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Online transportation relationship with the diversity of household food consumption during the COVID-19 pandemic

*Rahmadanih, Salman, D., Mahyuddin, Saadah and Viantika, N.M.

Department of Socio-Economic Agriculture, Faculty of Agriculture, Hasanuddin University, Perintis Kemerdekaan KM 10, 90245 Makassar, South Sulawesi, Indonesia

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Abstract

The COVID-19 pandemic has become a serious problem in the world in the last two years, including in Indonesia. This problem causes the government to treat the Large-Scale Social Restriction Policy (PSBB), where the policy can have an impact on the difficulty of certain people in accessing food. The technology that can help people in accessing food is the presence of online transportation. This study aimed to analyze the use of online transportation for a household in accessing food during the COVID-19 pandemic and to analyze the relationship between the use of online transportation and the diversity of household food consumption during the COVID-19 pandemic. This research was designed by using combining qualitative and quantitative approaches. The research location is in Makassar City, South Sulawesi, Indonesia. Data were collected from April to August 2021 by conducting survey methods and in-depth interviews. The unit of analysis is the household level. The number of samples is 200 households. Data analysis was carried out qualitatively as well as quantitatively using Spearman's rho correlation. The results showed that there were 49.5% of households used online transportation in accessing food during the pandemic. It was found that age, education level, and type of occupation of the household head and housewives, as well as the household income, are significantly related to the use of online transportation for accessing food. The reason most households use online transportation is that it is more practical and they do not need to leave the house to shop for food types of food that are commonly accessed by online transportation are very diverse, consisting of staple foods/substitutes for the main dishes, vegetables, fruits and snacks. The dominant foods that are accessed through online transportation are very diverse, including snacks, side dishes, vegetables, fruits, and substitutes for staple foods. Statistically, there is a significant and direct relationship between the use of online transportation and the diversity of household food consumption (r = 0.605 and Sig. (2-tails) = 0.000).

1. Introduction

Food Security is a pillar for the development of other sectors. This is considered strategic because no country can build its economy without solving its food problem first (AusAID (Australian Agency for International Development), 2012; Manap and Ismail, 2019; de Oliveira *et al.,* 2021). Although food availability is sufficient, challenges in the aspect of food distribution will still be faced. Food distribution is often insufficiently organized to meet current and future urban and rural needs (Armendariz *et al.,* 2016; Rahmadanih *et al.,* 2019); especially during the COVID-19 pandemic.

For the last two years, the world community has been busy with a common problem, namely the COVID-19 pandemic. The problem disrupts the community's food system (Ling Ma *et al.*, 2021). The COVID-19 outbreak stands out from previous global crises due to the rapidity of its spread and all encompassing disruption of supply chains. The agri-food system, in particular, has been impacted from production to consumption, both locally and globally (Clapp and Moseley, 2020).

COVID-19 impacts led to severe and widespread increases in global food insecurity, affecting vulnerable households in almost every country, with impacts expected to continue into 2022 and possibly beyond (World Bank, 2021; Galanakis, 2020) it has an impact on public policy and use of digital technology (Galanakis *et al.,* 2021; Yusuf *et al*., 2018).

*Corresponding author.
Email: *rahmadani.sosek@yahoo.com*

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In 2020, the Makassar City Government enforced the Large-Scale Social Restriction (PSBB) policy. This policy of limiting activities outside the home has an impact on many things, one of which is the economy, which ultimately causes a decrease in food consumption. There have been major disruptions to food supply chains in the wake of lockdown measures, which have affected the availability, pricing, and quality of food (Barrett, 2020).

Several studies have shown that in some developing countries the COVID-19 pandemic has brought risks to the livelihood systems of poor agricultural households, especially landless farmworkers, landless farmers, and rural daily labourers where one aspect of the vulnerability of livelihoods is food accessibility disorders (Workie *et al.*, 2020; FAO, 2020; O'Hara *et al.*, 2021). The COVID-19 pandemic has brought vulnerabilities to global, national, and local food supply chain systems, not only in developing countries but also in developed countries (Peng *et al.,* 2018; Rasul, 2021; Salman *et al.,* 2021) and it needs adaptive strategies (Kasim *et al*., 2019; Gorzelany-Dziadkowiec, 2021). More than any other dimension of food security, food access has arguably been the most affected by the COVID-19 crisis. The global economic recession triggered by lockdowns has had a very negative impact on people's ability to access food (Gerard *et al.,* 2020).

However, none of these studies has linked the impact of the COVID-19 pandemic with the emergence of online transportation within households to access food amid social restrictions. In Makassar City, there was a 9.2 decrease in population food consumption from PPH of 88.0 in 2019 to 78.8 in 2020 (Makassar City Food Security Service, 2021). Further exploration has not been carried out to address the decline, especially regarding household strategies for accessing food during the COVID-19 pandemic. Lack of access to public transportation or a personal vehicle limits access to food (USDA, 2009). The study aimed to analyze the use of online transportation for a household in accessing food during COVID-19 and to analyze the relationship between online transportation with the diversity of household food consumption during the COVID-19 pandemic.

2. Materials and methods

The research was designed using combining qualitative and quantitative approaches (Tashakkori and Teddlie, 2003). The research location is in Makassar city and data/information collection takes place from April to August 2021.

Quantitative data were collected with a survey method (using a questionnaire), while qualitative data was collected by applying an in-depth interview method. Survey methods were conducted by using 200 household samples and were taken using the accidental sampling technique, while in-depth interviews were conducted with 12 informants who were determined purposively (Silalahi, 2010).

Quantitative data were analyzed using descriptive statistics consisting of frequency distribution and cross-tabulation, but the data that allows analysis will be continued with Spearman-rho Correlation analysis (IBM-SPSS Statistics 25). While for qualitative data, is analyzed descriptively through the stages of indexing, description/interpretation, and connecting.

3. Results and discussion

3.1 Profile of respondent's household

The number of households involved in this survey is 200 units spread across six sub-districts within the Makassar City area. These areas include Rappocini (37.5%), Biringkanaya (10.0%), Tamalate (10.0%), Manggala (20.0 %), Panakukang (12.5%) and Tamalanrea (10.0%). Of the 200 households, 194 of them are headed by a male household head (97.0%) and 6 (3.0%) are headed by a female as the head of household and concurrently housewives. The age of the male head of household ranges from 26-70 years and mostly in the range 50- 59 year age group, meanwhile, the age of the female head of household is ranging from 20 years to 66 years and is dominantly in the 50-59 year age group. The formal education possessed by the head of the male household and housewife varies from elementary school graduates to university graduates of doctoral programs. However, when comparing both heads of household data, 36.0% of the male head of household held the undergraduate level and 33.5% hold high school level meanwhile for the housewife as the head of household, 45.0% of them were in high school level than undergraduate level with 31.05%. Based on ethnicity, dominantly both household heads were Bugisnese and Makassarnese who predominantly adhered to Islam (Table 1).

In terms of employment, the main types of work for the head of household vary, including the formal sector and the informal sector as well as self-employed, with a fixed income, not fixed to odd jobs. There are also 4.5% of household heads who do not have permanent jobs, and the other 6.5% have retired (no longer doing productive activities). During the COVID-19 Pandemic and the enactment of the PSBB policy in 2020, there were 7 heads of households (3.5%) who lost their jobs. However, in 2021, when the PSBB is not enforced,

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Table 1. Profile of respondent's household.

No	Description	Criteria	Household Head		Housewife	
			(n)	(%)	(n)	(%)
1	Age	< 30	13	6.5	25	12.5
		30-39	58	29.0	57	28.5
		40-49	37	18.5	51	25.5
		50-59	66	33.0	58	29.0
		60+	26	13.0	9	4.5
		Total	200	100.0		
2	Education	Primary School	7	3.5	6	3.0
		Junior High School	11	5.5	21	10.5
		Senior High School	67	33.5	90	45.0
		Diploma	13	6.5	6	3.0
		Bachelor's degree	72	36.0	62	31.0
		Master's degree	23	11.5	13	6.5
		Doctoral	7	3.5	2	1.0
		Total	200	100.0	200	100.0
3	Ethnic	Bugis	89	44.5	88	44.0
		Makasar	72	36.0	70	35.0
		Mandar	3	1.5	2	1.0
		Toraja	6	3.0	7	3.5
		Others	20	15.0	33	16.5
		Total	200	100.0	200	100.0
4	Religion	Islamic	189	94.5	189	94.5
		Christian	11	5.5	10	5.0
		Buddha	0	0.0	1	.5
		Total	200	100.0	200	100.0
5	Work	Not working/working but erratic	9	4.5	98	49.0
		Informal (un fixed income)	79	39.5	61	30.5
		Formal (fixed income)	112	56.0	41	20.5
		Total	200	100.0	200	100.0

sometimes the head of the family gets a job. Some housewives who are also heads of households work in the formal and non-formal sectors so that they get income from this work. From the data obtained 51% of housewives are self-employed (Table 1).

The diversity of working contributes to household income. Before the COVID-19 pandemic, per capita, household income was around 200,000 IDR to 9,000,000 IDR per month with an average of 1,878,065 IDR per household.

This amount of household income decreased when Makassar City experienced the COVID-19 pandemic. The implementation of the PSBB policy in 2020 resulted in household heads who had previously established jobs experiencing a decrease in income and even being without income due to job loss. The economic consequences of the COVID-19 pandemic result in many of those with more limited means and protection, such as workers in informal employment or diverse work arrangements, having been the least able to face the consequences of the crisis (ILO-OECD, 2020). The household income per capita at that time was around 0 IDR to 8,250,000 IDR with an average of 1,259,837 IDR/month. The Heads of households who lost their jobs during that period (in 2020) returned to work when the PSBB policy was no longer enforced (in 2021). Even though the work done is classified as "non-permanent", it has contributed to household income and increased the household income per capita which ranges from 100,000 IDR/month to 8,250,000 IDR /month with an average of 1,397,692 IDR /month. Based on this level of income, household income is classified into 3 categories as shown in Table 2.

The difference in the level of household income per capita depends on the type of work and the number of members in each household. In this study, it was found that the minimum number of household members is 2 people and the maximum is 9 people, with an average of 4 people per household. Of all recorded households, 54.0% of households consist of 1-4 people, while households with 5-6 members are 33.5% and the remaining 12.5% are households with more than 6 members. The number of household members can be a reference for households in making decisions to access food.

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Table 2. Distribution of respondents' households by income per capita per month prior to pandemic and during pandemic.

No	Income/Capita/month (Rp)	Prior to COVID-19 (2019)		COVID-19 (PSBB, 2020)		COVID-19 (Non PSBB, 2021)	
		n	%	n	%	n	%
1	≤ Rp. 500,000	28	14.0	75	37.5	58	29.0
2	> Rp. 500,000- Rp.1,500,000	77	38.5	61	30.5	73	36.5
3	> Rp 1,500,000 -Rp. 2,500,000	41	20.5	38	19.0	43	21.5
4	> Rp. 2,500,000	54	27.0	26	13.0	26	13.0
	Total	200	100.0	200	100.0	200	100.0

3.2 The use of online transportation for households to access food

There are three kinds of online transportation used by respondent households in accessing food, they are Gojek, Grab, and Maxim. Among the three, Maxim has not been widely used by respondents in accessing food. The number of households using online transportation services during the COVID-19 pandemic in Makassar City has decreased when compared to their usage before COVID-19. This finding is different from findings in big cities which show that during the COVID-19 pandemic and the implementation of the PSBB only affected the pattern of buying food, especially among the upper-middle class. In Makassar City, the percentage of households as users of online transportation services to access food has decreased by 33.0% during the pandemic. The intensity of the use of online transportation by households to access food can be grouped into 4 categories, (i) rarely (in two months, not necessarily households use online transportation), (ii): use online transportation 1-3 times per month, (iii): using online transportation 1 -3 times per week and (iv) using online transportation more than 3 times per week (Figure 1).

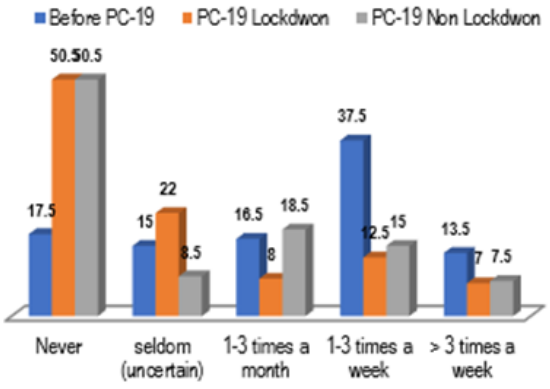

Figure 1. Percentage of households using online transportation.

The decline in households using online transportation during the pandemic was caused by (i) the decrease in household income when compared to before the pandemic (ii). Some concerns of household members (especially housewives) about the spread of COVID-19 through their food/packaging, so they decide to process themselves at home, by buying food directly at the market/supermarket to prepare for consumption for 1 to 2 weeks. Due to these conditions, online transportation users have different perceptions of the role of online transportation in helping households to access food during the COVID-19 pandemic (Figure 2).

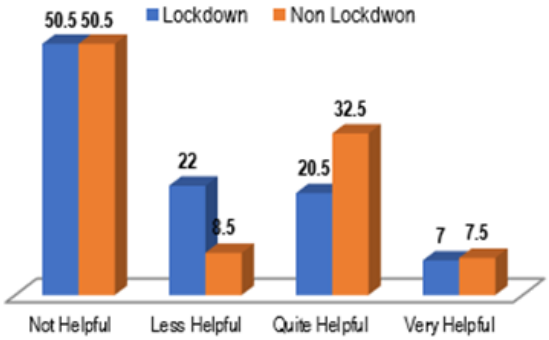

Figure 2. Respondents' perceptions about the role of online transportation in helping households to access food during the COVID-19 pandemic.

Although the number of households using online transportation to access food was lowered during the pandemic, users still find online transportation helpful, so certain households use it every day and even more than once day for helping them access different types of food. This household group generally has a per capita income of more than 1,500,000 IDR per month and is headed by a housewife who is the breadwinner. As shown in Figure 1 and Figure 2, it shows that the frequency of using online transportation is closely related to respondents' perceptions of the role of online transportation in helping their household access food. Figure 2 shows that 50.5% of respondents during the COVID-19 pandemic felt that online transportation did not help their household access to food. Those included in this category are households that do not use online transportation services during the COVID-19 pandemic. Moreover, the number of households that feel quite helped by online transportation in accessing food during the COVID-19 pandemic is 20.5% during the implementation of PSBB and 32.5% when non-PSBB. Only 7.0% of households felt that access to food was greatly helped during the PSBB period and 7.5% during the non-PSBB period. Respondents who feel that online transportation does not help them in accessing food are households with a rare category (i.e. households that do

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not necessarily use online transportation within two months). Meanwhile, respondents who feel that online transportation is enough to help their household in accessing food are households that use online transportation services regularly at least once a month. Other respondents who view online transportation as very helpful for their households in accessing food are those who predominantly use online transportation services regularly every day or at least three times a week.

Several elements (variables) of the respondent's household profile can contribute to the use of online transportation for accessing food. Table 3 shows the results of Spearman's rho test for variables that can contribute to the use of online transportation for households to access food during the Non-PSBB Pandemic Period (2021).

Table 3 shows the age, level of formal education, and type of work of the Head of the household and housewife, as household income is significantly related to the intensity of households using online transportation services to access food during the COVID-19 pandemic. The variable of housewife's occupation shows a fairly strong relationship strength (r = 0.511) and is not unidirectional. It can be concluded that the more housewives who work, especially in the formal sector and earn a fixed income every month, the frequency of household members who use online transportation to access food will be higher. As for the other 6 variables (Table 3), the strength of the relationship is weak (r < 0.3) but in the same direction, which means that the more mature and the higher the level of education, the more heads of households work in the formal sector and earn a fixed income every month, the higher the frequency of household members using online transportation to access food. By having a higher level of formal education, the use of technology becomes easier, such as using smartphone technology in utilizing online transportation services. The use of online transportation will be also strongly supported by the type of work and adequate household income.

Table 3 also shows that the number of household members is not significantly related to the frequency of households using online transportation services to access food. This means that the number of household members is not a determining factor in whether or not they often access food through online transportation. As a sample, both households with three members and households with more than 6 members were found to regularly use online transportation services because of the wishes of family members (especially children). However, there is a "tendency" that the larger the number of household members, the more difficult it is to access food via online transportation services. This is because the direction of the relationship from the results of the Spearmen-rho correlation test is not unidirectional (r = 0.102)

The households that use online transportation to access food during the COVID-19 pandemic, have the perception that online transportation is not only helping households in accessing food but is also useful in protecting household members from being infected with COVID-19. This is because when they use online transportation services to access food, household members do not have to go out of the house to buy food which makes them interact less and be safer during the pandemic. In addition to providing convenience in using its services, online transportation is considered quite easy to obtain, because only by using a smartphone, online transportation can meet the needs of the community anywhere and anytime within the scope of Makassar City. There are several reasons for respondents in using online transportation services to access food during the COVID-19 pandemic (based on the rankings of respondents), including:

- Practical/can order ready-to-eat food (no hassle to process food at home)
- No need to leave the house just to buy food
- Varied choices of food that can be accessed

Table 3. Spearman's rho test results variables that can contribute to the use of online transportation for households to access food.

No	Elements/Variable	Spearman's rho: Use of Online Transportation	
		Sig. (2-tailed)	Correlation Coefficient
1	Head of Household age	0.005	0.197**
2	Housewife age	0.002	0.222**
3	Head of household Education	0.004	0.203**
4	Education of Housewife	0.000	0.262**
5	Head of Household work	0.018	0.167*
6	Housewife work	0.000	0.511**
7	Number of Family members	0.150	-0.102
8	Household income	0.000	0.270**

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- Avoided meeting many people at the market/in the shop/at the restaurant
- Food ingredients that are needed for cooked are limited in availability at the nearest market/store. Conditions like this do not only occur in Makassar City or South Sulawesi, as the results of studies by Rasul (2021) showed that the COVID-19 pandemic has vulnerabilities to global, national, and local food supply chain systems. not only in developing countries and even in developed countries
- Easy payment process
- Delivery services are inexpensive (relatively affordable by almost all levels of society).
- Often offer promos.

3.3 Diversity of household food consumption

During the COVID-19 pandemic, there were 50.5% of households accessed food (staple food, side dishes, vegetables, fruits, and milk as well as ingredients for snacks) by buying it directly from sellers at the market/ supermarket and then processing it themselves at home for consumption by all household members. This means that the household does not use online transportation. Thus, there are 49.5% of households access food through online transportation, in addition to buying it by their direction at the market/supermarket.

- The types of food that can be accessed by households through online transportation during the COVID-19 pandemic mostly are:
- Staple food made from rice (such as fried rice, yellow rice, porridge),
- Staple food that has been processed in the form of packages (KFC packages, Nasi Padang packages)
- Food substitutes for rice in the form of food groups made from noodles (noodle soup, fried noodles, dry noodles, chicken noodles, wonton noodles, meatball noodles),
- A substitute for rice made from sago (Kapurung) and sweet potatoes (fried potatoes))
- Side dishes (especially fish, chicken, squid, shrimp, and various egg and meat preparations)
- Vegetables such as capcay, soup, stir-fried vegetables
- Beverage, especially in the form of juice
- Filling snacks (such as bread, terang bulan, martabak, brownies)
- Snacks that are not filling (such as various crackers).
- Fruits (apples, pears, grapes, lemons)

Based on the two ways of accessing food, either by direct purchase or by using online transportation assistance, it can be seen that there is a diversity of food availability at the household level which can then be consumed by household members. The diversity of food consumed within a week can be divided into 7 groups (Table 4). In terms of food diversity, 37.0% of households have a habit of consuming “very diverse” foods during the COVID-19 pandemic (Figure 3). What is meant by a household that consumes food classified as “very diverse” is a household that consumes at least one type of food from 6 to 7 food groups as shown in Table 4. Figure 3 also shows that there are 42.0% of households that have a diversity of food consumption as "quite diverse" and 37.0% are classified as "less diverse". A household is categorized in "quite diverse" food consumption, if the household consumes at least one type of food from the 4-5 food groups in Table 4,

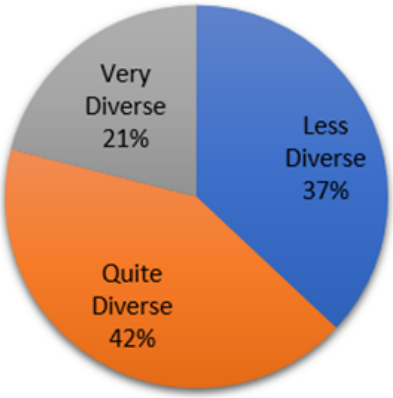

Figure 3. Food consumption diversity.

Table 4. Identification of household food diversity grouping during the pandemic COVID-19 (Non PSBB, 2021).

No	Food Group
1	**Variety of staple** foods and substitutes for staple foods consumed by one or more household members, such as rice, fried rice, yellow rice, in addition, some households also consume substitute staple foods such as: noodle soup, fried noodles, wonton noodles, meatballs noodles , dried noodles, bread, kapurung, boiled corn, boiled cassava, boiled banana and boiled sweet potato and various types of fried foods such as fried bananas, fried sweet potatoes, pastels, etc.
2	**Variety of side dishes** consisting of fish, chicken, beef, eggs, tofu and tempeh with varied processing
3	**Variety of vegetables**, both in type and processed
4	**Variety of fresh fruit** such as: papaya, banana, apple, pear, dragon fruit, mango.
5	**Variety of beverages** such as milk and juice variations
6	**Variety of Snack**
7	**Variety of functional food/drink**

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while a household classified as consuming "less diverse" food is a household that consumes at least one types of food from 3 types of food based on food groups in Table 4.

3.4 The relationship between the use of online transportation for accessing food and the diversity of household food consumption

Online transportation can help households to access food at the household level. The more food can be accessed, the more food that can be available at the household level. This is important because food availability at the household level can contribute to the development of diversified food consumption for the household members. The relationship between food availability and food diversification has also occurred in farm workers' households, as one study found that there was a relationship between food availability with food diversity of farmworkers. Improvement in food availability can increase food diversity (Prasetyaningtyas and Nindya, 2017)

The diversity of household food consumption depends on the type of food or food ingredients that can be accessed by households, either online or directly at the market/supermarket. Various types of food are accessed by households through online transportation during the pandemic, both in the form of raw food and in the form of ready-to-eat food (processed foods that are ready to be consumed).

The types of food that are often accessed through online transportation are rice and organic vegetables, while the types of ready-to-eat food are very diverse. Some households access fast food more than once a day. Some households also access food almost every day (including during the fasting month of Ramadan) by using online transportation services

In Table 5, it can be seen that from 37.0% of households that have food consumption in non-diverse categories, there are 32.0% of them do not use online transportation. In contrast, from 21.0% of households whose food consumption is classified as very diverse, there are 18.0% of them use online transportation regularly, ranging from 1-3 times a month to more than three times a week. These data indicate a unidirectional relationship between the use of online transportation and the diversity of household food consumption.

It is also seen that there are 17.5% of households whose consumption is quite diverse, but these households do not use online transportation services. There are even 1.0% of households that do not use online transportation but have very diverse food consumption. This shows that online transportation is not the only thing that can shape the diversity of household food consumption during the COVID-19 pandemic. As the results of in-depth interviews with the following informants (HJ: Female- 57 years old- undergraduate-hospital employee) that said:

"…….Before the COVID-19 pandemic, I let my children access fast food via online transportation almost every day. However, after Makassar City has had many residents who have been infected with COVID-19, I do not allow my child to use online transportation because apart from having to avoid contact with drivers, the packaging of the food is not guaranteed to be free from COVID-19….." (Interview result on May 1, 2021).

It means that food and nutrition knowledge is very important for the household members. One study found that there were 10.0% of households increased the diversity of their food consumption after they attended food and nutrition extension (Rahmadanih *et al..,* 2016).

Some informants who have avoided or reduced the frequency of using online transportation to access food feel they have to prepare their food at home by buying directly at a place (market) that is considered relatively safe and then managing it themselves at home for consumption by household members. In general, groceries purchases made are for consumption for 1-2 weeks. Some informants avoid using online transportation services to access food because of several cases of food stalls and food stores where the owner and his employees died from being infected with COVID-19. Thus, the decline in the use of online transportation for food access is not only caused by declining household income. On the other hand, the informant (HM: Female-46 years old- undergraduate-sales) said that:

"...we never used online transportation services for about three months during the 2020 lockdown. After that,

Table 5. Cross tabulation of the relationship between the use of online transportation and diversification of food consumption.

Diversity of Household Food Consumption	Use of Online Transportation					
	Never	Seldom (uncertain)	1-3 Times a Month	1-3 Times a Week	> 3 Times a Week	Total
Less Diverse	32.0	2.0	1.0	1.0	1.0	37.0
Quite Diverse	17.5	4.5	9.5	8.0	2.5	42.0
Very Diverse	1.0	2.0	8.0	6.0	4.0	21.0
Total	50.5	8.5	18.5	15.0	7.5	100.0

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I went back to using it regularly because my children enjoyed the food ordered online more than the food I prepared at home… (Interview Results on August 2nd, 2021).

Based on the results of this in-depth interview, food stall/shop institutions need to maintain the quality and cleanliness of food ingredients, especially ready-to-eat food that will be accessed by households through online transportation. Online transportation institutions (Gojek, Grab, and Maxim) also continually have to determine and control the use of health protocols for their employees or drivers.

As shown in Table 6, the use of online transportation for food access is significantly related to the diversity of household food consumption, where the strength of the relationship is relatively strong and unidirectional (r = 0.605**). It shows that with the frequent use of online transportation, the availability of food at the household level is increasingly diverse, which in turn causes household food consumption to be more diverse. The more diverse household food consumption, the household tends to be more food secure (Rahmadanih *et al.,* 2015).

Table 6. Spearman's rho correlation results.

Spearman's rho	Using of Online Transportation	
Diversity of Household Food Consumption	Correlation Coefficient	0.605**
	Sig. (2-tailed)	0
	n	200

The test results strengthen the results of in-depth interviews with informants who have provided information that food materials/groceries accessed by households through online transportation are not monotonous. They access a variety of food, both from the type of food and the type of processing, ranging from the staple food group/substitute for staple foods, side dishes, vegetables, fruit, milk, other beverages (juices), and snacks.

The existence of a significant relationship between the use of online transportation and the diversity of food consumption indicates that the variables that contribute to the use of online transportation (Table 3) also contribute to the diversity of household food consumption. Theoretically (Maxwell and Frankenberger, 1992; Sanjur, 1982), several factors influence household or community food consumption, including age, level of formal education, level of food and nutrition knowledge, type of work, number of household members, and household income).

Statistically, it was found that age, level of formal education, and type of work of the household head and Housewife, were significantly related to the diversity of household food consumption during the COVID-19 pandemic (Non-PSBB in COVID-19 Pandemic, 2021) also the number of household members and household incomes (Table 7).

Table 7 also shows that one of the variables that shows a weak and unidirectional relationship is the number of household members (-.223**). This indicates that the more members of the household, the less diverse household food consumption. It explained that the more members of the household mean the more food that must be distributed so that if the household income is inadequate, the variety of food that can be prepared at the household level will be limited.

It is also seen in Table 7 that the strength of the relationship between the age of the head of the household and the housewife and the type of work of the head of the household is classified as weak (r = <0.3) and unidirectional. Household income is classified as moderate (r = 0.30-0.49) and in the same direction. This shows that the maturity, the higher the level of education of heads of households and mere having jobs in the formal sector and earning a fixed income every month, the household food consumption will be more diverse. Although the housewife as the head of the household does not work at home, she can anticipate the provision of food for household members by accessing online transportation. On the other hand, during the pandemic, restrictions on activities outside the home resulted in

Table 7. Several variables related to the diversity of household food consumption (Spearman's rho test results).

No	Elements/Variable	Spearman's rho: Diversity of household food consumption	
		Sig. (2-tailed)	Correlation Coefficient
1	The head of household age	0.000	0.257**
2	Housewife age	0.000	0.264**
3	Head of household education	0.000	0.309**
4	Housewife education	0.000	0.300**
5	Head of household occupation	0.000	0.269**
6	Housewife occupation	0.000	0.417**
7	Number of household member	0.002	-0.223**
8	Household income	0.000	0.459**

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housewives spending more time at home and preparing food for their families. Results of in-depth interviews with informants (HR: 66 years old- Magister-Lecturer):

"....from one side COVID-19 pandemic is very dangerous and threatens human life, but on the other hand there are many benefits that are felt by having activities at home because we can gather with family, prepare various meals for the family and we always have breakfast, eat lunch and dinner with family, where before the COVID-19 we rarely did…" (Interview Results on July 27th, 2021)

Humans need various nutrients (carbohydrates, proteins, fats, vitamins, and minerals). There is no type of food or certain food ingredients that contain all the nutrients needed by humans, except breast milk (Minister of Health of RI, 2014). Therefore, the more diverse the food consumed, the more diverse the nutrients obtained. The results of the correlation test accompanied by the results of in-depth interviews with informants can be used as an important note to improve the quality of food consumption in the future. This means that the household or the community will be faced with two choices that can both contribute to improving the quality of food consumption. When viewed from one aspect, the habit of processing and preparing food every day at home based on DNHS (diverse, nutritious, healthy, and safe), is considered the most important choice as long as household conditions are allowed to do so every day. But for some conditions, households can order food by using online transportation as long as the quality and cleanliness of the food or food ingredients are guaranteed.

4. Conclusion

It can be concluded that, during the COVID-19 pandemic, there was a strong and direct relationship between the use of online transportation and the diversity of household food consumption. During the termination of the Large-Scale Social Restriction (PSBB) Policy, the use of online transportation for food access began to increase. Age, education level, and type of occupation of the household head and housewives, as well as the household income, are moderately related to the use of online transportation for accessing food. Most households use online transportation due to more practical and do not need to leave the house to shop. Types of food that are commonly accessed by online transportation are very diverse, including snacks, side dishes, vegetables, fruits, and substitutes for staple foods. Due to PSBB Policy, it was very difficult to create other factors like energy consumption and nutrients related to online transportation in this research. For future research, it needs to focus on these issues to address.

Conflict of interest

We declare that this manuscript is original, has not been published before, and is not currently being considered for publication elsewhere.

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References

Armendariz, V., Atzori, A.S. and Armenia, S. (2016). Systemic Analysis of Food Supply and Distribution Systems in City-Region Systems—An Examination of FAO's Policy Guidelines towards Sustainable Agri-Food Systems. *Agriculture Journal*, 6(4), 65. https://doi.org/10.3390/agriculture6040065

Australian Agency for International Development. (2012). Sustainable economic development-improving food security. Retrieved from Australian Agency for International Development (AusAID) website: https:// www.dfat.gov.au › food-security-strategy.

Barrett, C. (2020). Actions now can curb food systems fallout from COVID-19. *Nature Food*, 1, 319-320. https://doi.org/10.1038/s43016-020-0085-y

Clapp, J. and William, G.M. (2020). This food crisis is different: COVID-19 and the fragility of the neoliberal food security order. *The Journal of Peasant Studies,* 47(7), 1393-1417. https:// doi.org/10.1080/03066150.2020.1823838

de Oliveira, V.M., Parenti, E. and Neiva, S.S. (2021) Food Security: Conceptual History and Pillars. In Leal Filho, W., Azul, A.M., Brandli, L., Özuyar P.G. and Wall T. (Eds.) Zero Hunger. Encyclopedia of the UN Sustainable Development Goals. Cham, Netherland: Springer. https:// doi.org/10.1007/978-3-319-69626-3_21-1

Gorzelany-Dziadkowiec, M. (2021). COVID-19: Business Innovation Challenges. *Sustainability*, 13, 11439. https://doi.org/10.3390/su132011439

FAO. (2020). Impact of COVID-19 on agriculture, food systems and rural livelihoods in Eastern Africa: policy and programmatic options. Retrieved on February 29, 2022 from FAO Website: https://www.fao.org/documents/card/en/c/cb0552en/

Galanakis, C.M. (2020). The Food Systems in the Era of the Coronavirus (COVID-19) Pandemic Crisis. *Foods*, 9, 523. https://doi.org/10.3390/foods9040523

Galanakis, C.M., Rizou, M., Turki, M.S., Aldawoud, Ucak, I. and Rowan, N.J. (2021). Innovations and technology disruptions in the food sector within the COVID-19 pandemic and post-lockdown era. *Trends in Food Science and Technology,* 110, 193-200. http://doi.org/10.1016/j.tifs.2021.02.002

Gerard, F., Imbert, C. and Orkin, K. (2020). Social Protection Response to the COVID-19 Crisis: Options for Developing Countries. *Oxford Review of Economic Policy*, 36(Supplement 1), S281-S296. https://doi.org/10.1093/oxrep/graa026.

International Labour Organization-Organization for European Economic Co-operation. (2020). The impact of the COVID-19 pandemic on jobs and incomes in G20 economies. Saudi Arabia: DDG/P Office and OECD.

Kasim, K., Salman, D., Siregar, A.R., Nadja, R.A. and Ahmad, A. (2019). Vulnerability and Adaptive Strategies on Duck Breeder in Pinrang District, Indonesia. *IOP Conference Series: Earth and Environmental Science,* 235, 012046. https://doi.org/10.1088/1755-1315/235/1/012046

Ling Ma, N., Peng, W., Soon, C.F., Noor Hassim, M.F., Misbah, S., Rahmat, Z., Yong, W.T.L. and Sonne, C. (2021). COVID-19 pandemic in the lens of food safety and security. *Environmental Research*, 193, 110405. https://doi.org/10.1016/j.envres.2020.110405

Makassar City Food Security Service. (2021). Development of Food Consumption Patterns for Makassar City Residents in 2015 – 2020. Makassar, Indonesia: KKP Makassar.

Manap, N.M.A. and Ismail, N.W. (2019). Food Security and Economic Growth. *International Journal of Modern Trends in Social Sciences,* 2(8), 108-118. https://doi.org/10.35631/IJMTSS.280011

Minister of Health of RI. (2014). Regulation of The Minister of Health of The Republic Indonesia Number 41 the Year 2014 About Balanced Nutrition Guidelines. Retrieved from website: https://www.fao.org/nutrition/education/food-dietary-guidelines/regions/countries/indonesia/en/

Maxwell, S. and Frankenberger, T.R. (1992). Household food security: Concepts, Indicators, measurements. A technical review. Rome, Italy: UNICEF/IFAD Publication.

O'Hara, S. and Toussaint, E.C. (2021). Food access in crisis: Food security and COVID-19. *Ecological Economics*, 180, 106859. https://doi.org/10.1016/j.ecolecon.2020.106859

Peng, W., Sandro, D.S. and Berry, E.M. (2018). Coping With Food Insecurity Using the Sociotype Ecological Framework. *Frontiers in Nutrition,* 5, 107. https://doi.org/10.3389/fnut.2018.00107

Prasetyaningtyas, D. and Nindya, T.S. (2017). Association of Food Availability and Dietary Diversity of Household Farm Labour. *Media Gizi Indonesia*, 12(2), 149-155. http://doi.org/10.20473/mgi.v12i2.149-155 [in Indonesian].

Rahmadanih, Salman, D., Amrullah, A. and Dahri, M. (2019). Kajian Daerah Rawan Pangan. Kabupaten Mamuju Tengah Provinsi Sulawesi Barat. Retrieved from website: https://drive.google.com/file/d/1fp4R-18bqUzU1LiaQQQlBBKFJBh3t3UX/view?usp=sharing [In Bahasa Indonesia].

Rahmadanih, Bulkis, S., Amrullah, A. and Rukka. R.M. (2016). Penguatan Kelembagaan Kelompok Wanita Tani (KWT) Dalam Upaya Mengembangkan Konsumsi Pangan Rumahtangga. *Journal of Agrisystems*, 12(1), 1-12. [In Bahasa Indonesia].

Rahmadanih, Bulkis, S., Amrullah, A. and Rukka, R.M. (2015). Strengthening Institutional Model of Women -Farmers Group in Developing Household Food Diversification. *International Journal of Agriculture System,* 3(1), 29-40. http://doi.org/10.20956/ijas.v3i1.46

Rasul, G. (2021). Twin challenges of COVID-19 pandemic and climate change for agriculture and food security in South Asia. *Environmental Challenges,* 2, 100027. https://doi.org/10.1016/j.envc.2021.100027

Salman, D., Kasim, K., Ahmad, A. and Sirimorok, N. (2021). Combination of Bonding, Bridging and Linking Social Capital in a Livelihood System: Nomadic Duck Herders Amid the COVID-19 Pandemic in South Sulawesi, Indonesia. *Forest and Society*, 5(1), 136-158. https://doi.org/10.24259/fs.v5i1.11813

Sanjur, D. (1982). Social and Cultural Perspectives in Nutrition. New Jersey, USA: Prentice-Hall.

Silalahi, U. (2010). Social Science-Research-Methodology. Bandung, Indonesia: PT Refika Aditama.

Tashakkori, A. and Teddlie, C. (2003). Handbook of Mixed Methods in Social and Behavioral Research.

Thousand Oaks, California, USA: SAGE Publication.

USDA Economic Research Service. (2009). Access to affordable and nutritious food: Measuring and understanding food deserts and their consequences. Retrieved on March 2nd 2022 from: https://www.ers.usda.gov/webdocs/publications/42711/12698_ap036fm_1_.pdf?v = 41055

Workie, E., Mackolil, J., Nyika, J. and Ramadas, S. (2020). Deciphering the impact of COVID-19 pandemic on food security, agriculture, and livelihoods: A review of the evidence from developing countries. *Environmental Sustainability*, 2, 100014. https://dx.doi.org/10.1016%2Fj.crsust.2020.100014

World Bank. (2021). Food security and COVID-19. Retrieved on December 23, 2021 from Worlf Bank website: https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-COVID-19

Yusuf, S., Arsyad, M. and Nuddin, A. (2018). Prospects of Seaweed Development in South Sulawesi through a Mapping Study Approach. *IOP Conference Series; Earth and Environmental Science*, 157(1), 012041. https://doi.org/10.1088/1755-1315/157/1/012041

https://doi.org/10.26656/fr.2017.7(4).026