



## STOCKPILING DURING THE CORONAVIRUS PANDEMIC VERSUS THE SECURITY OF POLES

### GROMADZENIE ZAPASÓW W CZASIE PANDEMII KORONAWIRUSA A BEZPIECZEŃSTWO POLAKÓW

Justyna Stochaj\* , Natalia Moch\*\* , Bogusław Jagusiak \*\*\* 

#### — ABSTRACT —

The article is devoted to assessing consumers' behaviors, particularly in terms of stockpiling, after the coronavirus outbreak, as well as their impact on the security of Poles. Firstly, the paper reviews the literature. Then the research methodology was presented, with particular emphasis on the research methodology used, indication of the encountered limitations of the research, as well as characteristics of the respondents. General recommendations on stockpiles are then presented. These recommendations have been juxtaposed with those of the Polish government in this area. Then the author presented the results of the empirical research conducted using the survey technique. The results of the research were divided into four categories, which describe: the frequency of purchases, the quantity of products purchased, purchases of new products, and the reasons for stockpiling. Based on the above elements, a discussion was held, and recommendations were developed as a result.

#### — ABSTRAKT —

Artykuł został poświęcony ocenie zachowań konsumentów po wybuchu epidemii koronawirusa, zwłaszcza w zakresie gromadzenia zapasów, a także wpływowi tych zachowań na bezpieczeństwo Polaków. W artykule dokonano przeglądu piśmiennictwa. Następnie przedstawiono metodologię badań, ze szczególnym uwzględnieniem zastosowanej metodyki badawczej, wskazaniem napotkanych ograniczeń badań, a także charakterystyki respondentów. Kolejno przedstawiono ogólne rekomendacje w zakresie gromadzonych zapasów. Rekomendacje te zostały zestawione z zaleceniami polskiego rządu w tym zakresie. Autorka przedstawiła rezultaty przeprowadzonego badania empirycznego z wykorzystaniem techniki ankiety. Wyniki badań podzielono na cztery kategorie, w których opisano: częstotliwość robionych zakupów, ilość kupowanych produktów, zakupy nowych produktów, a także przyczyny gromadzenia zapasów. W oparciu o powyższe elementy przeprowadzono dyskusję i w jej efekcie wypracowano rekomendacje.

\* Military University of Technology in Warsaw, Faculty of Security, Logistics and Management.

\*\* Military University of Technology in Warsaw, Faculty of Security, Logistics and Management.

\*\*\* Military University of Technology in Warsaw, Faculty of Security, Logistics and Management.

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## INTRODUCTION

In 2019, the first wave of coronavirus hit selected countries around the world. They therefore had to take up the struggle by trying to alleviate its peak levels in order to reduce morbidity and mortality and to reduce the overall tension in their health system. The rest of the world was preparing for an epidemic on their territories (Flahault, 2020, p. 1037). In Poland, the first confirmed disease occurred at the beginning of March 2020 (Service of the Republic of Poland, 2020), while the WHO announced the occurrence of the COVID-19 coronavirus pandemic worldwide on March 11, 2020 (*WHO Director-General's Opening Remarks...*, 2020). As a result of the coronavirus, the health sector has been severely affected, as well as the food sector (Nicola et al., 2020).

The outbreak of the coronavirus has had a major impact on consumer behavior (Zwanka & Buff, 2021) in Europe and beyond (Evans, 2020; Feng & Fay, 2020), and during previous epidemics such as SARS and MERS, impacts on the supply chain were observed (Cavinato, 2004). In the world, at a time when the epidemic was in an embryonic state, unsustainable consumer behavior in the context of food purchases was observed in individual countries, most probably caused by fear (Cachero, 2020). The outbreak of the coronavirus has undoubtedly influenced changes in consumer purchasing behavior (Lamming, 2000; Dooley et al., 2010) and stockpiling. Panic buying has now become a frequent phenomenon that can be observed in many countries. It leads to stockpile depletion and interruptions in supply chains (Yuen et al., 2020, pp. 1–14).

It is important to note that changes in consumer behavior have already been observed after the occurrence of various crisis situations. For example, after Hurricane Katrina (Sneath, Lacey, & Kennett-Hensel, 2009; Kennett-Hensel, Sneath, & Lacey, 2012), after the Christchurch earthquake (Forbes, 2017), or after other natural disasters (Larson & Shin, 2018). Various negative events, such as cataclysms, have an impact on changes in society and bring a new set of values to those who are maturing at the time (Debevec et al., 2013).

First of all, it should be noted that building up stockpiles has been defined as a technique to remain on standby (Keck, 2017). Stockpiling is also referred to as

a security device (Amicelle, Aradau, & Jeandesboz, 2015). This action prepares for the future and contributes to minimizing the risk of lack of supply of certain products necessary for survival. People's preferences and behavior are likely to change with disasters and accidents (Teng et al., 2015; Cogato et al., 2019). The psychology of consumer stockpiling indicates that the main purpose of stockpiling is to regain control, particularly in view of the phenomena that cause us to lose control.

The aim of the paper was to assess consumers' behaviors in terms of accumulated stocks and their impact on security after the outbreak of the coronavirus epidemic in Poland. The study also makes recommendations and guidelines in relation to the stockpiling during future pandemics.

## 1. RESEARCH METHODOLOGY

### 1.1. Research methodology used

The following main research problem was solved during the research: *Did the Poles stockpile after the coronavirus outbreak and how did their purchase decisions affect their security?* The main problem was supplemented by the following specific problems:

1. What are the recommendations in relation to stockpiling?
2. How has the frequency of purchases made by Poles changed after the coronavirus outbreak?
3. How has the volume of purchases made by Poles changed after the coronavirus outbreak?
4. What products did Poles begin to buy after the coronavirus outbreak, which they did not buy before the outbreak?
5. What event has contributed to the decision to stockpile?

The following working hypothesis was assumed for the main research problem: "It was assumed that after the coronavirus outbreak, the vast majority of Poles accumulated stocks of basic food products (flour, bread, butter, milk, rice, groats, bottled water, sugar, and canned food) – above 80% on average for the indicated products. In addition, it was assumed that the purchasing decisions taken by Poles have only slightly improved their level of security, which was due to the increased quantity of products purchased which such products did not directly affect their survival".

The following specific hypotheses have been formulated accordingly to the specific problems assumed:

1. It was assumed that it is recommended to accumulate two-week stocks of food products with long shelf life, e.g., bottled water, canned food, etc.
2. It was assumed that Poles will shop less frequently after the coronavirus outbreak, but in the initial period after the announcement of the pandemic there will be more consumers in shops willing to make supplies.
3. It was assumed that the quantity of commodities purchased at a one-off purchase would increase for all commodities purchased, such as flour, bread, butter, milk, rice, groats, bottled water, sugar, and canned food.
4. It was assumed that after the outbreak of the coronavirus, Poles would buy personal protective equipment such as: protective masks, protective gloves, disinfectants (e.g., hand disinfection lotion).
5. It was assumed that most of the respondents (more than 50% of them) were motivated to make the decision to stock up because of the government's actions, such as: closing educational facilities, imposing an injunction to wear a protective mask, imposing a recommendation to disinfect hands, and imposing restrictions on the number of people allowed to enter a shop.

During the research, mainly quantitative research methods were used. The data for analysis were obtained using the diagnostic survey method with the use of a questionnaire technique. More precisely, the CAWI method, which allowed to learn the opinions of the respondents via an electronic questionnaire, was used to harvest the data<sup>1</sup>. The data have been statistically processed using the application – Statistica (*Statistica...*, 2008). Microsoft Excel spreadsheet was also used for calculations. These tools were used, among others, to calculate correlations, percentages of the respondents' responses, as well as to perform other statistical calculations, which are presented in the part containing the results of the survey in this paper. Correlations were calculated based on the Pearson's chi-square coefficient.

Apart from the empirical method, theoretical research methods were also used in the research, such as the analytical-synthetic method, which was used in particular for critical analysis of the literature on the subject studied. Moreover,

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<sup>1</sup> The questionnaire has been elaborated from the 1<sup>st</sup> to the 15<sup>th</sup> of July 2020 by Biostat Sp. z o.o. with its registered office in Rybnik.

an abstraction was used to select only those elements that proved to be necessary in the course of the research. The comparison was used to compare the data obtained from the survey questionnaire with the recommendations on the stockpiling. Generalization and conclusion were used to formulate the conclusions.

### 1.2. Limitations of research

The several main constraints have been identified in this study. The study did not provide in-depth information on the purchases made by Poles and the stocks collected after the outbreak of the coronavirus. The respondents only referred to the proposed answers, and very rarely presented their proposals for answers. It should be stressed that in surveys there is always a risk of false judgement or exaggeration. This is particularly important in the context of the great public and research interest in the COVID-19 pandemic. This may contribute to an error due to a social desire. Moreover, the selection of respondents for the survey was based, among other things, on the administrative division of the country into voivodeships. An equal number of respondents was appointed to participate in the study. This selection was not based on the size of individual voivodeships, which may undermine the representativeness of the study. In addition, it should be noted that the study was carried out using an online Internet tool. Therefore, the proportion of older people in relation to younger people is decreasing.

### 1.3. Characteristics of the respondents

A group of 384 people, representative in quantitative terms in relation to the Polish population, participated in the survey<sup>2</sup>. The sample was selected based on the following elements: age, sex/gender, and place of residence. As a result, 47.7% of men and 52.3% of women participated in the survey. Due to the place of residence, 24 people were examined per each voivodeship. The study involved 18.75% of people aged 20–31, 20.83% of people aged 32–41, 16.67% of people

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<sup>2</sup> The sample was determined on the basis of the following elements:

- population size – 38,383,000 (Cierniak-Piotrowska, Dąbrowska, & Stelmach, 2020),
- confidence level – 95%,
- fractional size – 0.5,
- maximum error – 5%.

aged 42–51, 16.14% of people aged 52–61, 15.10% of people aged 62–71, 8.33% of people aged 72–81, and 4.17% of people over 82.

Less than 3 out of 10 respondents were residents of cities with more than 200 thousand inhabitants. Slightly fewer respondents lived in cities with between 50 thousand and 200 thousand inhabitants. And 17.2% were from cities with 20 thousand to 50 thousand inhabitants. 11.5% of the studied residents were residents of cities up to 20 thousand inhabitants. Almost every fifth respondent was a village resident.

The majority of people participating in the study had university-level education – 39.6%. Secondary technical (high school) education was 28.4% of the respondents, and general secondary (high school) education – 20.6%. Every tenth respondent had basic vocational education, while only 1.3% of the respondents had basic education.

## 2. RECOMMENDATIONS FOR THE STOCKPILING

The literature recommends stockpiling for the reason of functioning in a variable, complex and interdependent environment in the so-called global village. Stockpiling helps to avoid the shortage of necessary products in case of disruption of their flows. “Multiple military and economic crises at the beginning of the 20<sup>th</sup> century challenged the liberal faith in the ability of dispersed private stores and the free circulation of goods to provide security of vital supplies. The liberal system of free-flowing circulations increasingly came to be regarded as a problem rather than a solution to the security and welfare of societies. The ever more intricate networks of progressively more global trade relations and the growing complexity of industrial societies created new bottlenecks in circulatory infrastructures and rendered disruptions of flows potentially disastrous” (Folkers, 2019, pp. 498–499).

Behavior in relation to stock building can be observed among consumers. They usually involve the purchase of large quantities of products by many consumers in order to avoid possible future shortages or increases of prices (Su, 2010; Shou, Xiong, & Shen, 2013).

After the coronavirus outbreak, major changes in consumer behaviors were observed. For example, before the outbreak of the pandemic, the Chinese largely bought food and groceries in supermarkets and bazaars. After the pandemic, this trend has changed in favor of online shopping and local independent small shops (Li, Hallsworth, & Coca-Stefaniak, 2020).

In the United States, as a consequence of the coronavirus, changes have been observed, among other things, in expenditure on air travel, food supplies, and public transport. These changes have been deepening significantly from week to week in the early stages of the pandemic (Baker et al., 2020).

Following the coronavirus outbreak in some countries around the world, recommendations were made on stockpiling. For example, recommendations for stockpiling have been issued by Federal Office of Civil Protection and Disaster Assistance in Germany. At that time, the Office has identified a list of necessary products that citizens should gather in order to survive for up to 10 days (Federal Office of Civil Protection and Disaster Assistance, 2020). These recommendations, on the other hand, were a response to the fact that the Germans went in large numbers to shops to build up stockpiles. This institution has already in the past made recommendations on the types of stocks to be collected, as A. Folkers referred to “28 litres of water; 5.6 kg of grain, bread, potatoes, pasta and rice; 5.6 kg of vegetables and legumes; 3.6 kg of fruit and nuts; 3.7 kg of milk and dairy products; 2.1 kg of meat, fish and eggs; 0.5 kg of fats and oils. According to the emergency stockpile checklist issued by the German Federal Office of Civil Protection and Disaster Assistance [...], this is the amount of food needed to survive a two-week food shortage” (Folkers, 2019, p. 493).

The recommendations of the German institutions are not surprising, given that people went to shops in large numbers to build up stockpiles. People have massively purchased paper towels, toilet paper, tinned food, pasta, and flour, as a result of which many supermarkets have run out of these products. A similar trend has been observed in Poland. For example, antibacterial hand gels and masks were bought out very quickly from online shops, the price of which increased significantly in just a few days (Krzymińska, 2020).

It should be stressed that after the coronavirus outbreak, the Polish authorities did not recommend stockpiles. The first time that such an announcement was made was at a press conference of the Prime Minister, during which he announced the closure of educational facilities. During this meeting, while asking questions by the press, one of the reporters referred to the recommendations of the German Government concerning the stockpiling and asked directly whether recommendations concerning the quantities and types of products to be stocked would also be directed to the Poles. The answer was unequivocal: there will be no such recommendations, because there is no need to stockpile (*The Prime Minister's Press Conference on the Closure of Educational Facilities of March 11, 2020*, 2020). Despite this statement, customers went to shops in large numbers

and started to buy out commodities, especially those with a long shelf life. In some shops the shelves were becoming empty, and their owners could not keep up with the refilling.

The recommendations presented in the media were in opposition to the recommendations of the Polish government. After the first case of coronavirus infection in Poland, there were recommendations on some websites to build up a sufficient amount of stockpiles for 14 days. First of all, it was recommended to stockpile:

- products dry and easy to store, such as: rice, pasta, oatmeal, groats, canned food, chocolate, coffee, water,
- hygiene products, such as: soap, hand disinfectants, toilet paper, tissues, sanitary towels, diapers, wet wipes,
- medicaments, such as: painkillers, antipyretics, for coughing, for stomach, and electrolytes (*Coronavirus in Poland...*, 2020).

The decision of the Polish authorities related to the lack of recommendations for stockpiling after the pandemic was not unique. Also, the Centers for Disease Control and Prevention did not recommend that people take stockpiling actions. Such a recommendation was issued only to persons who needed to take additional precautions (Centers for Disease Control and Prevention, 2020). Thus, people who were fully healthy were not supposed to stockpile, but to shop as usual.

Despite all the recommendations, people decide to accumulate supplies because of the behavior of others. When we see others buying and commodities disappear from the shelves, we start to buy for fear of shortages of commodities.

One of the reasons for stockpiling in the face of the coronavirus was pointed by the respondents as follows: “It can be for profit-seeking or loss avoidance purposes, and the goods may be meant for conventional consumption or unconventional use. Consumer stockpiling in the face of the COVID-19 pandemic can be viewed as unconventional inventory accumulation, mainly meant to minimize a perceived threat of loss or fear of going without” (Pan, Mantin, & Dresner, 2020).

As a result of all the information provided, one can state that it is possible to partially confirm the hypothesis assumed for the first detailed research problem concerning recommendations on stockpiling. It can be confirmed that it is generally recommended to build up food stocks. In such a case, the supplies for survival of the period of 10–14 days would have to be stockpiled. It is best to store products with a long shelf life.



### 3. RESULTS OF THE RESEARCH

The study showed that as a result of the coronavirus pandemic, there was a change in the frequency of purchases made by Poles, i.e., it decreased. Thus, an increase in purchases in the group of grocery products was noted. The respondents also declared to buy products they had not bought before the outbreak, such as personal protective equipment. As the main reason for stockpiling, the respondents pointed the imposition of a limit on the number of people allowed to enter a store.

#### 3.1. Frequency of purchases

Before the outbreak of the coronavirus, 71.1% of the respondents shopped twice a week or more often. During the pandemic, 29.2% of the respondents kept this frequency of purchases. On the other hand, 16.4% of the respondents shopped once a week before the outbreak of the coronavirus, and 48.2% after its outbreak. Before the outbreak of the coronavirus, 8.3% of the respondents did their shopping at least twice a month, after the outbreak – 16.9%. Before the outbreak of the pandemic, 1.8% of the respondents shopped once a month and less frequently, and 3.9% afterwards (Table 1).

**Table 1.** The Frequency of Purchases Made Before and After the Occurrence of the Coronavirus Pandemic [Data in%]

Frequency	Before the outbreak of the coronavirus	After the outbreak of the coronavirus
Once a month and less often	1,8	3,9
At least twice a month	8,3	16,9
Once a week	16,4	48,2
Twice a week and more often	71,1	29,2
I have no opinion	1,6	1,3
Another	0,8	0,5

Source: Author's own research.

### 3.2. The quantity of products purchased

All analyzed products were bought more often by the respondents after the outbreak of the coronavirus pandemic than before its occurrence. The highest increase was noticed for bottled water. Before the outbreak of the coronavirus, there were on average 4 bottles, after the outbreak of the coronavirus, there were already 6.1 bottles. Thus, an increase of more than 2 pieces was noticed. A large increase was also observed in the case of purchasing toilet paper. Before the outbreak of epidemic, it was on average 3.8 pieces, after the outbreak – 5. This is an increase of over 1 unit. There was also a significant increase in the purchase of milk. Before the pandemic, the respondents bought 2.2 bottles on average. After the pandemic outbreak, it was 3.2 pieces. It is an increase of 1 piece on average. There was also an increase in purchase declarations of less than one item of the following products on average: sugar, canned food, paper towels, rice, butter, flour, bread, and groats (Table 2).

**Table 2.** Number of Purchased Products on One-Off Purchases  
[Data in the Number of Items]

Products	Before the outbreak of the coronavirus	After the outbreak of the coronavirus	Difference
Flour	1,4	2,1	0,7
Bread	1,5	2,0	0,5
Milk	2,2	3,2	1,0
Butter	1,5	2,2	0,7
Rice	1,2	1,9	0,7
Groats	1,1	1,5	0,4
Bottled water	4,0	6,1	2,1
Toilet paper	3,8	5,0	1,2
Paper towels	1,6	2,3	0,7
Sugar	1,8	2,7	0,9
Canned food	1,1	1,9	0,8

Source: Author's own research.

Against the background of the above answers, it should be emphasized that not every respondent indicated an increase in the quantity of individual products bought by him/her. Analysis of the data showed that 37.76% of the

respondents bought more flour. Less than 6% bought it less, and 56.25% of the respondents maintained the same level of purchases of this product. 34.38% of the respondents decided to increase the purchase of bread, 5.21% bought less, and 60.42% kept their purchases at the same level as before the outbreak of the coronavirus. 35.68% of the respondents made their milk stocks, 2.6% bought less, and 61.72% maintained the same level of purchases as before the pandemic. 32.81% of the respondents decided to buy more butter, 2.86% of the respondents bought it less, and 64.32% did not change the quantity of this product. 35.94% of the respondents decided to increase their purchase of rice, 3.9% bought less, and 60.16% did not change the quantity of rice they bought. 28.9% of the respondents pointed an increase in the quantity of groats purchased by them, 3.9% of the respondents bought before and after the outbreak of the coronavirus at the same level, and 67.19% of the respondents bought less quantities. 42.97% of the respondents decided to increase their stocks of bottled water, 4.95% of the respondents reduced their stocks in this area, and 52.08% kept them at the same level. Toilet paper after the coronavirus was bought in greater quantities than before by 36.20% of the respondents, 2.86% bought it less, and 60.94% kept their purchases at the same level. An increase in the purchase of paper towels was declared by 36.20% of the respondents, a decrease of 1.8%, while the same level was reported by 61.98% of the respondents. 30.73% of the respondents made a stock of sugar, 2.6% bought it less, and 66.67% did not change the amount of this product in their purchases. 32.81% of the respondents after the outbreak of the coronavirus decided to stock up on canned food, 3.39% bought less, and 63.80% kept their purchases at the same level as before the outbreak of the pandemic.

As a result of this data, it was possible to solve the third detailed research problem related to the change in the quantities of purchases made after the outbreak of the coronavirus, and it was also possible to verify the hypothesis assumed for this research problem. It was confirmed that the quantity of purchased commodities increased. However, it should be emphasized that the increase in purchased products did not apply to all respondents. For various products, a declaration of purchase of a larger quantity of commodities was made by from 28.9% to 42.97% of the respondents. The biggest increase in purchases concerned bottled water.

### 3.3. Purchasing new products

Most respondents admitted that as a result of the pandemic they had started buying protective masks – 79.9%. Disinfectants started to be purchased by 62.8% of the respondents and protective gloves by 59.6%. Every fifth respondent was buying spirit (alcohol). Among other answers there were: Amol, vodka, vinegar. A little over 10% of the respondents answered that they had not started buying any of the products listed (Table 3).

**Table 3.** List of Products Purchased by the Respondents during the Coronavirus Pandemic [Data in%]

Product	Number of responses
Protective mask	79,7
Disinfectants	62,8
Protective gloves	59,6
Spirit	20,3
None of the above	10,4
I have no opinion	1,3
Another	0,5

Source: Author's own research.

Among all the respondents who declared to purchase protective gloves, 20.96% were people from the village, 8.30% were people living in the city up to 20 thousand inhabitants, 17.03% were people living in the city over 20 thousand inhabitants and under 50 thousand, 26.64% were people living in the city over 50 thousand inhabitants and under 200 thousand, 27.07% were people living in the city with more than 200 thousand inhabitants. Of all the people living in the village, 72.73% declared to have purchased protective gloves. Among the people living in a city up to 20 thousand inhabitants, 43.18% declared the same purchase. For people living in a city above 20 thousand and below 50 thousand inhabitants, the number of indications for the purchase of protective gloves was 59.09%. Among people living in a city with more than 50 thousand inhabitants and less than 200 thousand, 61% bought protective gloves. In turn, 57.41% of the inhabitants of the city of over 200 thousand decided to buy protective gloves.

Among all the respondents who declared to purchase a protective mask, 19.61% were people from the village, 9.80% were people living in the city up to

20 thousand inhabitants, 17.65% were people living in the city over 20 thousand inhabitants and under 50 thousand, 26.14% were people living in the city over 50 thousand inhabitants and under 200 thousand, 26.80% were people living in the city with more than 200 thousand inhabitants. Of all people living in the village, 90.91% declared to have purchased a protective mask. Among people living in the city up to 20 thousand inhabitants, 68.18% declared the same purchase. For people living in the city above 20 thousand and below 50 thousand, the number of indications for purchasing protective masks was 81.82%. People living in a city with more than 50 thousand inhabitants and less than 200 thousand in 80% bought the mask. In turn, 75.93% of the city's population over 200 thousand decided to buy protective masks.

Among all the respondents who marked the answer “none of the above”, i.e., after the outbreak of the coronavirus they did not purchase any personal protection equipment, 5% were from the village, 15% were from the city up to 20 thousand inhabitants, 7.50% were from the city over 20 thousand inhabitants and under 50 thousand, 32.50% were from the city over 50 thousand inhabitants and under 200 thousand, 40% were from the city with more than 200 thousand inhabitants.

### 3.4. Reasons for stockpiling during the pandemic

More than one in three of those surveyed (38.5%) did not make a larger stock at all during the pandemic. Slightly fewer respondents, namely 34.1% of them, made a stockpile after the speech by the authorities concerning the imposition of restrictions on the number of people allowed to enter a shop. One in ten respondents decided to build up food stocks after the authorities' speech related to the imposition of restrictions and closure of educational facilities (10.7%). Nearly 8% of those surveyed decided to stockpile after the imposition to wear a protective mask. A little over 3% of those surveyed decided to stockpile after the authorities' recommendations on hand disinfection had been presented. 2.3% of the respondents chose the other answer, where they reasoned the fact that they had stockpiled with the global situation, the World Health Organization's communications, the impositions of restrictions in other countries, and the imposition of restrictions on free people movement. 3.4% of the respondents had no opinion on this issue (Table 4).

As a result of the study, the fifth detailed research problem was solved, relating to the motives for making the decision to stock up. The hypothesis established

**Table 4.** Reasons for Stockpiling during the Coronavirus Pandemic [Data in%]

Cause	Number of responses
The government's speech related to the introduction of restrictions related to the number of people allowed to enter the store	34,1
The speech of the authorities related to the introduction of restrictions/closure of educational institutions	10,7
The speech of the authorities related to the introduction of the order to wear a protective mask	7,8
The authorities' speech related to the introduction of the obligation to disinfect hands	3,1
I have no opinion	3,4
Another	2,3

Source: Author's own research.

for this research problem has been verified negatively. It was not confirmed that the government's actions, such as closing educational institutions, introducing an order to wear a protective mask, introducing a recommendation to disinfect hands and introducing a restriction on the possibility of entering the store, motivated more than 50% of the respondents to make supplies. These events convinced the most 10.7% of the respondents, and this took place after the closure of educational institutions.

#### 4. DISCUSSION AND RECOMMENDATIONS

In the empirical survey, 34.1% of the respondents declared that they had stocked up. This means that more than a third of the respondents decided to buy more than usual. There is limited information available in the literature on the stockpiling by the population in Poland after the coronavirus outbreak and an impact of stockpiling on security. An empirical study showed that there was a change in the behavior of Polish consumers after the coronavirus outbreak. The frequency of purchases decreased. However, there was an increase in the quantity of products purchased. We bought more during one-time shopping, so the frequency of going to the shop decreased and thus the number of opportunities to transmit the virus to each other was reduced.

Less frequent purchases in the event of epidemic is a good phenomenon improving the security of the public. The decrease in the number of visits to the store is related to the increase in amount of purchased commodities. If this increase is within reason (stocks of up to 10–14 days) and does not significantly restrict access to these commodities for other people, it has no negative consequences for the security of the population.

The respondents declared making purchases they had not made before. This applies in particular to personal protective equipment. Perhaps the decisions to purchase them were due to the government injunctions that made wearing protective gear compulsory (an injunction to cover the mouth and nose and an injunction to wear protective gloves). These injunctions may have contributed to an increase in the number of protective masks and gloves purchased, which in the initial phase resulted in a significant increase in the price of these products, as well as their long-term unavailability. This action undoubtedly had a significant impact on the security of Poles. First of all, the use of personal protective equipment is recommended and improves security, but when faced with a limited number of personal protective equipment, it turned out that people who needed it less had been able to get it on time.

It should be stressed that the transmission of coronavirus can be similar to previous epidemics caused by other coronaviruses, such as MERS or SARS. Transmission of the virus is possible through droplets, aerosols, and direct contact (WHO, 2020). The transmission can happen while talking, coughing, and sneezing. It is important that both symptomatic and asymptomatic patients can infect (Singhal, 2020). It can therefore be concluded that transmission and getting infected is very easy (Shereen et al., 2020). The coronavirus can be transmitted by vectors (people), mainly through direct contact. However, getting infected is still possible indirectly, for example, through contact with objects with a virus, such as plastic or metal (Peng et al., 2020, pp. 1–6; Jayaweera et al., 2020).

The empirical study confirmed that more than 36% of the respondents decided to stock up on paper towels and toilet paper. These are commodities without which a man would have been able to survive. It was therefore not necessary to buy these commodities. The increased purchase of toilet paper was also reported by the media (Jones, 2020) and scientists (Garbe, Rau, & Toppe, 2020).

Panic buying is social herd behavior (Steven, O'Brien, & Jones, 2014), which can make a certain type of product unavailable for other people who need it more (Wessler, 2020, pp. 1–9). This is particularly important when purchasing medical supplies such as masks.

During the pandemic, Poles started to buy some of the products and pharmaceutical preparations that were available without a prescription. At the same time, none of the distinguished categories noticed decreases in purchases (except painkillers) (*New Shopping Habits for Non-Prescription Preparations*, 2020).

The perceived changes in consumers' behaviors are partly due to a feeling fearful of the virus (Harper et al., 2021). A violence has emerged in many homes during isolation (Prasso, 2020). Various stressful events are one of the reasons for changing consumption habits. This is one way to deal with stress (Mathur, Moschis, & Lee, 2003).

It should be stressed that undertaking an effective response of people to the epidemic threat or epidemic, e.g., COVID-19, depends on wide dissemination and widespread acceptance of accurate information (Dupras & Williams-Jones, 2012). In practice, however, there are many sources from which conflicting and false information is spread, which creates a climate of mistrust (Parmet & Paul, 2020) and causes a drop in a security level.

Stockpiling is a consumer response to the arising risk. This has already been confirmed by previous studies (Gao et al., 2014). However, sometimes the phenomenon of panic buying and stockpiling turns out to be disastrous consumer behavior, which is driven by a set of multiple motivations and psychological processes (Wang et al., 2020).

## CONCLUSIONS

This paper assesses consumers' behaviors in terms of stockpiles and assesses their impact on public security. As a result of the empirical study conducted, the main research problem was solved. This research problem was to find an answer to the question: Did the Poles stockpile after the coronavirus outbreak and how did their decisions affect their security? The hypothesis established for the main research problem, in the first part of the paper, was verified negatively. In the course of the survey, it turned out that only about one third of those surveyed decided to stockpile. However, it was assumed that the number of the surveyed who decided to stockpile would be much higher. The second part of the hypothesis assumed that the purchase decisions taken by Poles improved their security to a small extent. On the basis of the data collected, it is difficult to resolve this assumption. First of all, security was improved by the reduction in the frequency of purchases, which was combined with the increased quantity of



commodities purchased. In general, however, this behavior should be considered positive, as it reduced contacts with other people. As a result, the number of opportunities to transmit the virus decreased. Secondly, the crowded presence of people in shops for about two weeks after the worldwide announcement of the pandemic contributed to the deterioration of security. Too many people had suddenly come to the stores to do their shopping. There were no regulations yet that would require compliance with any rules to minimize the risk of infection, such as keeping a social distance, covering the mouth and nose, wearing protective gloves or restrictions on the number of people allowed to enter the shop. These rules came into force too late. Previously, however, there had been appeals from the government members that did not have much effect on society in the face of media messages.

Generally speaking, it is recommended to build up stocks in the event of an unforeseen crisis situation. Collecting stocks improves security level as well as well-being. However, the stocks must be collected in a reasonable manner. Firstly, it is best to stockpile in a systematic manner, not just on a one-off basis after the threat of a pandemic. The crowds in the shops buying all the products off the shelves are not only encouraging the possibility of the virus being transmitted, but also adding to the fear of other people seeing the commodities disappearing from shelves at an alarming rate. Secondly, the purchase made should be well thought out. It is important to focus on buying products with a long shelf life, and not buying perishable fruit and vegetables if we are unable to store them properly, because it may turn out that these purchases shall simply be wasted.

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