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The Impact of the Covid-19 Pandemic on Eating Behavior among Adults Poles

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Abstract

Background: Due to the outbreak of coronavirus disease (Covid-19), many restrictions and temporary lockdowns were carried out. As a result, the previous lifestyle, including diet, was disrupted.

Objectives: This review aimed to assess changes in eating behavior during Covid-19 compared to the period before the pandemic in Poland.

Methods: The review involved original studies concerning adult Poles (aged ≥ 18), including changes in their eating behavior.

Results: The Covid-19 pandemic and the social isolation periods had an ambiguous influence on diet in Poland. The changes depended on many factors, e.g., age, sex, education, occupation, or body weight. In general, a regular diet pattern was followed. In case of changes, positive and negative eating habits were observed. Improper eating behavior was noticed, such as increased total and junk food intake. However, improvement in the diet also was observed. Consumption of healthy food, such as vegetables and fruit, went up. A significant increase in home cooking also was noticed.

Conclusions: The present review indicates the need for future strategies to assess nutrition in alarming situations. Promoting healthy eating behavior appears to be essential, especially during the pandemic.

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INTRODUCTION

More than two years have passed since the first SARS-CoV-2 infection was detected in the Chinese city of Wuhan. The ongoing global pandemic, announced by the World Health Organization (WHO) on 11 March 2020, continues to affect many aspects of our lives[1]. In effect, restrictions and temporary lockdowns were introduced in most countries, including Poland. Their consequences were changes in diet and lifestyle. In Poland, the state of the epidemic was announced on 20 March 2020. Therefore, the restrictions were in force until 19 April 2020. The first stage of lifting the restrictions took place on 20 April 2020 and concerned, among other things, the loosening of restrictions related to moving from one place to another[2,3].

The pandemic has forced people to spend more time at home. Many people have switched to remote or hybrid learning/work. In Poland and other countries, alarming trends related to the increase in the number of people struggling with overweight or obesity had already been observed before the pandemic. According to Eurostat data for 2019, almost 53% of the European adult population (aged ≥ 18) was overweight (36% overweight and 17% obese). In Poland, 58% of adults had a BMI ≥25[4,5]. As the leading causes of excess body weight, WHO points to an increase in consumption of food with high energy density, rich in fats and sugars, and more and more often reduced physical activity resulting from a sedentary lifestyle, use of means of transport, and progressive urbanization[6]. It is worth noting that elevated BMI values are the main factor in developing chronic civilization diseases such as cardiovascular diseases, diabetes, disorders of the musculoskeletal system, and some cancers[6].

Assessing the nutrition of populations during the Covid-19 pandemic can help prevent overweight and obesity and their associated public health consequences. The study aimed to review the research results on dietary changes during the Covid-19 pandemic in an ethnically homogeneous population.

METHODS

For this study, the following databases were searched: Google Scholar and Pubmed, using the following keywords: diet, eating habits, eating behavior, lifestyle, pandemic, lockdown, Covid-19, Poland. The analysis included studies published between 03 June 2020 - 31 December 2021 concerning the inhabitants of Poland, meeting the following inclusion criteria: age of respondents ≥18; studies on the Polish population; studies on lifestyle during the pandemic, in which changes in eating behavior are included and exclusion criteria: studies focusing on non-dietary lifestyle behaviors - e.g., exercise, stimulants, sleep quality; studies evaluating the Impact of the pandemic on non-dietary/nutritional parameters such as body weight and studies concerning the effect of specific factors on eating behavior, e.g., the level of anxiety experienced during the pandemic.

Studies characteristics

The assumed criteria were met by eight original articles which examined the diet of adults in the Polish population (≥18 years of age) during the pandemic - in lockdown and the period

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immediately after it[7-14]. Data were collected between March 2020 and April 2021. The number of study participants ranged from 174[14] to 2,381[12]. The total number of respondents in all surveys was 5,880 people. 3 out of 8 studies[7-9] were conducted among students (aged 18-22, aged 22.24 ± 2.46)[9,8] and young adults (aged 18-34)[7], while the rest were adults (≥ 18 years old)[10-14]. The selection of the sample in terms of age was intentional[7-14]. The most numerous respondents in most studies were people aged 18-25[11,13,14], 30-39[12], or 25-65[10], which may result from the methods of obtaining data.

In each study, the surveys were made available to participants online, mostly through social media, on the participating institutions' websites, or via email. In one study, additional information from the respondents was obtained through face-to-face meetings[12]. In Czenczek-Lewandowska *et al.* study[7] a modified Food Frequency Question-naire (FFQ) (developed by Wądołowska[15,16]) was used to receive information on nutritional behaviors during a lockdown and the ongoing pandemic. In other studies, based on original questionnaires, the trends of changes in eating habits in the discussed period were examined, taking into account changes in total food consumption and the frequency of consumption of individual groups of products[8-14].

A detailed list of the studied samples, data collection methods, the duration of the research, and the tools used are presented in Table 1. The list of products that the respondents were asked about in individual studies is presented in Table 2.

RESULTS

The studies included analyzed changes in health behavior during the pandemic. In this review, issues related to the diet, i.e., total food consumption, regularity of meals consumed, changes in the consumption of selected products and drinks, and self-preparation or ordering takeaway, depending on gender, age, education, professional situation, and body weight of the respondents were assessed. Table 3 presents the conclusions from the studies included.

General food intake, products selection

The respondents usually declared no changes in their diet or frequency of consumption of particular groups of products[10-12,14]. However, an increase in total food intake[8,9,13], including the consumption of snacks or sweets[7,9,13] was observed. More meals were consumed[9,10]. Two studies reported eating breakfast more frequently[9,13]. The frequency of consumption of sweets and snacks, fruit, and vegetables was the same before and during the lockdown. Sweets and snacks were eaten a few times a week[7,10,13]. The fruit was eaten once a day to several times a day[10], as for vegetables, they were eaten several times a week[7] or every day[10, 13].

In two studies, a significant percentage of respondents increased the consumption of vegetables and fruit[9,14]. The respondents declared more frequent consumption of milk and dairy products[9,14]. The consumption of nuts, meat, and meat products slightly increased[9,14]. In two studies, more than half of the respondents declared no change in their consumption of fast-food[11,14]. In the other two studies[9,11] an increase, and one study[14], a decrease in their consumption was observed. Cereal products were eaten as often as before the pandemic or more frequently[9,14].

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Table 1. Characteristics of the Studies Included.

Authors and release year	Sample size [n]	Sociodemographic characteristics				Study design	Study period	Methods of nutritional assessment
		Age	Gender	Place of residence	Education / Occupation			
Blaszczyk-Bębenek E. *et al.*, 2020[10]	312	41,12 ± 13,05	64,1% women 35,9% men	Participants from 15 (out of 16) voivodeships from Poland; 77,7% of urban inhabitants	employed participants (during social isolation, almost 66,6% worked remotely); 75,5% with higher education	the observational retrospective online questionnaire study	29.4.2020 – 19.5.2020	food frequency questionnaire
Czenczek-Lewandowska *et al.*, 2021[7]	506	24,67 ± 4,23 (only participants in early adulthood)	70,2% women 29,8% men	residents of south-east Poland; 54,6% urban inhabitants, 45,5% village inhabitants	46% of respondents with higher and 52% secondary education; 36,8% of respondents were students; 13% of employed participants switched to remote work during the lockdown	a retrospective-pre-post survey study (online)	24.3.2020 – 11.4.2020	food frequency questionnaire
Dobrowolski H. & Włodarek D., 2021[11]	183	33 ± 11	78% women 22% men	More than half of the participants were urban inhabitants		a proprietary questionnaire (online)	2020	original questionnaire; Likert scale
Fila-Witecka K. *et al.*, 2021[8]	980	22,24 ± 2,46	75% women 25% men	urban inhabitants	University students in 1st or 2nd year,	a cross-sectional observ	12.5.2020 – 30.6.2020	survey questions regarding changes in

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					almost 75% unemployed	ational study (online)		eating habits during the pandemic
Górnicka M. *et al.*, 2020[12]	2381	the largest group was respondents aged 30-39	nearly 90% of women	above 83% of urban inhabitants,	students and employed participants (42% remotely); above 75% of respondents with higher education	large cross-sectional survey (online and face-to-face)	30.4.2020 – 23.5.2020	created three patterns: healthy, regular, unhealthy
Raczkowska E *et al.*, 2021[14]	174	the largest group was respondents aged 18-25	81,6% women 19,4% men	55,2% urban inhabitants, 44,8% village inhabitants	62% employed participants (12,6% remotely, 20,7% mixed working)	an original survey questionnaire (online)	15.4.2021 – 29.4.2021	changes in the frequency of consumption of food generally and of selected food groups rating ("less frequent," "no change," "more frequent."
Rzadkowolska K., 2021[9]	247	the most prominent group was respondents aged 18-22	only women	51,4% of urban inhabitants	students, 30,7% employed	diagnostic survey (online)	March 2021	changes in the frequency of consumption of food generally and of selected food groups rating ("less frequent," "no change," "more frequent," "never tried."
Sidor A. & Rzymski P., 2020[13]	1097	27,7 ± 9,0	95,1% women	80,3% of urban inhabitants	51,7% higher education, 43,2% secondary education, 47,2% students, 42,8% full-time worker	cross-sectional study (online survey)	17.4.2020 – 01.5.2020	food frequency questionnaire; changes in the frequency of consumption of food generally and of selected food groups

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Table 2. Products Analyzed

Products	Błaszczyk-Bębenek E. *et al.*, 2020[10]	Czenczek-Lewandowska A. *et al.*, 2021[7]	Dobrowolski H. & Włodarek D., 2021[11]	Fila-Witecka K. *et al.*, 2021[8]	Górnica M. *et al.*, 2020[12]	Raczkowska E. *et al.*, 2021[14]	Rzadkowolska K., 2021[9]	Sidor A. & Rzymski P., 2020[13]
Eggs	+	+			+			
Canned meats	+							
Canned vegetables	+							
Butter, lard	+							
Meat and meat products	+	+			+	+	+	+
Milk, dairy products	+	+			+	+	+	+
Nuts, seeds						+	+	
Fruit	+	+			+	+	+	+
Fried foods	+							
Fast foods	+		+		+	+	+	+
Cereal products	+	+			+	+		+
White grain products	+			no data			+	
Whole grain products	+	+			+		+	
Sweetened cereal					+			
Fish and seafood	+	+			+		+	
Sweets, confectionery	+	+	+		+	+	+	+
Salty snacks, crisps		+	+		+	+	+	+
Legumes	+				+		+	+
Oils, margarine	+	+						
Vegetables	+	+			+	+	+	+
Potatoes	+							
Instant soups	+							

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Table 3. Study Conclusions/ Key Points Summarising Changes in Dietary and Eating Behaviors

Study	Conclusions
Błaszczyk-Bębenek E. *et al.*, 2020[10]	• 32,4% of the study group did not introduce any changes to their dietary habits during the lockdown. • Over half of the respondents ate meals before and during the lockdown regularly. • The number of participants who had snacked regularly increased (from 72,8% to 77,9%; p = 0.0001). • The most commonly selected snacks before and during the pandemic were: fruit, sweet snacks, nuts, almonds, and seeds. Salty snacks were eaten more frequently during lockdown than before (p = 0.0386). • The number of meals per day had changed. Research showed an increase in participants who ate five or more meals per day (from 19,9% to 31,1%), during lockdown according to a time before the pandemic. An equal number of participants ate four meals regardless of the time of the survey (about 40% of respondents). The number of people who ate three daily meals decreased (32,1% to 23,1%); p<0.0001. • The frequency of consumer products such as eggs (p = 0.0022), potatoes (p = 0.0004), sweets (p = 0.0241), and canned meat (p = 0.0004) increased. • The number of daily servings of sweets (p = 0.0029) and canned meat (p = 0.0390) increased. • The frequency of consumer products such as fast foods (p = 0.0001), instant soups (p = 0.0247), and energy drinks (p = 0.0150) decreased. • The number of daily servings of bakery products (p = 0.0400), red meat (p = 0.0199), fast foods (p < 0.0001), and instant soup (p = 0.0283) decreased. • The number of people who did not eat out and did not order takeaway food during lockdown (from 15,7% to 51,6%) compared to the time before the pandemic (p<0.0001) increased significantly.

Czenczek-Lewandowska A. *et al.*, 2021[7]	• Statistically significant changes were recorded for sweets and snacks (p = 0.043) and cereal products (p = 0.011), related to the preferences of the respondents:
	  ○ people who used to eat less of these products ate more of them during the pandemic,
	  ○ people who consumed more of these products reduced their consumption.
	• Consumption of fat (p = 0.005) increased.
	• No relationship between health behaviors and BMI rate was found.

Dobrowolski H. & Włodarek D., 2021[11]	• Most respondents declared no change in food preferences. • 48,4% of participants reported to increase in total food consumption, and 13,9% claimed to decrease it. • Many respondents claimed they increased the consumption of sweetened products and confectionery (36,2% of respondents), salty snacks, and fast food (32,4% of respondents). • Few of them declared to decrease it: sweetened products and confectionery - 18,6% of participants, salty snacks and fast foods - 25% of participants. • 37,8% of respondents used home delivery and takeaway less frequently, and 29,8% declared to have done it more often. • About 20% of the respondents did not change their body weight, and almost half of the study group increased their body weight during lockdown (an average weight gain of 2,25 ± 2,5 kg) • Less than 30% of the study group reduced their body weight during the lockdown. • 20,2% of participants reported that changing their diet during the pandemic was the second consecutive cause of changes in their body weight.

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- A positive correlation between change in body weight during the lockdown and the change in consumption of real food, confectionery, fast food, and takeaway products ($p < 0.001$) was noticed.

Fila-Witecka K. *et al.*, 2021[8]

- 35% of respondents reported an increase in food consumption due to the pandemic, 23% declared no changes in their diet, and 22% claimed to eat less than earlier.
- 10% of participants took up a new diet.

Górnica M. *et al.*, 2020[12]

- The Impact of the pandemic on the diet of respondents was inconclusive.
- Over half of the respondents declared no change in food intake during the pandemic.
- Participants declared an increase in total food intake (34%), confectionery (33%), water intake (24%), homemade meals (48%), and a decrease in the intake of fast food (37%) ($p < 0.001$).
- Three diet patterns were created:
  - Prohealthy (28% study group) is characterized by increased consumption of healthy food and a decrease in consumption of non-recommended products.
    - ✓ Increased consumption of fruit, wholegrain products, low-fat meat and/or eggs and legumes (20% of respondents), vegetables, milk, and milk products (about 30% of respondents), and water (about 50% of respondents).
    - ✓ Reduced intake of fast food and commercial pastry (75% of respondents), confectionery and salty snacks (50% of respondents), ice cream (above 30% of respondents), and sugar-sweetened beverages (20% of respondents)
    - ✓ The adherence to this pattern was negatively associated with age and was lower by 35% among people aged 40-49, 67% among people aged 50-59, and 78% among people aged 60 and older, compared to people younger than 30.
    - ✓ The adherence to this pattern was lower by 27% among participants living in the better economically-developed region compared to those in the region with the lowest GDP.
    - ✓ Overweight and obese participants showed higher adherence to this pattern compared to those with normal weight and participants with increased consumption of homemade meals.
  - Constant pattern
    - ✓ The adherence to this pattern was positively associated with age (almost twice higher among respondents aged 40-49, 3 times higher among respondents aged 50-59, and almost three times higher among respondents aged 60 and older, compared to respondents younger than 30).
    - ✓ The adherence was lower by 30% among participants who had no work or had considerable work time reduction and 28% among respondents who began remote work and/or study.
    - ✓ Lower adherence was observed among obese respondents compared to normal-weight respondents.
  - Unhealthy (19% of the study group) characterized by increased intake of non-recommended food and decreased consumption of healthy products
    - ✓ The largest group here was people aged 30-39.
    - ✓ 64% of participants declared an increase in total food intake.
    - ✓ Respondents increased the consumption of processed meat, fast food, and ice cream (about 20% of respondents), commercial pastry (30% of respondents), homemade pastry and confectionery (about 70% and 80% of respondents, respectively), and salty snacks (50% respondents).

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	✓ They decreased the consumption of vegetables and fruit (about 60% of respondents), fish (about 30% of respondents), wholegrain products (about 25% of respondents), and water (about 20% of respondents) ✓ The adherence to this pattern was higher among participants living in the economic region with moderate and the highest GDP (1,4 and 1,5 times, respectively) ✓ The adherence was 1,5 times higher among participants who did not work or had considerable work time reduction. ✓ Higher adherence to this pattern was observed among participants with decreased consumption of homemade meals. • The number of respondents consuming homemade meals increased in the Prohealthy (63% of respondents) and Unhealthy (52%) patterns.
Raczkowska E. *et al.*, 2021[14]	• Most participants declared no changes in their frequency of meals. • If a change occurred, respondents declared more frequent consumption of sweets, fruit, and vegetables and less frequent consumption of fast food, sweetened beverages, or energy drinks. • A significant variation was found between the BMI rate of the respondents and the frequency of consumption of salty snacks ($p = 0.002$), sweets ($p = 0.001$), sweetened beverages ($p < 0.001$), chocolate ($p = 0.026$) and cereal products ($p = 0.021$). People with lower BMI less often chose unhealthy products during the pandemic. • The study showed a significant variation between the age of respondents and changes in the frequency of consumption of salty snacks ($p = 0.039$), sodas ($p = 0.025$), energy drinks ($p = 0.001$), fruit ($p = 0.021$), vegetables ($p = 0.044$), nuts ($p < 0.001$), cereals ($p = 0.008$), meat and processed meat products ($p = 0.003$) and dairy products ($p < 0.001$); Younger people consumed more salty snacks, energy drinks and cereals and fewer sweetened drinks, fruit and nuts. Older people increased their intake of fruit and nuts. • Ordering takeaway during the pandemic: 100% of retired or unemployed respondents declared a decrease, while respondents with a hybrid employment schedule declared an increase in the frequency of ordering takeaway compared to before the pandemic ($p < 0.001$). • Self-cooked meals: respondents whose monthly income changed during the pandemic declared more frequent self-catering; respondents whose income did not change prepared meals on their own less frequently ($p < 0.001$).
Rzadkowolska K., 2021[9]	• Participants declared an increase in total food intake (42,1%) and frequency of food consumption (33,1%). • 43,7% of respondents consumed four meals, and 40% declared eating breakfast during remote studying regularly. • Consumption of: extra meals and snacks (45,3% of respondents) increased; the most common snacks were: sweets (42,9% of respondents), fast food (about 30% of respondents), crisps, pastry, and salty snacks (about 25% of respondents). • The intake of vegetables (35,2% of respondents), fruit (31,2% of respondents), wholegrain cereal products, milk, and dairy products (20% of respondents) increased. • The respondents declared a smaller intake of sweetened beverages (about 25% of respondents). • The intake of water increased among 43,7% of respondents. • 40,1% of respondents noticed weight gain, and 19,8% reported weight loss during remote learning.

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Sidor A. & Rzymski P., 2020[13]	• 43,5% of respondents observed an increase in total food intake. • Consumption of snacks increased among 51,8% of respondents. • 65,5% of participants declared eating breakfast daily (people with higher education mainly $p < 0.001$). • The most frequent number of meals per day during quarantine was three (about 30% of respondents) and four (about 39% of respondents), while in the case of snacks, it was one (about 28% of respondents) and two (about 36% of respondents). • Nearly one-third of participants did not consume fresh vegetables or fruit daily. • About one-third of participants consumed sweets at least once a day. • Participants aged >45 displayed the lowest frequency of consuming vegetables and fruit, legumes, dairy, and sweets and the highest frequency of eating meat; men consumed the meat and instant products more often than women ($p < 0.05$). • About 62% of the respondents cooked more often during quarantine. • Almost 30% of the respondents gained weight during isolation, and above 18% lost weight. • Increased food consumption and snacking were reported by participants with higher BMI rates ($p < 0.01$). • The obese participants had the lowest frequency of consuming vegetables and fruit, legumes (58,5% and 13,8%), and the highest frequency of consuming fast food (3,2%), meat (40,4%), and dairy (54,2%) ($p < 0.05$).

The study by Rzadkowolska[9] additionally showed increased consumption of wholegrain bread, wholemeal pasta, and rice (but only among a small percentage of respondents), with reduced consumption of white bread. In two studies, the respondents declared no changes in the consumption of sweets and snacks or an increase in their consumption[11,14], while one study showed the prevalence of people who consumed them more often compared to respondents who consumed them as often as before[9]. Changes in the diet, taking into account the frequency and structure of consumption of particular food groups, are presented in Table 4.

Consumption of beverages

In some studies[7,9-12,14] the participants were asked about the beverages they chose. The respondents usually declared the same frequency of consumption of particular beverages[9,12,14]. If any changes occurred, they concerned the increased consumption of water[9,12] or fresh fruit juice[9], and the decrease in energy drinks, sweetened beverages[9,12], and ready-made fruit juice[9]. Czenczek-Lewandowska *et al.*[7] did not find statistically significant differences in the consumption of unsweetened beverages compared to sweetened ones before and during the pandemic. Dobrowolski and Włodarek[11] noted an increase in the consumption of sweetened beverages, sweetened products, and sweets in general, whereas Błaszczyk-Bębenek *et al.*[10] showed differences in consumption of water (increase) and energy drinks (decrease). Changes in the frequency and structure of consumption of selected beverages are presented in Table 5.

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Table 4. Changes in the frequency and structure of consumption of selected products during the pandemic.

Study	Dobrowolski H. & Włodarek D., 2021[11]	Raczkowska E. *et al.*, 2021[14]	Rzadkowolska K., 2021[9]
Products	Consumption during pandemic		
Sweets and snacks	More	more frequently	more frequently
Cereal products		more frequently	more frequently
Whole grains:	no data		
White:			less frequently
Fruit	no data	often	more frequently
Vegetables	no data	more frequently	more frequently
Meat and meat products	no data	more frequently	more frequently
Fast food	More	less frequently	more frequently
Salty snacks	More	more frequently	more frequently
Nuts	no data	more frequently	more frequently

Table 5. Changes in the frequency and structure of consumption of selected beverages before and during the pandemic

Study	Beverages (*p<0.05)					
	water	unsweetened beverages	fruit juices	fresh fruit juices	sweetened beverages	energy drinks
Błaszczyk-Bębenek E. *et al.*, 2020[10]	increase	no data	no changes	no data	no changes	decrease*
Czenczek-Lewandowska A. *et al.*, 2021[7]	no data	no changes	no data	no data	no changes	no data
Dobrowolski H. & Włodarek D., 2021[11]	no data	no data	no data	no data	increase	no data
Górnica M. *et al.*, 2020[12]	no changes/ increase*	no data	no data	no data	no changes/decrease*	no changes/ decrease*
Raczkowska E. *et al.*, 2021[14]	no data	no data	no data	no data	no changes/ less frequently	no changes/ less frequently
Rzadkowolska K., 2021[9]	no changes/ more frequently	no data	no changes/ less frequently	no changes/ more frequently	no changes/ less frequently	no changes/ less frequently

The Impact of the pandemic on preparing and eating homemade meals versus ordering takeaway

The pandemic and lockdown have affected home cooking. In the study by Górnicka *et al.*[12] an increase in the consumption of self-prepared meals was observed, regardless of the diet pattern the respondents were assigned to (healthy or unhealthy). In the study by Sidor and Rzymski[13], 62.3% of respondents declared that they started cooking more often. The preferences for ordering takeaway food and eating out have also changed. Respondents usually ordered takeaway meals less frequen-

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tly[10,11], regardless of how often it occurred before the pandemic[10]. Eating outside has also been reduced[10]. Raczkowska *et al.*[14] noticed the association between the respon-dent's current occupation and the change in the frequency of ordering takeaway meals. The unemployed and retired people ordered meals less frequently during the pandemic. People with hybrid employment declared an increase in the frequency of ordering takeaway meals. Respondents whose monthly income decreesed during the pandemic declared more frequent than self-catering.

On the other hand, the group of respondents whose income did not change declared that they prepared meals on their own less frequently[14]. In one of the studies, participants were asked about the place at home where they ate. Over half (57%) of the surveyed students stated that during remote learning, they often had their meals while working at the computer, and 30% noticed that they ate less often at the table[9].

Age and sex and the diet of the respondents

In the study conducted by Górnicka *et al.*[12] a positive association was found between the regular dietary pattern and the age of the respondents. Compared to respondents younger than 30, the adherence to this pattern by people aged 40-49, 50-59, and 60 and older was 1.8 times, three times, and 2.8 times higher, respectively. At the same time, the adherence to the pro-healthy pattern was negatively associated with age and was lower in groups of respondents aged 40-49, 50-59, 60 and older by 35%, 67%, and 78%, respectively, in comparison to the respondents younger than 30[12]. Respondents > 45 years old in Sidor and Rzymski's study[13] consumed fewer vegetables, fruit, legumes, and sweets, while the frequency of meat consumption increased, similar to instant products, which were eaten more often by men than women. Changes in the diet compared to age were also noticed in the Raczkowska *et al.*[14] studies. Statistically significant variation was noted in the frequency of consumption of selected groups of products such as salty snacks (more frequent consumption vs. no change), sweetened sodas (less frequent consumption vs. no change), energy drinks (more frequent consumption vs. no change, and more frequent vs. less frequent consumption), fruit (less frequent consumption vs. no change and more frequent vs. less frequent consumption), vegetables (more frequent vs. no change in consumption), nuts (less frequent vs. no change and more frequent vs. less frequent consumption), cereals (more frequent vs. no change in consumption), meat and processed meat products (less frequent vs. no change in consumption) and dairy products (more frequent vs. no change in consumption). Younger respondents consumed more salty snacks, energy drinks, and cereal products and fewer sodas, fruit, and nuts. Older people ate more fruit and nuts[14].

Respondents' diet according to education and occupation

The Górnicka *et al.*[12] research showed 27% lower adherence to pro-healthy patterns among people living in better economically-developed regions than those with poorer economic conditions. The number of respondents following their existing type of diet was lower by 30% and 28%, respectively, among the unemployed, those with work time reduction, or working/studying remotely. On the

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other hand, the adherence to the unhealthy pattern was 1.5 times higher among respondents who did not work or had considerable work time reduction during the pandemic than among those whose working conditions did not change. The adherence to this pattern among respondents living in medium and higher-developed economic regions was 1.4 times and 1.5 times higher, respectively[12]. Sidor and Rzymski[13] noticed a connection between the level of education and eating breakfast. People with higher education were eating breakfast every day[13].

Respondents' diet according to body weight and BMI

In certain studies, there was shown to be a relationship between food intake frequency and both body weight and the BMI of the participants[11,13,14]. During quarantine, the respondents with higher BMI rates or obese ate more food in general, including salty snacks and fast food. Moreover, they consumed meat more often and ate less fruit and vegetables[13]. Also, Dobrowolski and Włodarek[11] showed that body mass change was positively associated with the increase in total food intake and the intake of confectionery, fast food, and takeaway food. People with higher BMI rates more often declared the increase in food with higher energy density, i.e., confectionery, sweets, salty snacks, and fast food[11]. Raczkowska *et al.*[14] found significant variation between the BMI of respondents and the frequency of consum-ption of salty snacks, sweets, sodas, chocolate, and cereal products. Respondents declared less frequent or no change in consumption of a particular product during the pandemic[14]. Górnicka *et al.*[12] showed that the overweight or obese people surveyed followed a pro-healthy pattern compared to people with normal weight, who mostly declared no changes in their diet. Czenczek-Lewandowska *et al.*[7] analyzed health behaviors during the pande-mic, such as frequency of food consumption of several products, physical activity level, sleep quality, and level of anxiety. Their studies revealed that increased stress levels associated with the pandemic negatively affected health behaviors, including diet and physical activity, which are responsible for controlling body weight. Those studies did not confirm the relationship between health behavior and BMI rate, and similar behavior patterns were observed[7].

DISCUSSION

The Covid-19 pandemic had an ambiguous impact on people's eating behavior in Poland and the world[17-26]. The negative changes in the diet of adult Poles during the pandemic included increased consumption of unhealthy food - primarily sweets[9-11,13,14], salty snacks, and fast food[9-11]. Similar conclusions were presented by Gonzalez-Monroy *et al.*[17] in their review. They analyzed dietary changes during the pandemic based on studies from 12 countries. In the studies relating to adults (15 of 23 included in the review), the increase in general food intake, processed food, sweets, and the higher caloric value of the diet was observed[17]. Bennett *et al.*[18] indicate both favorable and unfavorable diet patterns, therein significant increase in the frequency of snacking, especially at night or after the last meal, and an increase in the number and frequency of meals.

Additionally, a decrease in the consumption of fresh food was observed[18]. Other reviews also stated the growing amount of snacks consumed and total daily food intake[19-23]. The

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tendency to increase snacking during isolation among the residents of Latin America and Spain was revealed by Enriquez-Martinez *et al.*[23]. The Chew and Lopez review[21] reported an increase in total food consumption (59.6% of respondents) in comparison to the people declaring a decrease in consumption (33.5%). Slightly more respondents declared adherence to the healthy diet compared to people whose attachment to this eating pattern decreased[21]. Different trends were observed in the study of Di Renzo *et al.*[24] conducted among Italians. Respondents declared lower consumption of snacks, processed meat, and carbonated and sweetened beverages during the lockdown period than before the pandemic[24].

Excessive food consumption, frequent snacking, and ultra-processed food are associated with adverse health effects. An improperly balanced diet with low nutritional density, providing excess calories, sugars and fats, may lead to obesity and other chronic metabolic diseases. In addition, it may increase the risk of SARS-CoV-2 infection and severe course of the disease[27,28].

Despite improper eating habits occurring during the lockdown, many reviews and original studies proved that the pandemic positively affected people's eating behaviors. Czenczek-Lewandowska *et al.*[7] observed an increase in the number of sweets and snacks consumed among respondents who used to eat less of these products before the pandemic. At the same time, a decrease in consumption of these products among people who used to eat more before the lockdown was observed. In the Rzadkowolska study[9], the respondents declared eating more sweets, fast food, and salty snacks, and the consumption of vegetables, fruit, whole grain products, milk, and dairy also increased among them. In the Enriquez-Martinez *et al.* study[23], apart from the increase in snacking, among the respondents making healthier dietary choices, the increase in vegetables, fruit, and legumes and the decrease in consumption of salty snacks and confectionary was observed[23]. Similar conclusions were drawn by Bennett *et al.*[18]. Despite negative behavior, i.a. significant increase in snacking, the increase in consumption of fresh vegetables and fruit was observed[18]. In the Mignogna *et al.*[19] reviews, increased consumption of snacks and general food intake was noted, but respondents were eating more vegetables and fruit and were limiting ready-made meals and takeaway food. An ambiguous conclusion was provided by Rawat's *et al.* review[22] about the population of India. Besides a generally negative change in eating behaviors, e.g., overeating and eating more meals, the increase in consumption of vegetables and fruit was also noticed. In one of the studies included in this review, respondents consumed ginger and garlic more due to their perceivable immune-boosting properties[22].

The pandemic also affected the type of beverages selected[7,9-12,14,19,20,26]. In the studies included in this review, respondents usually declared no changes in the frequency of intake of beverages[9,12,14]. In the case of changes, consumption of water[9,12], fresh fruit juice[9] was increasing, and intake of energy drinks and sweetened beverages[9,12], and ready-made juice[9] was decreasing. Błaszczyk-Bębenek *et al.*[10] showed significant differences in the consumption of water (increase) and energy drinks (decrease), Catucci *et al.*[20] noticed a higher water intake, and Mignogna *et al.*[19] demon-

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strated the increase in water intake in all studies analyzing this issue included in the review. Different results showed Zeigler Z.[26], pointing out the decrease in water consumption and replacing it with sweetened beverages. Also, Dobrowolski and Włodarek[11] observed an increase in sweetened product consumption, including beverages. Czenczek-Lewandowska *et al.*[7] did not observe statistically significant differences in the consumption of unsweetened beverages compared to sweetened ones before and during the pandemic.

In the research analyzed, most respondents usually did not change their Eating behaviours[10-12,14,23]. In the case of changes in diet, they were both positive and negative. The Górnicka *et al.*[12] studies showed ambiguous influence on eating behaviors during the lockdown. The respondents were divided into two groups, depending on whether they followed a healthy or unhealthy diet. In the group following a healthy diet, what increased was the intake of fruit, whole grain products, lean meat, eggs, legumes (20% of respondents), vegetables, milk and dairy (30%), and water (50%) beside decreased consumption of fast food, pastry (75%) confectionary, salty snacks (50%), ice creams (about 30%), sweetened beverages (20%) was observed. Also, Błaszczyk-Bębenek *et al.*[10] noticed more negligible consumption of unhealthy products, such as sweetened beverages, energy drinks, confectionery, red meat, fast food, and instant soups. In the other study groups, Górnicka observed that the consumption of processed meat, fast food, ice creams (almost 20% of respondents), pastry (30%), homemade pastry (about 70%), confectionery (80%), salty snacks (50%) increased, while the intake of vegetables and fruit (60%), fish (30%), whole grain products (25%), and water (20%) decreased[12]. In the Enriquez-Martinez *et al.*[23] studies, most respondents did not change their diet during the pandemic, and some of them, especially young people (<30 years old), improved their eating habits. They were eating more vegetables, fruit, and legumes with just a limited amount of snacks and confectionery. It was more challenging for the respondents with lower education to follow an unchanged dietary pattern or adapt to healthy Eating compared to those with higher education[23]. The improvement of health behaviors, including diet, was revealed by Di Renzo *et al.*[24]. Their respondents, especially those aged 18-30, were following the Mediter-ranean diet[24]. The Chew and Lopez review[21] stated the relationship between the adherence to the Mediterranean diet and the age of respondents. In one of the studies, people aged 18-30 more often presented this pattern than those younger or older. The relationship between the quality of diet and the age of respondents varied. Both a decrease in adopting healthy eating habits with age and a lower adherence to healthy eating in the group of people 21-50 years old compared to respondents over 50 were noticed[21]. In the Mignogna *et al.*[19] reviews, the increase in food in general and unhealthy food intake was observed, but general improvement in diet quality was also noted. Consumption of leading groups of products, except fish, was coherent with a traditional Mediterranean diet, pointing to improvements in eating habits around the world during the pandemic. Consumption of vegetables, fruit, legumes, cereals, olive oil, and dairy has increased[19].

A properly balanced diet may positively affect the immune system, which is crucial during the Covid-19 pandemic. Food containing nutrients

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such as antioxidant vitamins, B vitamins, unsaturated fatty acids, minerals, e.g., zinc, selenium, and bioactive compounds such as polyphenols is essential. The microbiome is also relevant to the proper functioning of the immune system. We can support it by following a diet rich in plant products containing fiber. Therefore, the increased tendency to eat health-promoting products, such as vegetables and fruit, during social isolation and the pandemic is positive, despite higher consumption, e.g., snacks in the same time[27, 30].

In several studies, healthy eating habits were observed, i.e., regular meals and more frequent consumption of breakfast[9,10,13]. It might be connected with social isolation – remote learning and work because people had more time to prepare meals in the morning and all day. In Enriquez-Martinez *et al.* study[23], the number of meals for most respondents did not change. However, if so, the main meals, i.e., breakfast, dinner, and supper, were skipped[23]. In the Di Renzo *et al.* study[24], more than half of the respondents did not change the number of their daily meals (57.8%). Those respondents who did change this number declared skipping main meals or snacks between meals (17,5% and 23,5%, respect-tively)[24]. Irregular Eating can lead to snacking, followed by gaining weight. Rodriguez-Leyva and Pierce[25] noticed a smaller intake of calories and nutrients. 7–15% of respondents were skipping warm meals. Such behaviors can lead to undernutrition[25].

Meal-time and eating places also changed during the pandemic. In the Rzadkowolska[9] study, 57% of respondents often ate while working on a computer and 30% less often at the table during remote learning. Górnicka *et al.*[12] indicated increased screen time among the respondents who followed the unhealthy diet. Chew and Lopez[21] noticed an increase in screen time too. These are negative habits and can lead to overeating.

Many research studies showed a more enormous interest in homemade food[10-14,19,21,24,25], as opposed to takeaway food and eating out, which, because of the restrictions, was temporarily not allowed during the pandemic. Błaszczyk-Bębenek *et al.*[10] found that the number of respondents who stopped eating out or ordering takeaway meals increased from 15,7% to 51,6%, compared to the time before the pandemic. Sidor and Rzymski[13] showed that over 62% of the surveyed more often cooked during the lockdown, and Górnicka *et al.*[12] received similar results. Respondents assigned to healthy and unhealthy dietary patterns more often made homemade meals (63% and 52%, respectively)[12].

The growing interest in homemade meals could be observed not only in Poland[18,19, 21,24,25]. Bennett *et al.*[18] showed more frequent home cooking, e.g., pizza and bread. In the Di Renzo *et al.*[24] studies, the respondents declared increased consumption of homemade food, such as sweets, pizza, or bread. Mignogna *et al.*[19] stated more frequent cooking and eating of homemade meals and a decrease in eating outside and consumption of ready meals or takeaway food.

The professional situation of respondents also determined choosing self-cooking or ordering meals. Raczkowska *et al.*[14] noticed that the unemployed and retired less often ordered food during the pandemic, while hybrid workers did it more often. People whose

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monthly income decreased declared more frequent self-catering, whereas people whose income did not change – less frequent[14]. In Dobrowolski and Włodarek's study[11] 37,8% of respondents ordered takeaway food less often, while 29,8% did it more often, compared to the time before the pandemic. Perhaps part of the surveyed group, especially those with higher income, decided to order takeaway food to support the catering industry. The time of pandemic was difficult for many restaurants because of the lockdown and restrictions.

Self-cooking could be connected with caring for a healthy diet, having more free time, fewer opportunities to eat out, and the need to stay safe. Self-catering is beneficial because of the food's limited amounts of sugar, salt, and fat. In addition, preparing and eating meals with other family members might reduce the stress associated with lockdown[30].

The relationship between diet and body weight was also investigated. Dobrowolski and Włodarek[11] noticed a positive correlation between weight gain and increased intake of confectionery, fast food, and takeaway food. Many research papers confirm a connection between weight gain and general food intake[20,21,24,26]. Two studies concerning the population of Poland carried among respondents with higher BMI proved higher consumption of salty snacks, sweets, sweetened beverages, chocolate, and cereal products[14] as well as an increase in food intake in general[13]. Sidor and Rzymski[13] indicated that people with obesity had improper eating habits –eating more fast food, meat, and dairy and fewer vegetables, fruit, and legumes. Di Renzo *et al.*[24] came with similar conclusions. The higher BMI of respondents was connected with the increased consumption of junk food (packaged sweets, baked products, sweet beverages, salted snacks, and dressing sauces), whereas the association between BMI and healthy food consumption was not found[24]. In one of the works analyzed by Gonzalez-Monroy *et al.* study[17], a significant increase in the amount and frequency of junk food intake among obese people was observed. Catucci *et al.*[20] noticed a relationship between weight gain and consumption of sweets, salty snacks, and more significant food intake. However, in one of the studies, the respondents who declared eating homemade baked products also put on weight. Although Chew and Lopez[21] observed both the increase and decrease in body weight during the pandemic, more respondents gained weight. They were especially people with higher base BMI rate or with higher junk food and higher general food intake. Zeigler[26] noted a relation-ship between the consumption of junk food and weight gain. Compared to people with normal BMI, it was more difficult for over-weight and obese respondents to follow heal-thy eating habits[26].

On the other hand, Górnicka *et al.*[12] showed a positive association between being overweight or obese and adherence to healthy diet patterns, in contrast to respondents with normal BMI. Czenczek-Lewandowska *et al.*[7] did not find any relationship between diet and BMI rate. Summarizing it, changes in eating behavior during the pandemic foster putting on weight, which can have adverse health effects, as obesity and the inflammation it may cause might increase the risk of both infection and the severe course of Covid-19[28,30].

The limitation of the review is connected to the fact that the respondents included in the original studies were mostly women with higher education or young adults, so one should be cautious about generalizing the

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findings of these studies as concerning the whole adult population of Poles. The limited access to surveyed groups and their characteristics may result from collecting data via the Internet.

CONCLUSION

The SARS-CoV-2 pandemic and its social isolation periods had an ambiguous influence on eating behaviors in Poland and other countries. In many research papers, the respondents declared no changes in their diet. However, an increase in the consumption of food in total, especially junk food, was observed. Despite negative trends in diet, many people improved their eating habits during remote learning or work. They started eating more regularly and preparing meals at home. Although junk food intake increased, healthy food consumption, such as vegetables and fruit. A disturbing founding was the relationship between negative eating habits and weight gain. Being overweight and obese leads to non-communicable chronic diseases, which could increase the risk of coronavirus infection or a severe illness. In conclusion, promoting healthy eating beha-viors in all societies appears essential, especially during the pandemic.

REFERENCES

1. Coronavirus disease (Covid-19) – World Health Organization. https://www.who.int/emergencies/diseases/novel-coronavirus-2019
2. Rozporządzenie Ministra Zdrowia z dnia 20 marca 2020 r. w sprawie ogłoszenia na obszarze Rzeczypospolitej Polskiej stanu epidemii – Dziennik Ustaw. https://sip.lex.pl/akty-prawne/dzu-dziennik-ustaw/ogloszenie-na-obszarze-rzeczypospolitej-polskiej-stanu-epidemii-18972567
3. Kalendarium wydarzeń ważnych dla polskiego ekosystemu przedsiębiorczości i innowacyjności 2020. https://www.parp.gov.pl/storage/publications/pdf/kalendarium-2020_18032021-do-publ.pdf
4. Overweight and obesity - BMI statistics – EUROSTAT https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Overweight_and_obesity_-_BMI_statistics
5. Over half of adults in the EU are overweight – EUROSTAT https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20210721-2
6. Obesity and overweight – World Health Organization. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight
7. Czenczek-Lewandowska E, Wyszyńska J, Leszczak J, *et al.* Health behaviors of young adults during the outbreak of the Covid-19 pandemic – a longitudinal study. BMC Public Health 2021; 21:1038
8. Fila-Witecka K, Senczyszyn A, Kołodziejczyk A, *et al.* Lifestyle changes among Polish university students during the Covid-19 pandemic. Int. J. Environ. Res. Public Health 2021; 18:9571
9. Rzadkowolska K. Nutritional behaviors in Polish students during remote learning.

doi: 10.26714/magnamed.10.1.2023.1-8
10 (1) February 2023

Społeczeństwo Edukacja Język 2021; 14:281-298

10. Błaszczyk-Bębenek E, Jagielski P, Bolesławska I, *et al.* Nutrition behaviors in Polish adults before and during Covid-19 lockdown. Nutrients 2020; 12:3084

11. Dobrowolski H, Włodarek D. Body Mass, physical activity and eating habits changes during the first Covid-19 pandemic lockdown in Poland. Int. J. Environ. Res. Public Health 2021; 18:5682

12. Górnicka M, Drywień ME, Zielinska MA, *et al.* Dietary and lifestyle changes during Covid-19 and the subsequent lockdowns among Polish adults: a cross-sectional online survey PLifeCovid-19 study. Nutrients 2020; 12:2324

13. Sidor A, Rzymski P. Dietary choices and habits during Covid-19 lockdown: experience from Poland. Nutrients 2020; 12:1657

14. Raczkowska E, Mazurkiewicz D, Ambrozik-Haba J, *et al.* The Impact of the Covid-19 pandemic on Poles' nutritional and health behaviour and quality of life – a pilot study. Int. J. Environ. Res. Public Health 2021; 18:10656

15. Wądołowska L. Validation of food frequency questionnaire [FFQ]. Reproducibility assessment. Bromatol Chem Toksykol 2005; 38(1):27-33

16. Niedźwiedzka E, Wądołowska L, Kowalkowska J. Reproducibility of a non-quantitative food frequency questionnaire (62-Item FFQ-6) and PCA-driven dietary pattern identification in 13–21-year-old females. Nutrients 2019; 11(9):2183

17. González-Monroy C, Gómez-Gómez I, Olarte-Sánchez CM, *et al.* Eating behaviour changes during the Covid-19 pandemic: a systematic review of longitudinal studies. Int. J. Environ. Res. Public Health 2021; 18:11130

18. Bennett G, Young E, Butler I, *et al.* The Impact of lockdown during the Covid-19 outbreak on dietary habits in various population groups: a scoping review. Front. Nutr. 2021; 8:626432

19. Mignogna C, Costanzo S, Ghulam A, *et al.* Impact of nationwide lockdowns resulting from the first wave of the Covid-19 pandemic on food intake, eating behaviors, and diet quality: a systematic review. Adv Nutr 2022; 0:1-36

20. Catucci A, Scognamiglio U, Rossi L. Lifestyle changes related to eating habits, physical activity, and weight status during Covid-19 quarantine in Italy and some European countries. Front. Nutr. 2021; 8:718877

21. Chew HSJ, Lopez V. Global impact of Covid-19 on weight and weight-related behaviors in the adult population: a scoping review. Int. J. Environ. Res. Public Health 2021; 18:1876

22. Rawat D, Dixit V, Gulati S, *et al.* Impact of Covid-19 outbreak on lifestyle behaviour: a review of studies published in India. Diabetes & Metabolic Syndrome: Clinical Research & Reviews 2021; 15:331-336

23. Enriquez-Martinez OG, Martins MCT, Pereira TSS, *et al.* Diet and lifestyle changes during the Covid-19 pandemic in Ibero-American countries: Argentina,

e-ISSN 2774-2318
p-ISSN 2407-0505

Brazil, Mexico, Peru, and Spain. Front. Nutr. 2021; 8:671004

24. Di Renzo L, Gualtieri P, Pivari F, *et al.* Eating habits and lifestyle changes during Covid-19 lockdown: an Italian survey. J Transl Med 2020; 18:229

25. Rodriguez-Leyva D, Pierce GN. The Impact of nutrition on the Covid-19 pandemic and the Impact of the Covid-19 pandemic on nutrition. Nutrients 2021; 13:1752

26. Zeigler Z. Covid-19 self-quarantine and weight gain risk factors in adults. Curr Obes Rep 2021; 10:423-433

27. Clemente-Suárez VJ, Ramos-Campo DJ, Mielgo-Ayuso J, *et al.* nutrition in the actual Covid-19 pandemic. A narrative review. Nutrients 2021; 13:1924

28. Muscogiuri G, Barrea L, Savastano S, *et al.* Nutritional recommendations for Covid-19 quarantine. Eur J Clin Nutr 2020; 74:850-851

29. Skrajnowska D, Brumer M, Kankowska S, *et al.* Covid-19: diet composition and health. Nutrients 2021; 13:2980

30. Wądołowska L, Drywień M, Hamułka J, *et al.* Zalecenia żywieniowe podczas pandemii Covid-19. Stanowisko Komitetu Nauki o Żywieniu Człowieka Polskiej Akademii Nauk. Standardy Medyczne Pediatria 2021; 18:289-298