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Professional paper

OBESITY AND MODERN CHRONIC DISEASE RESEARCH

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Abstract

Obesity is a significant global concern, and this research aims to assess the body mass index (BMI)in a representative sample while conducting a detailed statiscal analysis of respondents' lifestyles. The primary objectives are to gain insights into the prevalence of obesity and its repercussions on human health and lifestyles among the population in the Republic of North Macedonia. The study was conducted in the period from 01.01.2022. until 31.12.2022 using a representative sample of 2007 respondents: including 1133 women and 874 men aged between 15 to 75 years. As a statistical method of work, relative numbers and student t-test were used to test the significance of the difference between two proportions, in order to show the frequency of overweight and obesity, as well as data related to the lifestyle and health status of the respondents. The data are presented tabularly and graphically. According to the results of the study, 38% of the respondents are classified as overweight because their BMI is over 25, and 31% of the respondents are obese with a BMI over 30. Such devastating results are due primarily to the poor eating habits of the subjects and their physical activity. 65.8% of respondents (1321 respondents) suffer from diseases of abundance: high blood pressure, diabetes, atherosclerosis, coronary heart disease and other cardiovascular diseases and cancer. 69.9% of respondents who suffer from diseases of abundance have an increase in body weight (BMI > 25), and 30.1% of respondents who suffer from diseases of abundance are overweight or underweight (BMI < 25). Since the obtained value for $t = 15.308$ is greater than the table value $t = 2.576$ for $n = 1319$ and $p < 0.01$, it is concluded that the difference between the proportions in the two groups is significant (significant), and arises due to differences in BMI.

Keywords: obesity, weight, nutrition, activity, diseases

1. Introduction

Weight gain and weight loss are common challenges in the lives of modern individuals, and excessive body weight can lead to various health issues (increased cardiovascular risk, increased risk for malignant diseases, etc.). The ideal body weight is not solely a subjective preference but rather a weight that aligns with an individual's height, gender, age, and constitution. It is typically assessed using the Body Mass Index (BMI), which falls within the normal range of 18.5 to 24.9.

When the BMI exceeds 25, it signifies an increased body weight, often resulting from an imbalance between high energy intake and low energy expenditure.

Energy expenditure is calories used for basal metabolism, thermogenesis and muscle work. [1] According to data from the World Health Organization (WHO) in 2007, within European countries, including the Republic of North Macedonia, approximately 50% of the population shows moderate weight problems, and 20% have problems with obesity. Also, numerous studies on body mass index estimates are of fundamental importance for the prevention of obesity in children and adolescents, since a BMI above 25.00 kg/m2 significantly increases the risk of morbidity and mortality. [3]

Various epidemiological determinants have been identified as possible causes of obesity, including dietary patterns, eating habits, physical activities, alcohol consumption, stress, and family history of any chronic health problem such as obesity, diabetes, hypertension, etc. [4] Physical activity levels have decreased in developing countries and sedentary behavior has increased, which may contribute to the increased incidence

of obesity and other chronic diseases such as diabetes and hypertension. [5] Starvation increases food cravings and weakens control over what and how much you eat, so it is not healthy to lose weight by fasting. When you starve, the useful substances that the body needs do not come from the fat deposits, but the body takes them from the muscles, so the muscles weaken. Physical activity is essential not only for burning fat but also for preserving and strengthening muscle mass. Prolonged starvation may result in the loss of fat deposits, but it also jeopardizes overall health. Instead of resorting to starvation, it's advisable to consume meals with lower calorie content and increase physical activity. For instance, just 30 minutes of moderate exercise can burn 350 calories, roughly equivalent to 3 slices of bread. While the quantity of food can remain the same, its composition and calorie content should be altered.

Staying adequately hydrated with fresh water is also crucial. Regular eating habits help maintain an optimal metabolic rate, while starvation slows down metabolism, causing the body to conserve and store calories due to the perceived threat of food scarcity.

Healthy weight loss requires a combination of factors: proper nutrition, regular meals with lower calorie content, well-planned moderate physical activity, and lifestyle adjustments. This gradual approach allows the body to adapt to new dietary and weight loss strategies.

Reducing daily caloric intake by 300-500 calories can result in losing 1-2 kilograms per week or 4-5 kilograms per month. Since fats contain the highest calorie content, replacing them with less fatty but nutritionally valuable substances can yield positive outcomes. Additionally, inadequate sleep can reduce leptin levels, a hormone that signals fullness to the brain, potentially leading to overeating. Sleep deprivation also triggers the body to compensate by consuming more sugar, caffeine, and food [1].

2. Goals

The objective of this research is to determine the rate of obesity in the Republic of North Macedonia and to gain insight into the lifestyle habits of its citizens. In that case, the main goals of this study are as follows:

- to calculate and analyze the body mass index within a representative sample, aiming to provide a comprehensive overview of the obesity rate among the population of the Republic of North Macedonia and its implications for public health;
- to make a detailed statistical analysis of the lifestyle habits of a representative sample in order to obtain a more detailed picture of the citizens.

3. Material and Methods

3.1. Research material: Since overweight and obesity are global pandemic issues (and not to be neglected when it comes to our homeland, the Republic of North Macedonia), we decided to conduct research on the prevalence of obesity among our population, as well as to study their lifestyles. The research was carried out by the VT Diet Club located in Bitola and the Faculty of Food Technology and Nutrition at the University of Tetovo in the period from January 1, 2022. until
31.12.2022. Additionally, the survey questionnaire that was utilized for this research is provided below:

QUESTIONNAIRE

1. Age: _____

2. Gender: A) Male B) Female

3. Place of residence: _____

4. Body weight (kg): _____

5. Body height (cm): _____

6. Do you eat fatty foods (meat, deli products, high-fat dairy products)? A) Yes B) No

7. Do you consume foods rich in carbohydrates (cakes, pastries, pasta, juices)? A) Yes B) No

8. Do you eat fast food (sandwiches, toast, etc.)? A) Yes B) No

9. Watching TV...? A) > 2 hours during the day B) < 2 hours during the day

10. I use a computer...? A) > 2 hours during the day B) < 2 hours during the day

11. Do you eat snacks (chips, pretzels, peanuts, etc.) while using the TV or computer? A) Yes B) No

12. Do you suffer from any disease (which)? _____

13. Are you physically active during the day (training, walking, fitness, gym)? A) Yes B) No

The research was conducted on a representative sample of 2007 respondents. Including both male and female participants aged 15 to 75 years. In order to be able to use the obtained data in our study, we obtained verbal consent from the respondents participated in the research.

3.2. Research methodology: The study was conducted using a quota sample: There were 1,133 female respondents and 874 male respondents. The sample selection process was systematic, meaning it had to meet specific criteria:

- the study should include both sexes;
- respondents should be aged between 15 and 75 years.

3.3. Statistical method of data processing: Relative numbers were used as statistical methods to show the frequency of overweight and obesity, as well as data related to the lifestyle of the respondents and students' t-test to test the significance between two proportions. The data are presented tabularly and graphically.

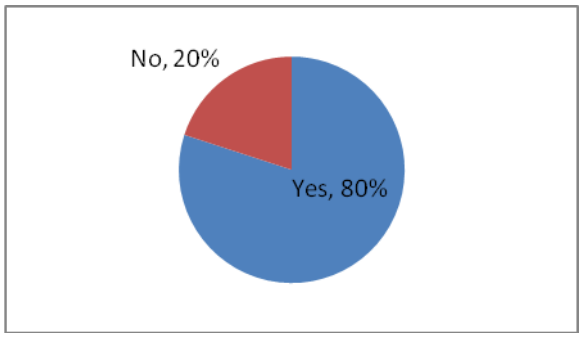
4. Results

Table 1 shows data on the body mass index (BMI) after a detailed analysis of the data that was collected in the period from 01.01.2022. until 31.12.2022 by the VT diet club in Bitola and the Faculty of Food Technology and Nutrition at the University of Tetovo, the nutrition study program.

Table 1: Determination of body mass index (BMI)

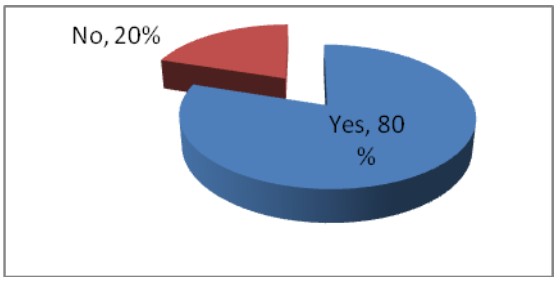
BMI	**Number of respondents**
Malnutrition (below 18.5)	162
Normal (18.5 – 22.9)	201
Early obesity (23 – 24.9)	256
First degree of obesity (25 – 29.9)	763
Second degree obesity (over 30)	522
Third degree obesity (40 or over 40)	103
In total	2007

From table 1, it can be concluded that 38% of the respondents (763 respondents) are overweight because their BMI is over 25. Also, 31% of the respondents (625 respondents) are obese because their BMI is over 30.
In the graphs with ordinal numbers from 1 to 7 we are shown data about the life habits of the respondents who were included in this study.



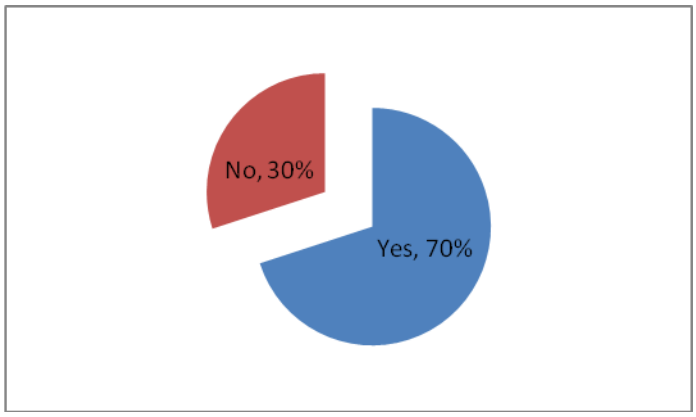
Graph 1: Percentage distribution of the number of respondents who answered the question: "Do you eat fatty foods (meat, deli products, high-fat dairy products?")

From graph 1, it can be determined that 80% of respondents consume fatty foods (meat, cured meat products, high-fat dairy products). And 20% of respondents do not consume such food items.



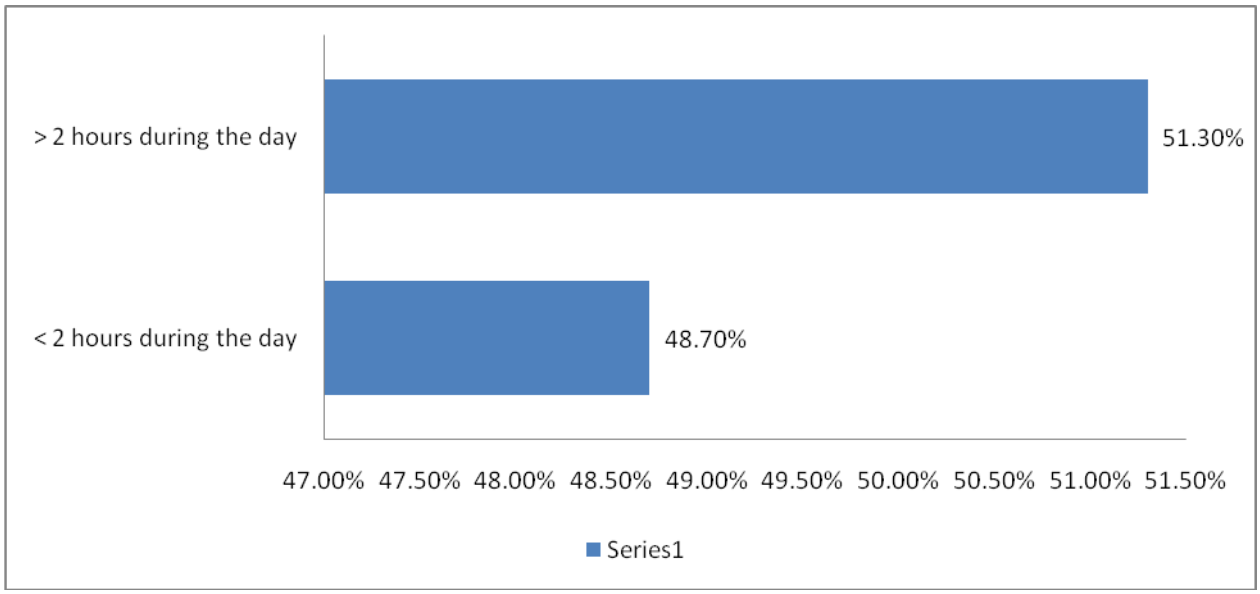
Graph 2: Percentage distribution of the number of respondents who answered the question: "Do you consume food rich in carbohydrates (cakes, pastries, pasta, juices)?"

From graph 2, it can be easily seen that the percentage distribution of the number of respondents who answered that they consume foods rich in carbohydrates (cakes, pastries, pasta, juices) is the same as the percentage distribution of the number of respondents who answered that they consume fatty foods (meat, cured meat products, high-fat dairy products), i.e. it is 80%. While 20% of respondents answered that they do not consume food rich in carbohydrates (cakes, pastries, pasta, juices).



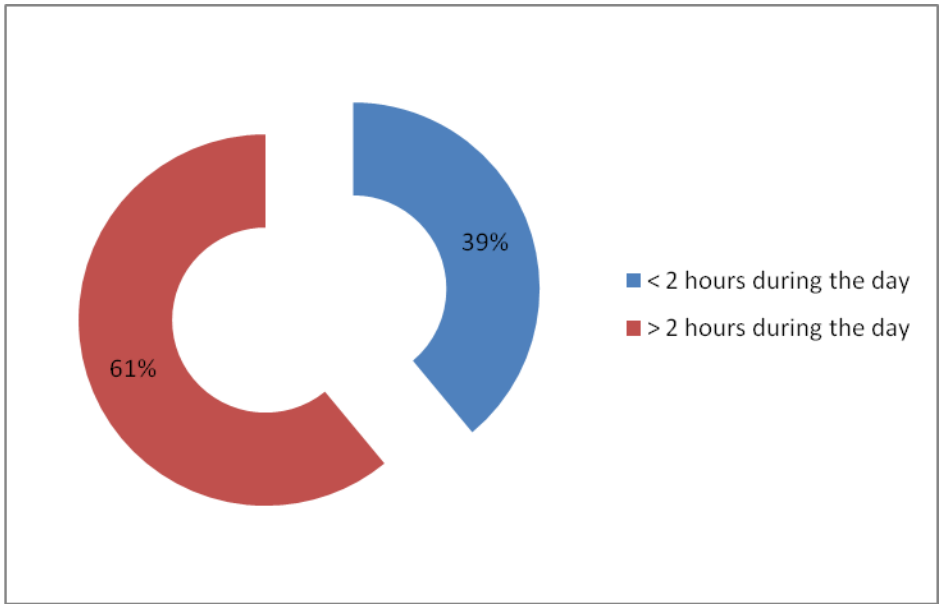
Graph 3: Percentage distribution of the number of respondents who answered the question: "Do you eat fast food (sandwiches, toast, etc.)?"

From graph 3, it can be concluded that a large % of respondents (70%) consume fast food such as: sandwiches, toasts, hamburgers, cheeseburgers, hot dogs, etc.



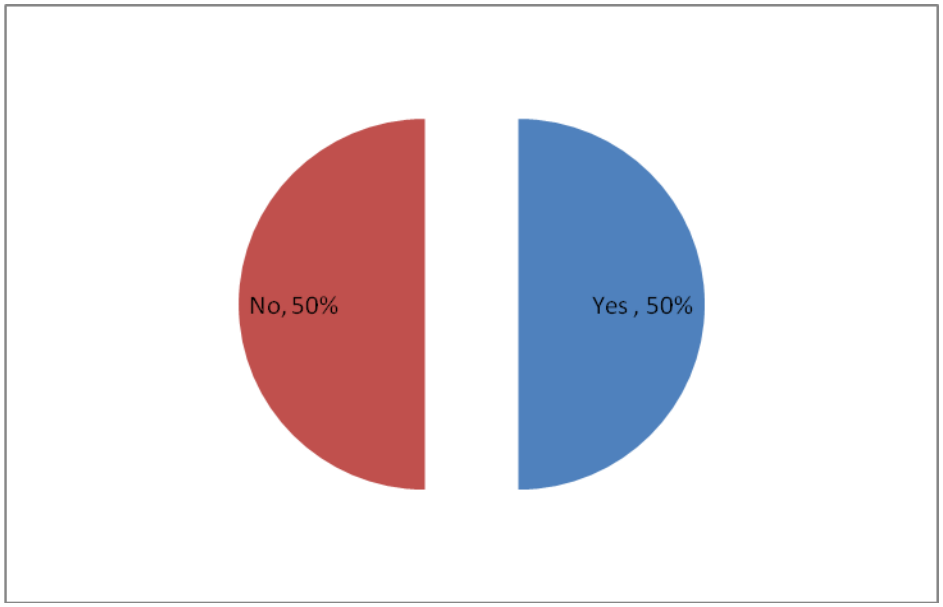
Graph 4: Percentage distribution of the number of respondents who answered the question: "I watch TV...?"

From graph 4, it can be concluded that 51.3% of respondents answered that they watch TV for more than 2 hours during the day. However, the percentage of respondents who answered that they watch TV for less than 2 hours during the day - 48.7% - is also not to be neglected. Such a narrow percentage difference is primarily due to the generation gap. The older respondents watch more television compared to the younger ones, who spend their time primarily in front of the computer as can be seen from the attached graph 5.



Graph 5: Percentage distribution of the number of respondents who answered the question: "I use a computer?"

From graph 5, it can be concluded that 61% of respondents use a computer for more than 2 hours during the day, and 39% of respondents use a computer for less than 2 hours.



Graph 6: Percentage distribution of the number of respondents who answered the question: "Do you eat snacks (chips, pretzels, peanuts, etc.) while using the TV or computer?"

From graph 6, it can be concluded that 50% of respondents eat snacks (chips, pretzels, peanuts, etc.) while watching TV or using a computer.

Table 2 shows the frequency of diseases suffered by some of the respondents who were included in this research.

Table 2: Registered diseases among the respondents

Health problems	**Number of respondents**
Arterial hypertension	352
Atherosclerosis	303
Cardiovascular diseases (heart attack, stroke, vascular dementia)	251
Diabetes	322
Malignant diseases	93
Other health problems	283
They have no health problems	403
Total:	2007

From table 2, it can be seen that the most common health problem that respondents suffer from is arterial hypertension (352 respondents). In second place is diabetes (322 respondents), and in third place are atherosclerotic changes of blood vessels (303 respondents).
Table 3 shows information on the BMI of subjects suffering from obesity diseases. According to the Oxford Reference, diseases of abundance are defined as: chronic non-communicable diseases (high blood pressure, diabetes, atherosclerosis, coronary heart disease and other cardiovascular diseases, and cancer) associated with overeating and increased body weight. [6]

Table 3: Distribution of respondents suffering from diseases of abundance distributed according to BMI

BMI	**Number of respondents**	**%**
<25	397	30,1%
>25	924	69,9%
Total:	1321	100%

From table 3, it can be seen that 69.9% of respondents who suffer from obesity diseases have increased body weight (their BMI is over 25), and 30.1% of respondents who suffer from obesity diseases have a normal or low body weight. weight (their BMI is up to 25).
In order to see if there is significance in the difference between the two proportions, we will use a student's t-test. Testing is performed according to the formula:

$$t = \frac{p_1 - p_2}{np1 - p_2}$$

In the shown formula, p1 represents the proportion of a certain attribute in the first sample, and p2 the proportion in the second sample. δp1-p2 represents the standard error between the two proportions. The standard error of the difference between the two proportions is determined by the formula:

$$np1 - p2 = \sqrt{\frac{p_1 q_1}{n_1} + \frac{p_2 q_2}{n_2}}$$

The value of q is determined in the following way q1 = 1 – p1; q2 = 1 – p2. n1 represents the size of the first sample and n2 is the size of the second sample. [7]
If the values are replaced in the previous formulas, we get:

$$np1 - p2 = \sqrt{\frac{0{,}699 \times 0{,}301}{924} + \frac{0{,}301 \times 0{,}699}{397}} = 0{,}026$$

$$t = \frac{0{,}699 - 0{,}301}{0{,}026} = 15{,}308$$

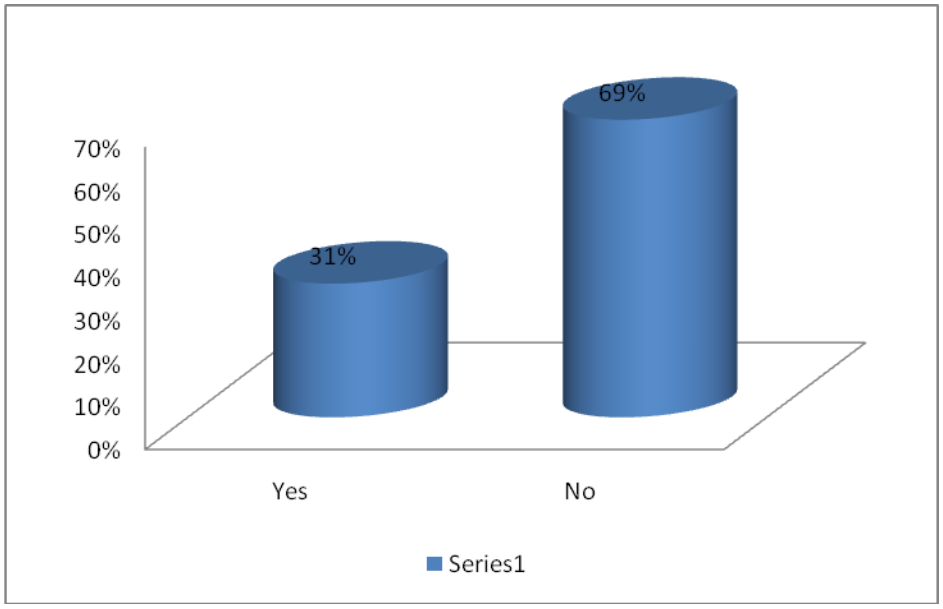
The obtained result for t = 15.308 is compared with tabular value (table 4) for t – test, for a certain degree of freedom n (n1 + n2 – 2) and p = 0.01. Since the obtained value for t = 15.308 is greater than the table value t = 2.576 for n = 1319 and p < 0.01, it is concluded that the difference between the proportions in the two groups is significant (significant), and arises due to differences in BMI. In this case, the working, that is, the alternative hypothesis that overeating and increased body weight are the main causes of the occurrence of diseases of abundance is accepted.

Table 4: Table of t-distribution

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										

Graph 7 shows the percentage distribution of the number of respondents who are physically active and the number of respondents who are not physically active.



Graph 7: Percentage distribution of the number of respondents who answered the question: "Are you physically active during the day (training, walking, fitness, gym?")

From graph 7, it can be concluded that 69% of the respondents are not physically active, while 31% of the respondents answered that they practice a certain type of physical activity: training, walking, fitness, working out in the gym, etc.

5. Discussion

Excess body weight can lead to various health problems, including increased stress on the heart, bones, and circulation. Losing weight means gaining health. It is claimed that one kilogram of excess shortens life by one year.

The ideal body weight for an adult can be roughly determined by his height: height over 100 cm is the kilograms of your body weight. For example, a person 170 cm tall should weigh 70 kg. Depending on the constitution of the body, deviations of ± 7 kg are possible.

Weight gain is a consequence of an imbalance between the energy taken in and the energy needed by the body. That difference is layered in the form of fat, primarily under the skin. [8] The overwhelming fact is that 69% of the subjects who were included in this study were overweight.

Foods that cause the most weight gain are:

- Fats, especially those of animal origin;
- Refined carbohydrates (white flour, white sugar, sweets made from them);
- Alcoholic beverages (especially beer). Alcohol provides an abundance of calories that are converted into fat;
- Salt in excessive amounts in the diet. Salt binds water, which leads to weight gain. [8]

In our study, we observed that 80% of respondents consumed foods rich in animal fats, while the same percentage consumed foods high in refined carbohydrates. Additionally, 70% of respondents reported consuming fast food items like sandwiches and toasts. The excessive consumption of these items is a major contributor to the high rate of obesity, with 69% of respondents being overweight. Of course, there are several other factors that contribute to weight gain, which we will discuss below:

- There is a hereditary factor. Some people have inherited from their ancestors a corpulent constitution, which is probably important for better assimilation of products. There is an 80% probability that a child of obese parents will become obese themselves.

- There are also individual factors that depend on the hormonal balance of each person. Chromones, such as thyroxine, which are secreted by the thyroid gland, accelerate the burning of food in the body. In contrast, insulin increases lipogenesis (fat creation). Obese people have been shown to be less responsive to insulin, which means they need more insulin to metabolize glucose. That condition is the reason for increasing the production of fat in our body.
- Fat people produce less heat than thin people. Calories that are not converted into energy are stored in the body as fat. In contrast, thin persons expend a greater number of calories to maintain body heat, and yet are not prone to fever; they use more energy and have less fat.
- People prone to obesity seem to have a more sensitive appetite center. It is about the nerve center that regulates appetite and is located in the hypothalamus, in the very center of the brain. Because of this, they are hungry more often and need a larger amount of food to feel full. [8]

Another worrying factor that also contributes to the high rate of obesity is that 50% of respondents snacked on chips, pretzels, peanuts and other snacks while watching TV or working at the computer. "Snacking" between meals is a bad habit, because the digestion of food does not proceed normally (the stomach needs time to rest between meals). This contributes to digestive problems, loss of appetite, and finally the person begins to gain weight, because what he eats is mainly rich in sugars and fats. [8]

There are only two ways to lose excess weight: eat fewer calories and burn more. But also, in terms of physical activity, the respondents are not commendable. Namely, 69% of respondents said that they do not practice any physical activity. Also, 51.3% of the respondents watch television for more than 2 hours during the day, and 61% of the respondents sit in front of the computer for more than 2 hours a day. These percentages indicate that most of the respondents have a sedentary lifestyle, which, unfortunately, has become synonymous with the modern lifestyle. This factor is very significant and contributes a lot to the high rate of obesity among the respondents.

Also, in this chapter we will discuss the so-called diseases of abundance. Diseases that plague underdeveloped countries are called poverty-related diseases. In other, developed countries, the population suffers from the so-called diseases of abundance.

What are the diseases of abundance? The name itself says that these diseases arise not from too little, but from too much, and what is too much is usually the daily intake of food and calories. Professionally speaking, we say that it is a positive energy balance. Namely, we have a situation in which we daily consume more energy than we consume, and that excess energy over time is manifested by increased body weight. Excess body weight is the stem from which most diseases of abundance arise: high blood pressure, diabetes, atherosclerosis, coronary heart disease and other cardiovascular diseases, and cancer. [6] Unfortunately, the diseases of abundance are also very common in a large % of our respondents: in the first place is arterial hypertension (352 respondents), in the second place is diabetes (322 respondents), and in the third place is atherosclerosis (303 respondents)). The figures for cardiovascular and malignant diseases are not to be neglected, i.e. 251 subjects had some cardiovascular problem (heart attack, stroke, vascular dementia, etc.) and 93 subjects suffered from some malignancy. Also, the obtained value for $t = 15.308$ is greater than the tabular value $t = 2.576$ for $n = 1319$ and $p < 0.01$, so it is concluded that the difference between the proportions in the two groups is significant, and arises due to the differences in BMI. In this case, the working, i.e. alternative hypothesis is accepted that overeating and increased body weight are the main causes of the appearance of diseases of abundance.

t the end of this chapter, we will review some other scientific studies by other authors, in order to verify the obtained results.

A study conducted at Al-Nilin University on 216 Sudanese medical students indicated that dietary habits had a stronger influence on BMI than physical activity ($p < 0.05$). The alarming figures regarding overweight and low physical activity among medical students identified in this study encourage the implementation of health

programs. The conclusion of the study suggests that the importance and benefits of physical activity and diet should be emphasized in medical curricula. [9]
Another study conducted in Kosovo in May and June 2020 on 689 subjects (79% women and 21% men) during the lockdown due to the COVID-19 pandemic indicated that the increased body weight that occurred during the lockdown in the subjects were due to: the higher frequency of cooking ($p < 0.01$), the lower consumption of meat and fish ($p = 0.02$ and $p = 0.04$), the higher consumption of fast food ($p = 0.02$) and the absence of physical activity ($p = 0.02$). [10]
Also, the study that was conducted in Gostivar in the Republic of North Macedonia indicates that 11.02% of the adolescents who were included in the study have a high BMI and have increased body weight. The analysis of the eating habits of adolescents indicates that they most often consume: bread and similar products, fruits and vegetables, milk and dairy products, fast food and coffee. Also, most adolescents reported that they eat lunch regularly, but about a quarter of adolescents skip breakfast and dinner. In the conclusion of the study, it is suggested to consume less fast food and not to skip main meals. [11]

6. Conclusion

The World Health Organization (WHO) warns that obesity has tripled since the 80s of the last century in EU countries, but also in North Macedonia, and the fact that 75 percent of overweight patients are not aware of their problem is particularly worrying., while one in five does not take any treatment measures. The facts about the nutritional status of children aged 7 to 8, which come from the Institute of Public Health of the Republic of North Macedonia, are also astonishing. As many as 31 percent of boys and 29 percent of girls in the Republic of North Macedonia have a body weight greater than that predicted for their age. Of these, 16 percent of boys and 13 percent of girls are obese.
Obesity is one of the biggest public health concerns of the 21st century, a chronic disease that affects 650 million adults worldwide. [12] In the context of the above, the conclusions that emerged from the preparation of this scientific research also speak:

- 38% of the respondents are overweight because their BMI is over 25, and 31% of the respondents are obese with a BMI over 30;
- 80% of respondents consume fatty foods (meat, cured meat products, high-fat dairy products, etc.) and foods rich in processed carbohydrates (cakes, pastries, pasta, juices, etc.);
- 70% of respondents eat fast food (sandwiches, toasts, etc.);
- 51.3% of respondents watch television for more than 2 hours during the day, and 61% of respondents use a computer for more than 2 hours during the day;
- 50% of respondents eat snacks (chips, pretzels, peanuts, etc.) while watching TV or using a computer;
- 3 most common health problems that the respondents suffer from and which are closely correlated with overweight are: arterial hypertension (352 respondents suffer from it), diabetes (322 respondents suffer from it) and atherosclerosis (303 respondents suffer from it);
- since the obtained value for $t = 15.308$ is greater than the table value $t = 2.576$ for $n = 1319$ and $p < 0.01$, it is concluded that the difference between the proportions in the two groups is significant (significant), and arises due to differences in BMI. In this case, the working, i.e. alternative, hypothesis is accepted that overeating and increased body weight are the main causes of the occurrence of diseases of abundance;
- 69% of respondents are physically inactive.

Finally, we will list 5 steps that can help in dealing with overweight and obesity.

- Step 1: To reduce the total amount of calories consumed. So, to reduce the amount of food. We must know that our organism needs a minimum amount of energy to fulfill its basic functions, even when it is in a state of rest. If we compare it to a car, that minimum energy corresponds to the energy consumed by

the engine when the car is "in idle". The human body needs 70 calories per hour to meet basic life needs, which is called basic (baseline) metabolism. Only during sleep we spend 65 calories per hour. If we were to stay in bed for 24 hours doing nothing, we would need 1560 calories just to stay alive. The diet of a person who does an office job and moves a little, does not require more than 2000 calories per day. Excess calories are converted into reserve fat. For example: a person who needs 2000 calories per day consumes 2900 calories. That person has an excess of 900 calories, which is equal to 100 grams of fat. On the other hand, if we take in fewer calories than necessary, our body will be forced to use up its own reserves. The total amount of calories that a person should take in every day must never be less than 1560. That amount depends on various factors: on body weight (the heavier we are, the more calories we need), on gender (on women need 10% less energy than men), from the type of physical exercises. The exact calculation of these amounts should be done by a nutritionist.

Step 2: To maintain an appropriate balance between different caloric products and to try to reduce the intake of fats in the body to the desired minimum. Our organism cannot be fed only with carbohydrates, only with fats or only with proteins. Theoretically, this would be possible, because each of those nutrients allows you to get the necessary calories. But in practice it would cause severe metabolic disorders. It is necessary to use a variety of products, and the calories that come from the products should be balanced: carbohydrates between 55 and 75%, fats 15 to 30% and proteins 10 to 15%. This means that certain diets are not healthy, such as Atkinson's diet, which advises the complete elimination of carbohydrates and the unlimited use of fats and proteins. With this regimen, we can lose several kilograms, especially in the first days, due to the large loss of water and the burning of fats that are converted into ketone bodies that are excreted through the urine in abnormally large quantities. In addition, a diet rich in fats and proteins causes constipation, increases cholesterol levels and acidity at the cellular level, and leads to disorders that are difficult to cure. There are other unbalanced diets that are also harmful and dangerous to health due to the imbalance between nutrients: carbohydrates, fats and proteins. For example, the regime in which food is divided and according to which carbohydrates and proteins may not be used in the same meal. And the macrobiotic regimen, at its higher level, can be harmful, because it advises only the use of grains.

• Step 3: Reduce the number of calories that come from fat to the desired minimum (15%), omitting animal fat. These are saturated fats, solid at room temperature (as in bacon) and are deposited in our organism in the places where they are found in the animal from which they originate: under the skin, in the subcutaneous tissue. In contrast, vegetable fats or oils are liquid at room temperature and our body metabolizes them more easily than animal fats. So, vegetable oils are more easily converted into energy and do not accumulate in the body. Plant products derived from soy have a great advantage over meat not only in weight loss diets, but in general. Soybeans provide complete proteins with all essential amino acids, and they also contain no cholesterol. Because it contains less fat, soy products contain proportionally fewer calories than animal products. These are pleasant, healthy products that provide our body with all the nutrients in the appropriate ratio during the weight loss diet.

• Step 4: Hearty breakfast, light dinner or no dinner. Calories taken in in the morning are easily burned throughout the day. This is not the case with the calories consumed in the evening, if you go to bed after dinner. [8]

• Step 5: Be physically active. Physical activity is very important for burning calories and reducing excess body weight. In addition, 30 minutes of moderate physical activity (walking, cycling, etc.), 5 days a week, reduces the risk of some non-communicable diseases in adults such as: cardiovascular disease, stroke, diabetes mellitus type 2, colon cancer and breast cancer. [13]

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