods in which the effects of the Covid-19 outbreak on online grocery shopping can be observed. These time zones are:

- (1) "Period-1", the one-month period before the official announcement of the first Covid-19 case in Turkey on March 11, 2020, the pre-pandemic period between February 10, 2020 - March 11, 2020,
- (2) "Period-2", a month-long period of intense restrictions (school closures, curfews and bans, working from home, distance rules, etc.) after the first Covid-19 case was seen, is the pandemic between March 11, 2020 - April 11, 2020 period,
- (3) "Period-3", which is the one-month period in which the normalization started with the reduction of restrictions, covers the "new normal" period between 1 July 2020 and 1 August 2020.

The structure of online grocery shopping data consists of a set of online order information. Each online order is identified by a unique number and includes information about the customer number, date of the order, the region where the order is located, and the total amount of the order. An example order record is shown in Table 1. According to this table, online order number O123: On March 20, 2020, C1000 was ordered by the customer, delivered to the 100. Yıl neighborhood of Çankaya district in Ankara, and the customer paid 125 TL.

Table 1. Example of Online Order Registration

Order ID	Order Date	Customer ID	Province	Sub Province	Quarter	Order Amount (TL)
O123	20-03-2020	C1000	Ankara	Çankaya	100. Yıl	125
O124	20-03-2020	C3000	Ankara	Mamak	Akdere	75
O125	20-03-2020	C5000	Ankara	Keçiören	Ayvalı	320
O305	06-07-2020	C1000	Ankara	Çankaya	Alacaatlı	240
O306	06-07-2020	C7000	Ankara	Sincan	Fatih	450

For each online order, the information of the products purchased by the customer in the relevant order is also included in the data as a transaction. In other words, for the shopping cart identified by a unique transaction number, information about the products in that cart (product code, category and unit price, the amount purchased by the customer and the total price paid for that product) is also available. An example set of operations is shown in Table 2. According to this table, online order O123 contains three products with order number T123, which are PC4000, PC1000, and PC1010.

Table 2. Example of operation set

Transaction ID	Order ID	Product Code	Product Category	Amount	Unit Price	Total Price
T123	O123	PC4000	Meat & fish	1	80	80
T123	O123	PC1000	Fruits and vegetables	5	5	25
T123	O123	PC1010	Cleaning product	2	10	20
T124	O305	PC3000	Cosmetics	4	50	200
T124	O305	PC1030	General food	5	8	40

These raw data were passed through the pre-processing stages and data extraction was made in accordance with the purpose of the study. First of all, considering the order dates, the data was divided into three periods (according to the time intervals specified above) and total expenditures were extracted for each period. Then, the data were separated on the basis of districts and neighborhoods and the total expenditures for each district/neighborhood were found. In addition, purchased products are marked as food and non-food according to product categories, and food and non-food expenditure amounts for each order are calculated on a district and neighborhood basis.

Socio-Economic Status (SES) data regarding the socio-economic characteristics of the area were also used within the scope of the study.

Socioeconomic status is the social standing or class of an individual or group. It is often measured as a combination of education, income and occupation. Socioeconomic status is typically broken into three levels (high, middle, and low) or six groups with the names A, B, C1, C2, D, E. Of course, the general characteristics of these groups vary according to each country.

In this study, TUIK SES Status data is used; each neighborhood/quarter area has a SES Class. There are 6 classes in this data, and these classes are considered A as top, B as lower top, C1 as upper middle, C2 as lower middle, D as low, and lastly E as the lowest.

2.3. Method

Within the scope of this study, online orders during COVID periods, socio-economic status of neighborhoods, and geographic distribution of orders by neighborhood were analyzed using MapInfo Pro 2019 64-bit version GIS program.

Online order data has been transferred to digital media by mapping the address according to the name of the district and neighborhood. Columns for the neighborhood name and district name of each record (in order not to mix neighborhoods with the same name in different districts) were matched with the district and neighborhood name in the geographical neighborhood table, and each record was transformed into a geographical point (Fig. 2).

ANKARA NEIGHBOURHOODS ONLINE SHOPPING STUDY AREA MAP

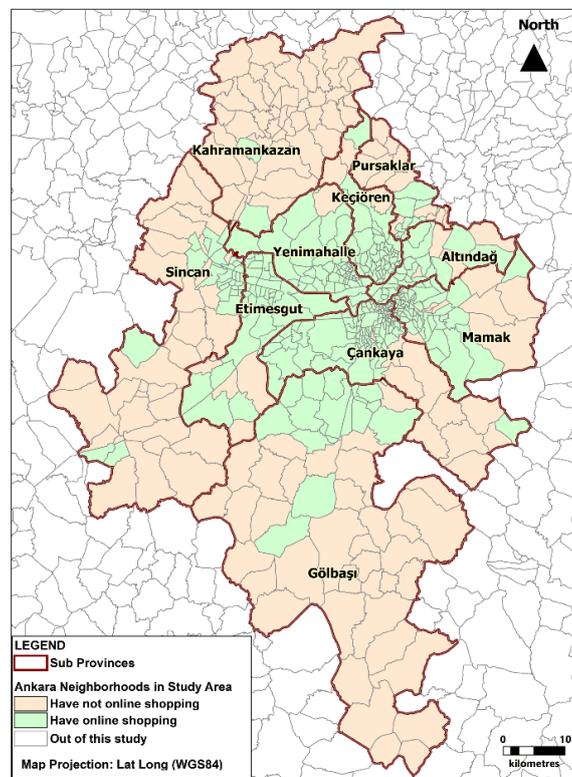


Figure 2. Neighborhoods, districts, and online order points

Fig. 3 shows the neighborhood-based thematic representation of Ankara SES data. In this map, the province of Ankara was coded by dividing the map from A-J from West to East and 1-12 from North to South in order to be able to analyze.

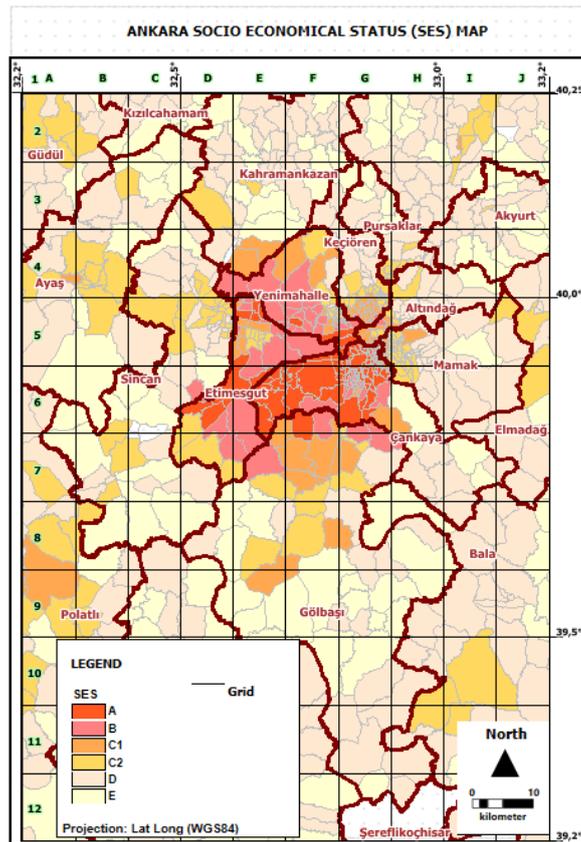


Figure 3. Neighborhood based thematic representation of Ankara SES data

2.3.1. Geographical Distribution and Changes of Order Quantities and Quantities by SES Group

After the geographical matching of the neighborhood SES data and the order data, analyses of the neighborhood, SES group, population distribution, and order quantities became possible. The total population of the SES group, the total population of the places ordering, and the distribution of the orders according to the population of the SES group could be calculated.

The geographical distribution of food sales in different periods is given in the left section of Figure 4. The results are given below.

- Ankara distribution in Period 1 (P1): It is seen that E4, E5, E6 and F6 protrude in total food sales.
- In Period 2 (P2), orders increased in all Ankara, and D6, E4, E5, E6, F5, F6, G5, G6, H4, H5 regions stood out as the regions with the highest total food sales.
- In Period 3 (P3), it is seen that the orders in Ankara decreased compared to P2 and increased compared to P1. Regions E4, F4, E5, E6, F6 are the places with the highest food sales in this period.

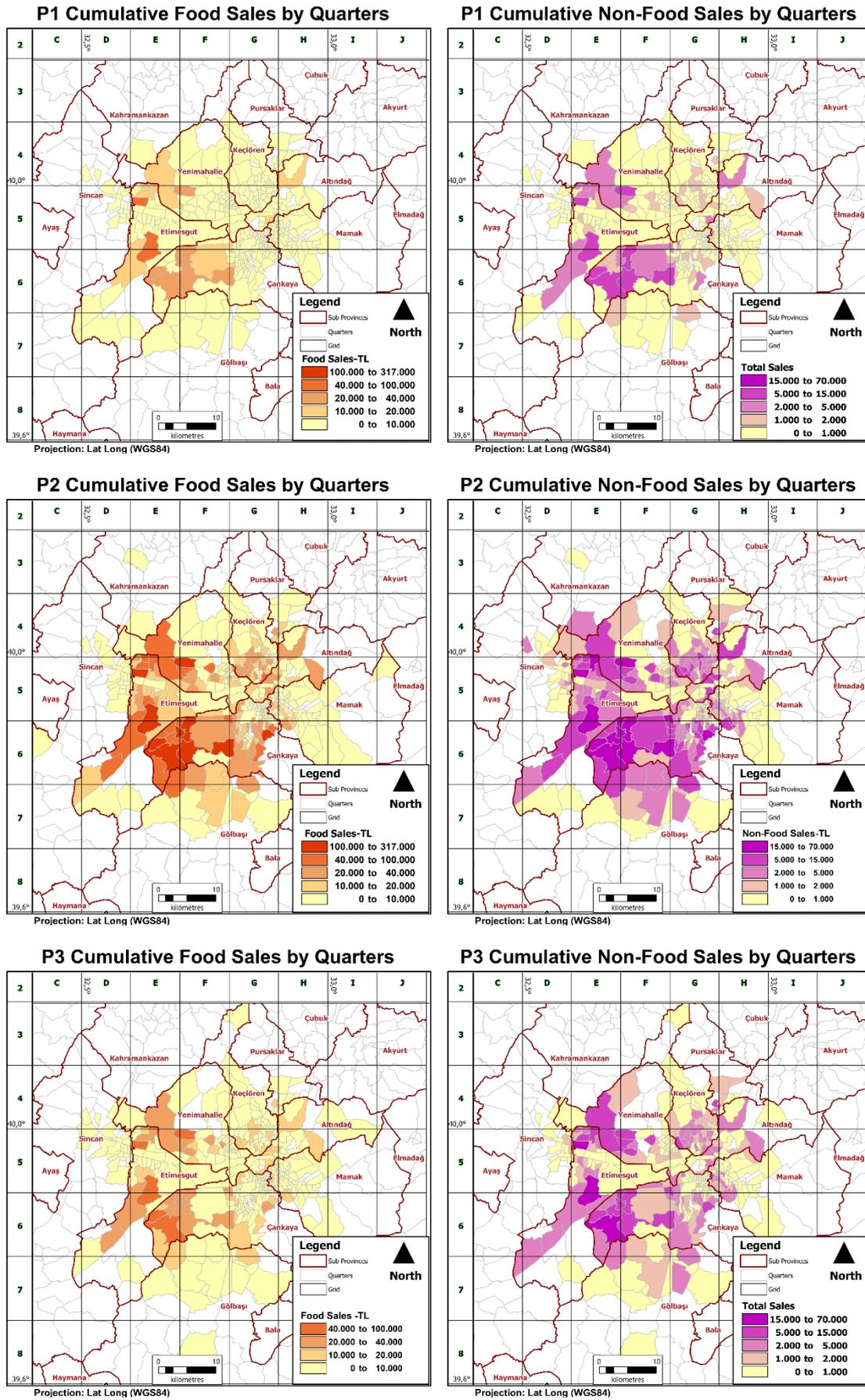


Figure 4. Geographical distribution of total food (left) and non-food (right) sales in TL terms

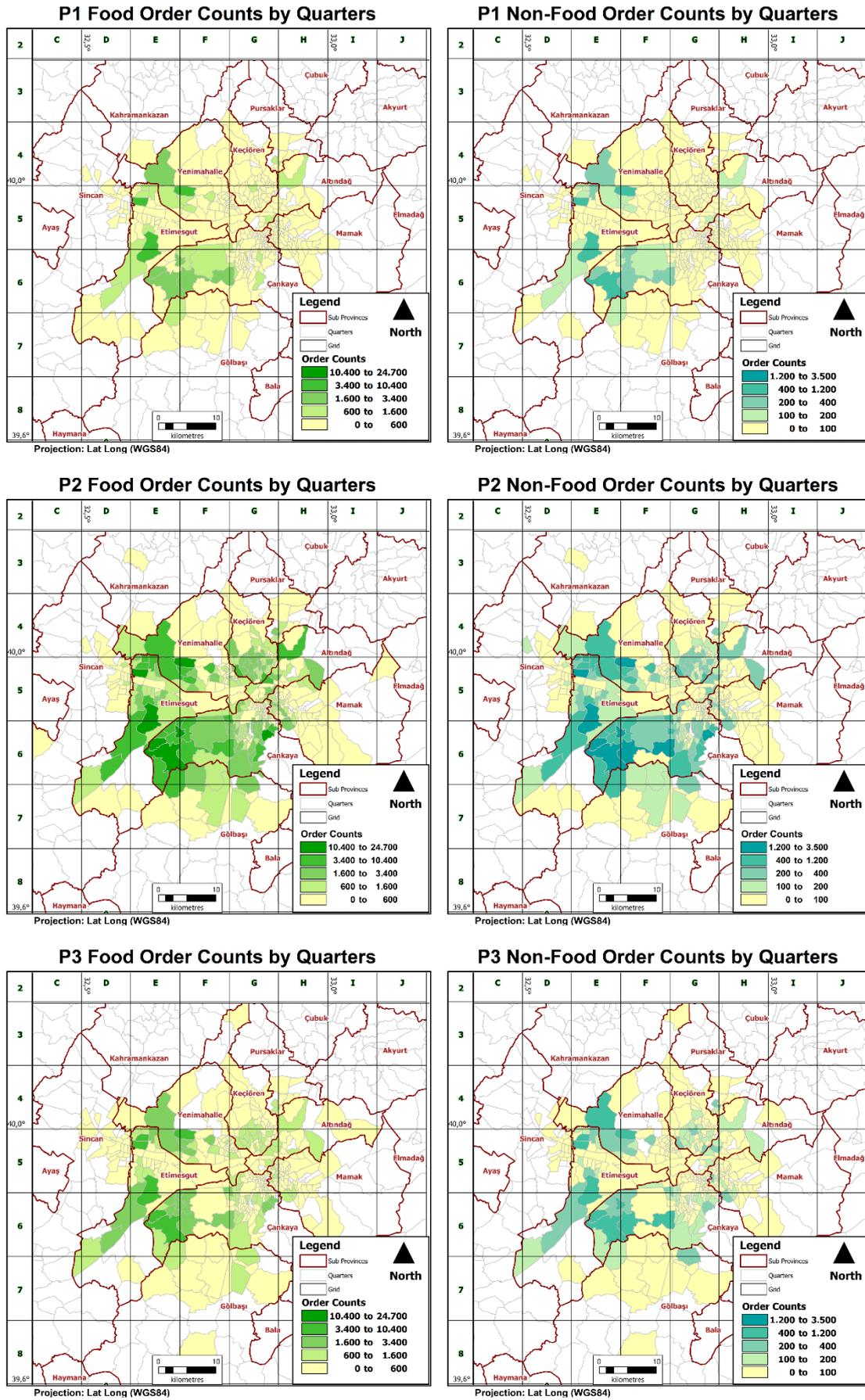
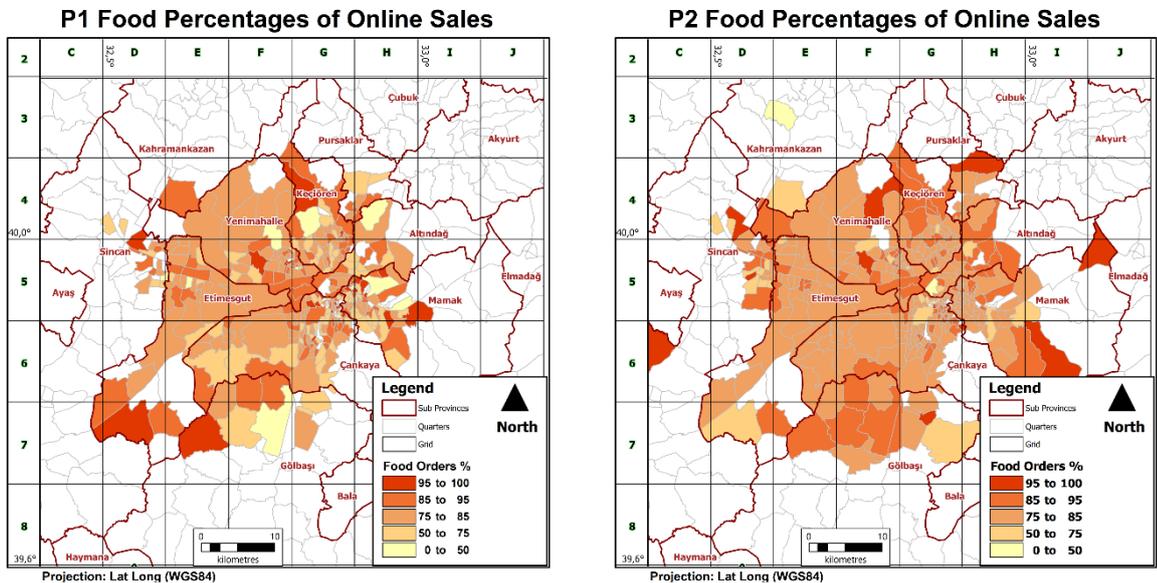


Figure 5. Geographical distribution by food and non-food sales order counts

Geographical distribution of Non-Food sales is given in right section of Fig. 5. The results are given below.

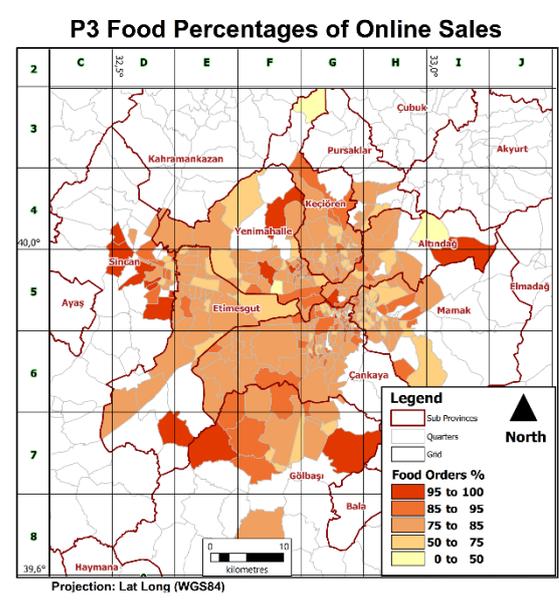
- Non-food sales were at a very low level throughout Ankara in the P1 period,

- Non-food sales also increased in regions where food sales increased in the P2 period,
- It is observed that non-food sales in the P3 period decreased compared to P2, but increased compared to P1. It is noteworthy that the areas where non-food sales increased in the P3 period were similar to the areas observed in food sales.



a) Period 1

b) Period 2



c) Period 3

Figure 6. Percentage and geographic distribution of food orders in total order quantity

The geographical distribution of food and non-food sales orders is given in Figure 6. The results are given below.

- The distribution in all periods is in accordance with the order quantity and comes from similar places,
- P1, P2, P3 changes are seen to be like each other.

The geographical distribution of the ratio of food orders to total orders is given in Figure 7. It is seen that the food order percentage (GSY) is high in each period.

Compared to the first period, the increase in the ratio of food orders to total orders in the second period was both spatially widespread and increased in value. When it comes to the third period, it is seen that the spatial spread in the proportional increase is still higher than the first Period, but it has decreased compared to the second Period.

Places with low GDP value in P1, Ankara city center (G5) and some industrial zones (F4, D5, G7) differ from their surroundings in online orders. It is thought that the reason for this is that it is easier to shop without ordering online due to the variety of facilities in Kızılay.

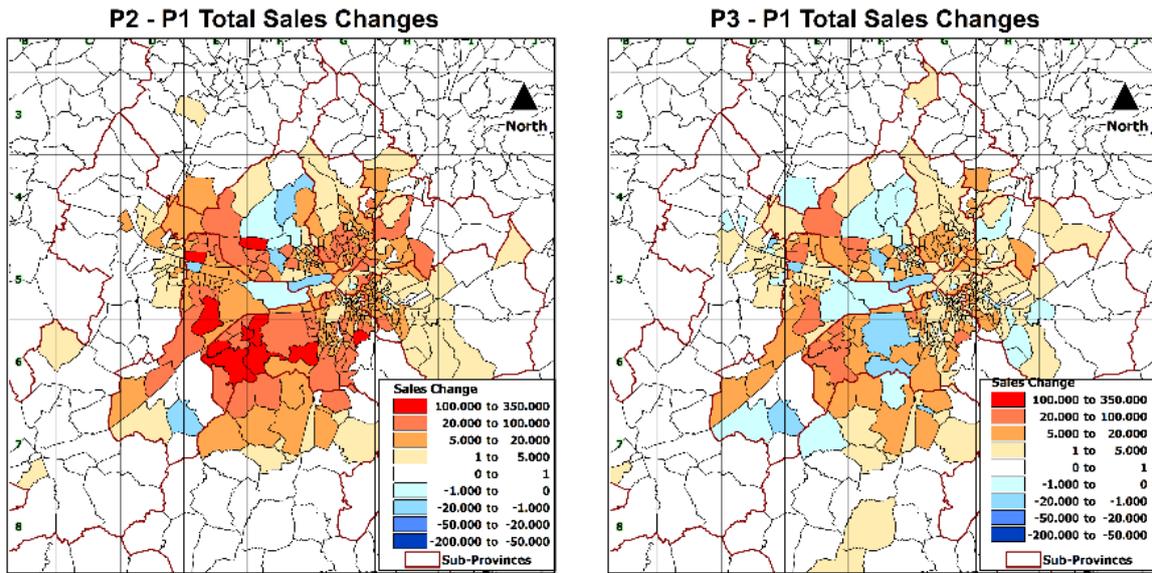
In P2, on the other hand, it is seen that orders placed online have increased due to the closure in the city center of Ankara (the G5 region with the most residential population). However, it is noteworthy that the online order rates (F4, D5, G7) in industrial zones have a lower percentage than in P1. It is thought that the reason for this is that people cannot go to work due to the full closure within the scope of Covid-19 measures.

In addition, a clear change is observed in the G5 (Kızılay) region and industrial zones. It is noteworthy that in the city center online orders decreased in P3, whereas in industrial areas, on the contrary, online orders increased in P3 (more orders than P1). It is thought that the reason for this is that some places in the industry were closed after the closure or the increasing orders with the psychology of the pandemic. Based on this, when the ordering habits of people are evaluated on the basis of the pre-Covid-19 period and the post-Covid-19 periods, it is concluded that more online orders are given compared to the previous periods (P1), but traditional shopping methods are still preferred.

Compared to the SES level of P2 and P1 online order increases, it can be safely said that those with higher SES in P2 order more online (Figure 8-a).

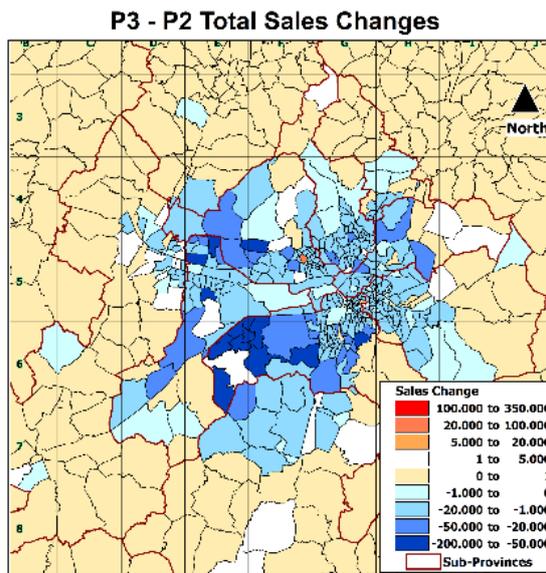
When the online order changes (P3-P1) of the P3 and P1 periods are compared with the SES level, it is seen that the regions with higher SES level continue to have high online orders despite the decrease in online orders. Despite this, it is also striking that there are differences between regions with similar SES levels. Although many areas of Çankaya and Yenimahalle have similar SES values, the west and east of these districts differ from each other in online ordering (Figure 8-b).

After P2, there was a significant decrease in online orders in P3, and orders in regions with higher SES values fell at a higher rate (Figure 8-c). While some areas are still observed where P3 orders are still higher than P2 in the urban fringes, orders in the city center have dropped drastically.



a) P2/P1

b) P3/P1



c) P3/P2

Figure 8. Geographical distribution of online order variation between periods

2.3.2 Order, Population, Amount, and Percentage Distributions and Changes by SES Group

According to the findings of the study, it is understood that as the density of settlement in a neighborhood increases and the SES level of those living in that neighborhood increases, the online order rates also increase, and online orders are realized at low rates in neighborhoods with low rural populations.

Table 3 shows that more than 90% of the population in SES group A-B neighborhoods order.

While orders are placed from approximately 84% of the neighborhoods with SES group C1, when this rate is analyzed in terms of population, it is seen that it corresponds to 94% of the population.

It is seen that 88% of the population of the neighborhoods with SES group C2 place orders.

In group D, it is seen that orders are placed from the settlements in 7.1% of the population, which is approximately two-thirds of the population.

Online orders remained around 1% of the population in group E. In this case, it can be said that economic power is directly related to online ordering according to SES groups. It is seen that orders are given from areas where the population is crowded in C2 and D groups, while online grocery orders are not given from rural neighborhoods where the population is low.

Table 3. Percentage of whole and ordering population by SES groups

SES group	Neighborhood Count	Number of neighborhoods that placed orders	Percentage of neighborhoods that placed orders	Total population	Population that placed orders	Percent of population that placed orders
A	83	80	96.4%	861775	832774	96.6%
B	77	72	93.5%	804082	792683	98.6%
C1	82	69	84.1%	967337	909683	94.0%
C2	243	110	45.3%	1885275	1659766	88.0%
D	659	47	7.1%	1038245	688856	66.3%
E	281	3	1.1%	82358	610	0.7%

The percentages of the population according to SES groups, male, female, and age ranges are given in Table 4.

When the evaluation at the SES groups in the region where the orderers live is conducted, it is seen that the female population and the population over 65 are higher, and the population under 20 is less in places with high SES group.

Table 4. Number of neighborhoods and population percentages of ordering neighborhoods by SES group

SES group	Male population (%)	Female population (%)	Population 0-19 (%)	Population 20-35 (%)	Population 35-65 (%)	Population over 65 (%)
A	47	53	22	25	41	12
B	49	51	25	24	42	9
C1	49	51	27	23	40	9
C2	50	50	31	24	39	6
D	51	49	34	25	36	5
E	50	50	0	0	0	0

In the distribution of the changes in food and non-food orders according to SES groups, it was seen that group E placed orders only in P2 and did not place orders in P1 and P3 before and after the closure (Table 5, 6, and 7).

When comparing and before the closure, it is seen that the highest food order increase according to P2/P1 is in the C1 (726%) and A (650%) groups, respectively, while the increase in the B, C2 and D groups is between 525% and 551%, which is close to each other.

When the post-closure and closing time are compared (P3/P2), it is seen that the most decrease in food sales was in the A group (33%), while the least decrease was observed in the E and C2 groups (163% and 52%, respectively). It is noteworthy that orders decreased to 40-44% in B, C1, and D groups.

When compared before and after the closure (P3/P1), an increase in food sales was observed, nearly three times the highest increase in groups C1 and C2 (317% and 271%, respectively); It was observed that it was nearly doubled (between 214% and 234%) in groups A, B and D.

Table 5. Distribution of food and non-food online order changes by SES group and periods

SES Group	Food P2 /P1	Food P3 /P2	Food P3/P1	Non Food P2/P1	Non Food P3/P2	Non Food P3/P1
A	650%	33%	214%	584%	34%	201%
B	551%	40%	220%	474%	44%	208%
C1	726%	44%	317%	567%	53%	299%
C2	525%	52%	271%	467%	62%	291%
D	531%	44%	234%	419%	58%	244%
E	-	163%	-	-	175%	-

In non-food orders, the highest increase in food orders was again approximately 6 times in the A and C1 groups, respectively, compared to P2/P1, and the increase in the B, C2, and D groups was approximately 4-5 times, which is close to each other.

When the post-closure and closing time are compared (P3/P2), it is seen that the A group decreased the most in non-food sales by 34% (same as food sales), and the least decrease was in the E, C2 and D groups (175%, 62% and D, respectively). 58%). In the B and C1 groups, the orders decreased to 44-53%.

When the post-closing and pre-closure periods are compared (P3/P1), an increase was observed in food sales, the highest increase was observed in C1 and C2 groups with 299% and 291%, a 2-fold increase was observed in groups A and B, while an average increase of 244% was observed in group D. is seen.

Compared to P1, the increase in orders in the P2 period was mostly in the C1 and A SES groups. The order increase in the P3 period compared to P1 was mostly observed in the C1 and C2 SES groups. Compared to P2, the decrease in orders in P3 was mostly in the A and B SES groups. While the E SES group (in rural areas) did not have a significant number of orders in the P1 period, it is seen that there are orders in the P2 and P3 periods, and even that it is the only group that places more orders in P3 than in P2.

Table 6. Distribution of inter-period changes of all online orders by SES group

SES Group	P2/P1 (%)	P3/P2 (%)	P3/P1 (%)
A	637	33	211
B	536	41	217
C1	692	45	313
C2	514	54	275
D	509	46	236
E	-	171	-

When the percentage of order totals by SES groups is analyzed (Table 7), it is seen that groups with higher SES levels in total orders make higher purchases. It is seen that group A has 41% of the orders on average, 26% of group B, and 13% of group C1 in all periods. Group C2 placed an order with a higher amount than C1, while Group D remained at 3% of the total order amount. The share of group E in orders is close to 0%. The findings that high SES level leads to a high online order rate are consistent with studies in the literature (Ali, Samsuri, Seman, Brohi, and Shah, 2019; Ganapathi, 2015; Sánchez-Torres, Arroyo-Cañada, Montoya-Restrepo, and Rivera-González, 2017). However, it is noteworthy that this segment quickly returned to traditional shopping after the restriction. Online orders may differ between different parts of neighborhoods with the same SES level. This situation requires demographic analysis based on different components. For example, the high number of individuals aged 65 and over and the female population in regions with high SES revealed in the study may indicate the presence of effective demographic factors in online shopping. Meanwhile, some studies also show that as technology advances and online shopping experience increases, the importance of socioeconomic factors in online shopping decreases (Hernández, Jiménez, and Martín, 2011).

Table 7. Percentage distribution of all online order totals by SES levels by period

SES Group	Food P1 (%)	Food P2 (%)	Food P3 (%)	Non-Food P1 (%)	Non-Food P2 (%)	Non-Food P3 (%)	P1 % Total	P2 % Total	P3 % Total	Average (%)
A	42	45	38	42	46	36	42	45	37	41
B	28	25	26	28	25	25	28	25	25	26
C1	11	13	15	12	13	15	11	13	15	13
C2	16	14	19	16	14	20	16	14	19	16
D	4	3	3	3	3	4	4	3	4	3
E	0	0	0	0	0	0	0	0	0	0

When the order totals are divided by the SES group population, it is understood that the A group made the highest expenditure per capita (5.94%), followed by the B, C1, C2, and D groups, respectively (according to the SES distribution). Group E differed from the others with a figure equivalent to group C2 in the urinary part (Table 7).

Table 8. Amount of online orders per SES group population

SES Group	Food P1	Food P2	Food P3	Non-Food P1	Non-Food P2	Non-Food P3	P1 Total %	P2 Total %	P3 Total %	Total
A	0.50	3.26	1.07	0.13	0.73	0.25	0.63	3.99	1.32	5.94
B	0.35	1.92	0.76	0.09	0.41	0.18	0.44	2.33	0.95	3.71
C1	0.12	0.87	0.38	0.03	0.18	0.10	0.15	1.06	0.48	1.69
C2	0.10	0.52	0.27	0.02	0.11	0.07	0.12	0.63	0.34	1.08
D	0.05	0.27	0.12	0.01	0.05	0.03	0.06	0.32	0.15	0.54
E	0.00	0.12	0.19	0.00	0.28	0.48	0.00	0.39	0.67	1.07

3. Conclusion

This comprehensive study has provided a detailed analysis of the effects of the Covid-19 pandemic on consumer behavior, with a specific focus on the dynamics of online purchasing. The pandemic has catalyzed a substantial shift in both social structures and individual behaviors globally, leading to an increased reliance on online shopping. This shift is particularly evident in Ankara, where there was a significant rise in online purchases of both food and non-food items during the pandemic's second phase. This increase is attributed to consumers' efforts to minimize virus exposure and the constraints imposed by pandemic-related restrictions like curfews. Notably, the study found that food orders took precedence in online shopping during the pandemic, but the frequency of these orders varied depending on the availability of traditional shopping methods. In areas with abundant conventional shopping options, online food sales were lower, suggesting a nuanced relationship between online and offline shopping habits. SES played a crucial role in online purchasing behaviors. Individuals with higher SES were more inclined towards online shopping, a trend consistent with existing literature. Conversely, those with lower SES tended to engage in online shopping mainly during periods of stringent restrictions, focusing primarily on essential items like food. This observation aligns with economic theories indicating that lower-income groups allocate a larger portion of their expenditure to food. The study's findings highlight the need for public policies that facilitate equitable access to online shopping, particularly for lower SES groups and those residing in areas with limited traditional shopping facilities. Providing robust, affordable internet access and expanding online shopping options can significantly enhance social welfare and mitigate regional inequalities, not only during extraordinary times such as a pandemic but also in regular circumstances. These measures are crucial in fostering a more inclusive and equitable society where everyone has equal opportunities to adapt to changing circumstances and leverage digital advancements for their benefit. Furthermore, the pandemic's impact on urban economic geography at both intra- and inter-regional scales reveals significant shifts (Florida, Rodriguez-Pose & Storper, 2021). The social scarring instilled by the pandemic, the lockdown as a forced experiment, the necessity to secure the urban built environment against future risks, and changes in the urban form and system have all contributed to these shifts. While the pandemic is unlikely to significantly alter the winner-take-all economic geography and spatial inequality of the global city system at the macrogeographic scale, it may bring about short-term and potentially longer-lasting social changes in the structure and morphology of cities, suburbs, and metropolitan regions at the microgeographic scale.

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