Guidelines are one thing, practice is another. With newer and newer guidelines, why can't we manage to control modifiable cardiovascular risk factors?

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Abstract

Summarizing WOBASZ studies, hypertension prevalence increased with age and gender adjustments. Despite a minor drop in awareness, treatment and control rates improved from past studies but remain inadequate. This underscores the urgent need for increased awareness and better treatment strategies to address hypertension effectively. The data on hyperlipidemia are very alarming. There is a critical need for more effective dyslipidemia prevention and treatment strategies.

Over a decade, the WOBASZ Studies observed a 27% surge in diabetes prevalence. Additionally, there was a notable 50% increase in individuals with impaired fasting glucose.

The prevalence of obesity has increased significantly in Poland over the last decade, particularly in men. It is concerning that every fourth inhabitant of Poland is now obese. Abdominal obesity is observed in every third man and nearly every second woman, with an excess of abdominal fat increasing in both sexes.

Physical activity is another topic that requires significantly more attention as it is really insufficient among Polish population.

Poland, regrettably, continues to be among the countries where the issue of tobacco smoking remains very much present, resulting not only in health consequences but also socioeconomic implications.

Data from WOBASZ studies indicate a significant gap between the perceived and actual nutritional adequacy among Polish individuals, highlighting the urgent need for improved dietary practices.

Addressing CVD prevention is a critical objective at both personal and societal levels, necessitating active engagement from healthcare professionals and policymakers. We propose a change, potentially somewhat controversial, in the approach to prevention and treatment.

Key words: risk factors; hypertension; obesity; smoking; diabetes; hypercholesterolemia; physical activity; diet; cardiovascular diseases, national survey

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Introduction

Cardiovascular diseases (CVD) stand as the primary cause of death, early mortality, and disability across Poland and Europe [1, 2]. This high prevalence may be partly attributed to the lack of frequent application of preventive measures and adherence to recommended

treatments for CVD, both non-pharmacological and pharmacological. Since 1994, European societies have been regularly issuing guidelines on CVD prevention, with the most recent update in 2021 [3]. The EUROASPIRE study, a cross-sectional survey conducted in 26 European countries under the European Society of Cardiology, evaluated how well these CVD prevention guidelines were being followed. The outcomes highlighted a considerable mismatch between the current knowledge on CVD prevention and its actual execution in clinical environments [4].

The purpose of this paper is to discuss modifiable risk factors in the Polish population based on the results of large epidemiological studies: WOBASZ, WOBASZ II, NATPOL 2011, POLSENIOR and POLSENIOR 2 and data from the National Health Fund [5, 6]. The selected risk factors include hypertension in the general and elderly population, hypercholesterolemia, diabetes, poor diet, obesity, smoking, and low physical activity. The control of these risk factors will also be addressed.

Since 1991, the percentage of deaths attributed to CVD in Poland has been on a decline. In 1991, CVD were responsible for 47.7% of all deaths (42.8% among men and 53.3% among women). By 2014, the number of deaths from CVD was 169,735, constituting 45.8% of all deaths in the country (40.9% for men and 51.1% for women). Between 1991 and 2013, there was a 27% decrease in the age-standardized CVD mortality rate for men and a 30% decrease for women [7, 8].

Hypertension

Hypertension is a major modifiable risk factor for a range of CVDs, including coronary heart disease and stroke [9]. The World Health Organization (WHO) identifies high blood pressure as the leading global cause of death [10]. A U.S. study shows hypertension causes 40.6% of cardiovascular deaths, compared to 13.2% from smoking, 11.9% from poor diet, and 8.8% each from insufficient physical activity and high plasma glucose [11]. Every 20 mm Hg rise in systolic BP and 10 mm Hg in diastolic BP doubles the mortality risk from CVD and stroke. Research by Hebert and MacMahon found that lowering diastolic BP by 3–6 mm Hg reduces stroke incidence by 40–42% and cardiovascular events by 16–25% [12]. Farley's study indicated that a 10% improvement in hypertension management could prevent 14,000 deaths annually in the U.S. adult population, outperforming similar improvements in managing LDL cholesterol or aspirin use (could prevent 8,000 deaths) [13].

The WOBASZ and WOBASZ II studies, conducted in 2003–2004 and 2013–2014, investigated among others hypertension prevalence, awareness, treatment, and management in Poland. These studies revealed a notable reduction in average systolic blood pressure (SBP) and diastolic blood pressure (DBP) across both male and female participants. In the WOBASZ II study (age 19–99), after adjusting for age, the overall hypertension prevalence was 42.7%, peaking in the 70–79 age group. Across all ages, men had a notably higher prevalence than women (46.2% *vs.* 40.4%). Disease awareness was highest in those over 50, with women being more aware than men in every age group (63.2% *vs.* 55.3%). Pharmacological treatment was most common in individuals over 60. In the WOBASZ II study, women received treatment more frequently than men (52.1% *vs.* 40.2%). Effective blood pressure control was achieved in 23% of the entire group and 51.9% of those treated. Women had a higher rate of pressure normalization than men (27.3% *vs.* 19.0%). However, the poorest control was seen in the 19–49 age group, affecting both genders.

The prevalence, awareness, percentage of treated patients, and percentage of controlled hypertension are illustrated in Figure 1.

Over a decade, with age and gender adjustments, hypertension prevalence rose from 34.7% to 39% in the combined WOBASZ studies (age 19–74). This increase was more pronounced in men (from 38.1% to 44.3%) than in women (from 32.3% to 35%). Overall awareness of hypertension dipped slightly but rose in men (from 51.6% to 52.3%) while falling in women (from 59.2% to 54.7%). Treatment rates improved, going from 32% to 40.5%. The proportion of patients with controlled blood pressure doubled, rising from 9.6% to 20.7% across the entire study population.

In summary, the research observed a decline in average systolic and diastolic blood pressure in both genders. Yet, after adjusting for age and gender, there was an uptick in hypertension prevalence. Overall awareness of hypertension dipped slightly, but there was an improvement in both the number

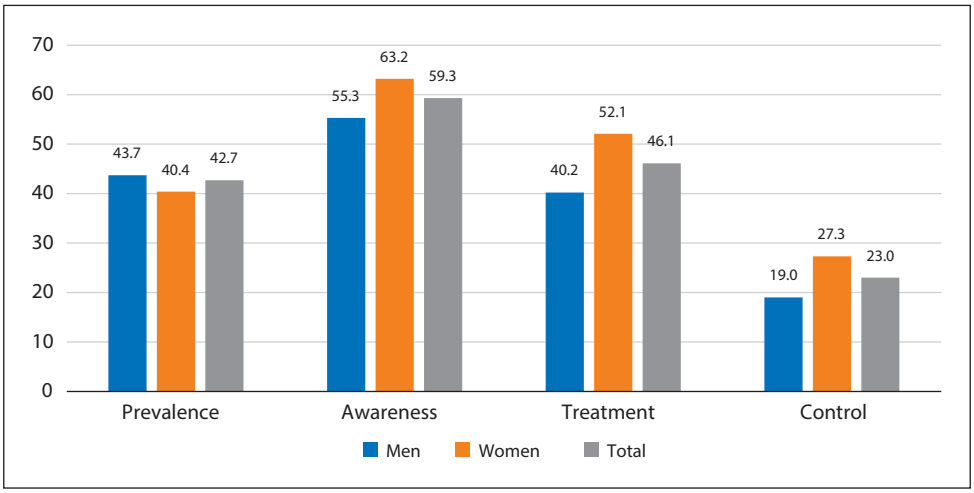

Figure 1. Age-adjusted prevalence, awareness, treatment and control of hypertension, in 2013–2014 (WOBASZ II Study)

of patients receiving treatment and in blood pressure management compared to earlier findings. This underscores the importance of enhancing awareness and treatment approaches, particularly among younger groups, to effectively manage hypertension and minimize its related health risks [14].

Hypertension in elderly

The WOBASZ SENIOR and WOBASZ II study, carried out in Poland, focused on evaluating shifts in hypertension prevalence, awareness, and treatment among individuals aged over 75 from 2007 to 2014. This research involved 467 participants in its 2013–2014 phase, comparing these findings with the 2007 survey that included 1,096 participants.

The study observed a notable decrease in both systolic and diastolic blood pressure over the years (SBP from 153.0 ± 23.9 mm Hg to 142.9 ± 22.3 mm Hg and DBP from 85.2 ± 11.9 mm Hg to 78.4 ± 11.3 mm Hg. While the overall prevalence of hypertension marginally declined (from 83.8% to 77.9%), awareness among patients increased significantly (from 59.2% to 72.9%). Treatment rates for hypertension rose considerably in both genders (from 48.4% to 61.1%), with the treatment's effectiveness more than doubling for all participants (from 10.3% to 26.8%) [15].

The POLSENIOR study found the highest average SBP in men aged 75–79 years (148.3 mm Hg) and women aged 80–84 years (149.9 mm Hg), with a gradual decline thereafter, while DBP consistently decreased from age 65. Around 80% of those in their seventies were affected by hypertension, with its prevalence decreasing to 67% in women and 60% in men over 90. Hypertension awareness was lower in elderly men (61%) compared to women (72%). Fewer men (54%) received treatment than women (64%). However, the best blood pressure control was seen in those over 85, with 34% of women and 38% of men achieving well-controlled levels (BP < 140/90 mm Hg). These results reflect improvements in managing hypertension in Polish elderly population [16].

Although progress has been made, our pace in matching the best countries in hypertension management has been gradual. The NHANES study (2009–2012) revealed hypertension awareness in about 82.7% of patients over 20, with 76.5% of them receiving treatment and 54.1% managing good BP control. Canada stands out in hypertension care, boasting the highest rates of hypertension awareness (83.4%), treatment (79.9%), and effective blood pressure control (65.8%) [17].

The U.S. guidelines for the prevention, detection and treatment of hypertension in adults, published at the end of 2017 [18], have caused a great deal of controversy and discussion since their publication [19]. They significantly modified the blood pressure classification and lowered the threshold at which hypertension is diagnosed to 130/80 mm Hg. The blood pressure threshold from which the treatment is recommended has been lowered to the same values, and the blood pressure target values have been lowered to < 130/80 mm Hg for all patients, regardless of their initial blood pressure. Such a move was justified by the Americans with the results of numerous clinical and observational studies which showed that intensive treatment below the values recommended by JNC VII was associated with a significant reduction in the risk of death

due to CVD. Individuals with blood pressure below 120/80 mm Hg compared to those with blood pressure between 130–139/85–90 mm Hg had a twice lower risk of stroke and 1.5 times lower risk of coronary disease [20–25]. There is currently no convincing evidence of forcing hypotensive treatment except for non-pharmacological treatment in adults with a blood pressure of 130–139/80–90 mm Hg and low risk of CVD. On the one hand, the diagnosis of arterial hypertension gives physicians the opportunity to discuss the role of non-pharmacological treatment in blood pressure lowering, to implement such treatment while introducing appropriate lifestyle changes [26]. On the other hand, it stigmatizes patients with the diagnosis of chronic disease requiring practically lifelong treatment.

Adoption of the U.S. guidelines in Polish population would increase the number of adults with hypertension by 52% to 20.466 million (10.699 men and 9.766 women), the number of people with hypertension detected would decrease by 22% to 1.778 million (0.892 million men and 0.808 million women), the number of patients with implemented pharmacological treatment would decrease by 32% — 2.022 million (0.8991 million men and 1.131 million women), and the number of patients with well-controlled blood pressure would decrease by 71% — 2.215 million (0.901 million men and 1.314 million women). In addition, in about 6% — nearly 2 million patients who have a high or very high risk of CVD — pharmacological treatment should be included.

Hypercholesterolemia

For over 60 years, the relationship between blood lipid levels and CVD risk has been well-documented. This strong correlation has prompted actions and recommendations from governments and various national and international bodies. In 1985, the United States pioneered this approach with the initiation of the National Cholesterol Education Program, marking the first major national effort in this area [27, 28]. Substantial evidence indicates that high total cholesterol (TC), especially low-density lipoprotein cholesterol (LDL-C), is a significant risk factor for CVD. Additionally, hypertriglyceridemia and low high-density lipoprotein cholesterol (HDL-C) are recognized as independent CVD risk factors. The WOBASZ II study set cholesterol targets based on a 10-year CVD mortality risk assessment. For those with low to moderate CVD risk (under 5%), the goals were set at less than 5 mmol/L for TC and under 3 mmol/L for LDL-C. Patients with a higher risk (5–10%) should aim for LDL-C levels below 2.5 mmol/L, while those at very high risk (above 10%) should maintain LDL-C below 1.8 mmol/L or achieve a 50% reduction if the target level is unattainable. The WOBASZ II study reported that 70.3% of men and 64.3% of women had hypercholesterolemia. It also identified isolated hypertriglyceridemia in 5.6% of men and 2.4% of women, and isolated low HDL-C levels in 5.1% of men and 7.3% of women. While the prevalence of hypercholesterolemia remained similar to that reported in the WOBASZ study, there was a notable 26% rise in hypertriglyceridemia among men and a doubling of low HDL-C levels in both sexes. Despite more people being on high- or moderate intensity statins, 60.6% with hypercholesterolemia were not aware of their condition, and only 6% met their treatment targets.

Studies have demonstrated that a rise in SBP from 110 to 170 mm Hg correlates with a sixfold increased risk of coronary heart disease (CHD). Similarly, TC levels climbing from 4.0 to 8.0 mmol/L are linked to an eightfold surge in CHD risk. Moreover, an increase in SBP within the 110 to 170 mm Hg range and DBP within 70 to 105 mm Hg substantially raises the stroke risk by almost eight times [29]. Implementing antihypertensive treatment has been shown to cut the risk of CHD by roughly 25% [30]. The AFCAPS/TexCAPS and ASCOT-LLA studies have shown that incorporating lipid-lowering treatment in patients with hypertension can reduce the residual risk of CHD by more than 35% [31].

In the WOBASZ II study, the age-standardized prevalence of concurrent hypertension and hypercholesterolemia was 34.6%. Among those with hypertension, 69.7% also had hypercholesterolemia. The age-standardized control rates for hypertension, hypercholesterolemia, and both conditions were 24.3%, 11.2%, and 5.4%, respectively, in the 19–99 age group. Multivariable logistic regression models indicated that the control of both conditions correlated with factors such as smoking [odds ratio (OR), 0.5; 95% CI: 0.34–0.76), existing CVD (OR: 2.25; 95% CI: 1.70–2.97), frequent doctor visits (OR: 1.76; 95% CI: 1.33–2.32), and higher educational levels (OR: 1.37; 95% CI: 1.03–1.80) [32]. Patients with hypertension and hypercholesterolemia often struggle with adherence to medical recommendations, failing to meet therapeutic targets. This issue has notable clinical and economic implications, as outlined in many studies [33–35]. A recent innovative approach to improve control of

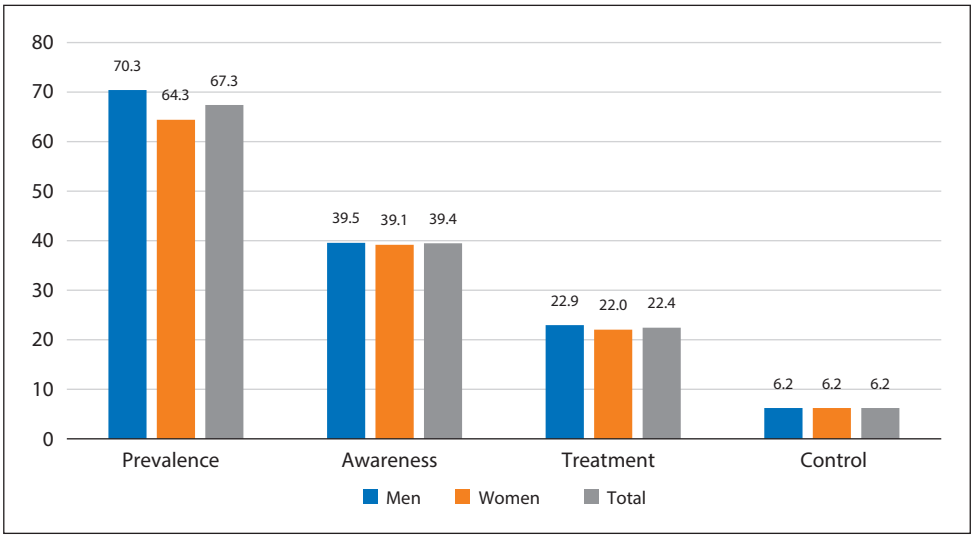

Figure 2. Age-adjusted prevalence, awareness, treatment of hypercholesterolemia, in 2013–2014 (WOBASZ II Study)

these conditions is the polypill, a single tablet that combines multiple efficacious drugs, including antihypertensive and lipid-lowering medications. Such combination pills have the potential to prevent up to 80% of cardiovascular incidents among individuals over 55, as stated in studies [36, 37]. However, their utilization in

clinical practice remains limited. Wider adoption of the polypill could lead to better blood pressure control and achievement of cholesterol targets. Recognizing this, European guidelines have recently bolstered the role of combination treatments for hypertension and hypercholesterolemia. The polypill could address non-compliance issues, as currently 13% of hypertensive patients and 17% of those with hypercholesterolemia either do not start or discontinue their medications, and 23% of patients in both groups receive ineffective doses. Lifestyle changes, such as diet and physical activity, are also crucial for patient motivation. Moreover, a major public health challenge in Poland is the inadequate detection of risk factors.

The prevalence, awareness, percentage of treated patients, and percentage of successfully treated patients with hypercholesterolemia are illustrated in Figure 2.

Diabetes

In 2017, the global prevalence of diabetes among those aged 20 to 79 years was estimated at 8.8%[38]. In the WOBASZ II Study, which surveyed 5,694 individuals (2,763 women and 2,645 men) aged 20 to 74 years, 6% (95% CI: 5.4–6.6) reported having been previously diagnosed with diabetes, with the rates being 5.8% in women and 6.2% in men. Additionally, in 2.4% of participants (95% CI: 2.0–2.8%), who had not been diagnosed before, including 1.8% of women and 3.1% of men, fasting blood glucose levels of > 7.0 mmol/l were registered. Notably, 18.4% of all participants (95% CI: 17.4–19.4), including 13.2% of women and 23.8% of men, had impaired fasting glucose on a single measurement. During a 10-year period, the WOBASZ Studies recorded a 27% increase in diabetes prevalence, from 6.6% to 8.4%. There was also a significant 50% rise in the number of people with impaired fasting glucose, from 9.3% to 18.4%. This increase is particularly concerning as impaired fasting glucose often precedes diabetes, indicating a potential growth in diabetes cases. A key limitation of these studies was the use of only a single blood glucose measurement to identify diabetes, a common approach in epidemiological research for its simplicity and cost-effectiveness [39]. Despite this, diabetes diagnosis based on a single fasting blood glucose test must be approached cautiously, as various external factors can affect the results (such as meal timing, physical activity, time of day). Experts and diabetes guidelines therefore recommend confirming a diabetes diagnosis with tests on two different occasions [40]. It's important to recognize that employing two blood glucose measurements for diabetes diagnosis in epidemiological studies could alter the estimated prevalence in the population. This was evident in the Polish NATPOL 2011 study, where the incidence of impaired fasting glu-

cose notably decreased when a second blood glucose test was conducted. In the NATPOL 2011 Study, the overall diabetes prevalence was 6.7% (95% CI: 5.6–7.9); 6.4% (95% CI: 5.0–8.0) among women and 7.0% (95% CI: 5.4–8.8) among men, mirroring the 2002 rate (6.8%, 95% CI: 5.8–7.9). Notably, over a quarter of those with diabetes were unaware of their condition. Factors such as obesity, arterial hypertension, and being male were significant predictors of undiagnosed diabetes. The total prevalence of impaired fasting glucose was 15.6% (95% CI: 14.0–17.2) in the study population [41]. Incorporating HbA1c level measurements could enhance the accuracy of diabetes diagnoses in epidemiological studies, as has been done in some research [42].

The POLSENIOR 2 study, carried out in 2018–2019, revealed that in Poland, among individuals over 60, the prevalence of diabetes mellitus was 20.3% (95% CI: 18.3–22.4) and newly diagnosed (de novo) diabetes was 1.8% in women (95% CI: 1.2–2.4), while in men, these rates were 24.2% (95% CI: 21.9–26.6) and 2.7% (95% CI: 1.9–3.5) respectively. The incidence of pre-diabetic conditions was 18.7% in women (95% CI:16.9-20.4) and 23.5% in men (95% CI: 21.1–25.9). Diabetes prevalence increased with age, peaking in women aged 85–89 and in men aged 80–84.

National Health Fund data from 2013 showed that the prevalence of diabetes in the entire Polish population was 5.7% (6.1% in women and 5.1% in men). Combining this with data from the NATPOL 2011 and POLSENIOR Studies, the estimated diabetes prevalence in Poland was 6.97%.

In NATPOL 2011 study, the proportion of people with undiagnosed diabetes, was 2,39% in men and 0,68% in women [43].

However, comprehensive cross-sectional study results on diabetes control in the Polish population are currently unavailable.

Obesity

Obesity prevalence in Central and Eastern Europe, including Poland, is notably higher than in Western and Northern regions [44]. This presents a significant public health issue, with obesity-related costs impacting up to 0.7% of Europe's GDP [45]. In Poland, obesity-related health expenses constitute about a fifth of total health spending [46]. Obesity increases the risk of CVD, type 2 diabetes, certain cancers, and arthritis. It particularly exacerbates other cardiovascular risk factors such as hypertension, glucose intolerance, dyslipidemia, and chronic inflammation, with abdominal fat being a key concern for cardiometabolic disorders. Obesity, a chronic condition influenced by lifestyle choices such as poor diet and inactivity, also correlates with a higher mortality risk [3, 47, 48]. Between 2003 and 2014, the prevalence of obesity and overweight in Poland showed a shift towards higher body mass index categories, especially among men, with a notable increase in abdominal obesity in both genders. The WOBASZ II study found that the age-standardized prevalence of obesity [body mass index (BMI) > 30 kg/m^2] was present in 24.4% of men and 25% of women.

Overweight (BMI: 25.0–29.9 kg/m^2) was observed in 43.2% of men and 30.5% of women. Additionally, 32.2% of men and 45.7% of women had abdominal obesity (waist circumference > 102 cm in men or > 88 cm in women). In conclusion, one in four individuals in Poland is affected by obesity, a condition that has seen a marked increase

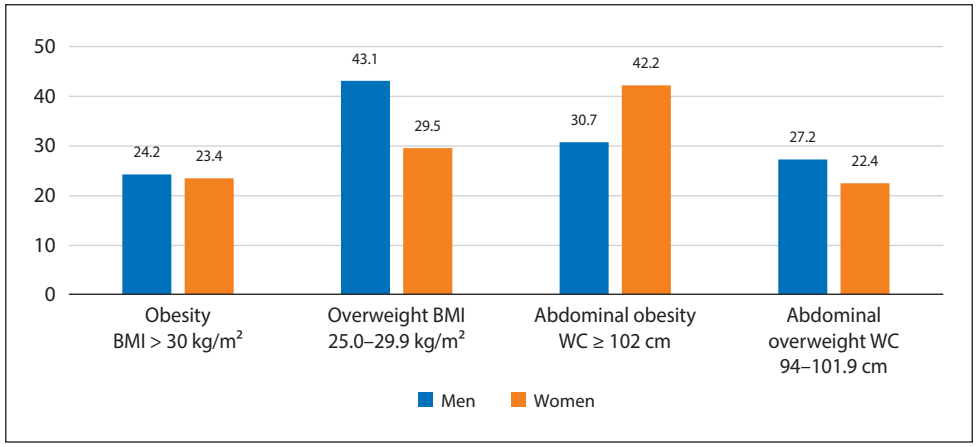

Figure 3. Prevalence of general and abdominal obesity and overweight by sex and age group in 2013–2014 (WOBASZ II Study)

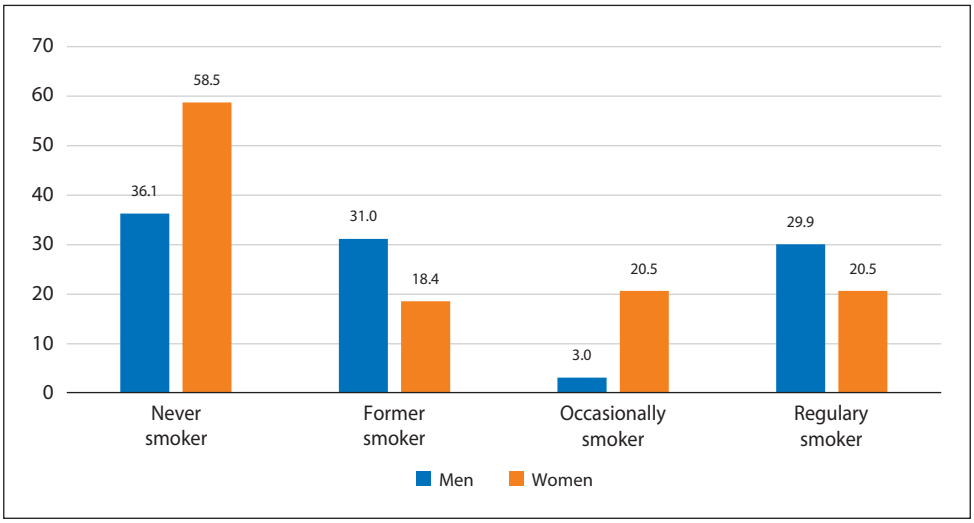

Figure 4. Distribution of the smoking status (%) in WOBASZ II Study

over the past ten years, particularly among males. Abdominal obesity is notably prevalent, affecting one-third of men and almost half of the women, with a rising trend in abdominal fat observed across both genders [49] (Fig. 3).

Smoking

Poland belongs to a group of countries with a high prevalence of smoking, both among men and women [50]. The extensive health ramifications of tobacco smoke have been well-established over time [51]. It's a leading cause of death and contributor to diseases such as cancer, coronary artery disease, stroke, and respiratory conditions. This global issue also results in considerable economic and societal losses [52]. The WHO reported that smoking-related diseases caused over 100 million deaths in the 20th century [53]. In Poland, smoking is a major health concern, causing approximately 70,000 deaths annually, with lung cancer being a prevalent outcome, especially among older adults. The financial burden on Polish healthcare system due to tobacco-related diseases is substantial, with costs running into 18 billion PLN (4.5 billion USD) annually [54]. The WOBASZ and WOBASZ II Study delved into the prevalence and patterns of tobacco use among Polish adults between 2003 and 2014, assessed smoking habits, motivations, and readiness to quit, offering valuable insights for public health policy and smoking cessation initiatives. In the comprehensive WOBASZ and WOBASZ II studies, a clear trend was observed where men were more likely to be regular smokers compared to women. The first WOBASZ survey reported 39.0% of men and 23.8% of women as regular smokers, which declined to 29.9% for men and 20.5% for women in the WOBASZ II Study. This decline in smoking rates was significant across all adult age groups in Poland. The studies revealed distinct age-related smoking patterns, with middle-aged individuals smoking most frequently and the oldest age group smoking the least. Over the decade, there was an observable shift towards a higher age of initiating regular smoking and a varied distribution of smoking motivations, with an increasing number of smoking "for pleasure". The daily average of cigarettes smoked also decreased in this period, both for men (17.9 *vs.* 15.8 cigarettes/day) and for women (13.7 *vs.* 12.1 cigarettes/day). In the WOBASZ II study, the proportion of participants who were not inclined to quit smoking was almost double that observed in the first WOBASZ study. In both WOBASZ studies, the primary motive for quitting smoking, cited by about 40% of participants, was the fear of illness. Financial considerations were the second most common reason, mentioned by over 20% of participants. Notably, the prevalence of these motivations remained constant throughout the study period. Other reasons, including doctor's advice, were much less influential, with only 3% of surveyed individuals citing medical recommendations as a reason to quit smoking [55] (Fig. 4).

Low activity

Physical inactivity ranks as the fourth leading risk factor for noncommunicable diseases and glob-

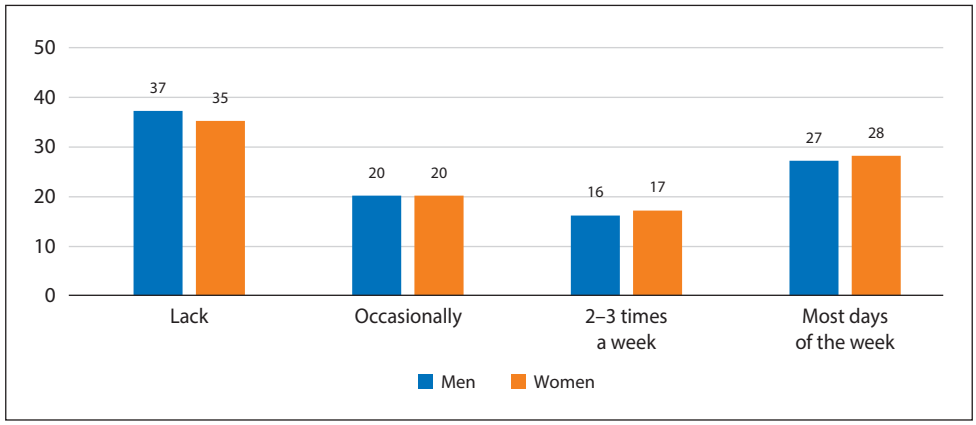

Figure 5. Frequency of physical activity undertaken in free time (≥ 30 min/day) in men and women (WOBASZ II study)

al mortality [56]. Research by Arem et al. suggested that individuals who are physically inactive face a 20% higher mortality risk than those who adhere to current physical activity (PA) guidelines [57]. Furthermore, low physical activity is a key factor in metabolic disorders, CVD, cancers, depression, and overall quality of life [58, 59]. Despite well-known benefits of an active lifestyle, approximately one-third of the global population aged 15 and older does not meet the recommended levels of physical activity [60]. Bandosz et al. attributed over half of the decline in coronary heart disease mortality in Poland to major risk factor changes, especially reduced total cholesterol and increased leisure-time PA. Approximately 10% of the mortality rate decrease, preventing about 2,500 coronary deaths between 1991 and 2005, was due to increased PA [61]. Therefore, promoting PA is a key element of the noncommunicable disease prevention strategy in Poland. The 2003–2005 WOBASZ survey showed increased PA levels compared to the late 1990s, with a marked decrease in sedentary lifestyles among participants. Between the WOBASZ surveys, leisure-time PA significantly changed (37.4% *vs.* 27.3% in men and 32.7% *vs.* 28.3% in women). The proportion of men engaging in none or occasional activity increased from 49.6% to 56.8%, while it remained stable among women (55.2% *vs.* 54.9%) (Fig. 5).

Factors such as lower education levels, smoking, and living in large urban areas were linked to higher PA. Occupational activity levels didn't change significantly for men but increased in sedentary nature for women from 43.4% to % 49.4%. Active commuting also saw a significant decline in both genders. In the WOBASZ II survey, a significant majority, 79.3% of men and 71.3% of women, indicated that they did not engage in active commuting methods i.e. walking or cycling [62].

Diet

A nutritious diet is crucial for preventing CVD and other chronic illnesses. Essential nutrients in this context include fatty acids, selected vitamins and minerals, and fiber. The overall quality of a diet, assessed through various indices, is also pivotal. The link between diet and CVD is well-established, covering both individual nutrients and overall dietary patterns. Efforts are needed to shift societal dietary habits towards healthier choices, in line with guidelines, while also encouraging food industry participation in producing healthier options. This approach is vital, as diet significantly influences cardiovascular risk factors, which are notably high in the Polish adult population studied. Elevated levels of hypercholesterolemia and LDL-C, often linked to poor diet, highlight the need to reduce saturated fat intake and replace it with unsaturated fats, particularly polyunsaturated ones, to maintain normal cholesterol levels and lower CVD risk. Research suggests a 2–3% reduction in CVD for each 1% replacement of saturated fats with polyunsaturated fats [63–67]. To promote healthier eating, it is crucial to first understand the current dietary trends of the population, a goal addressed by the comprehensive WOBASZ II national health survey. The dietary patterns of adult Poles fell short of expectations. Only 1 in 13 adhered to a low fat or diabetic diet, and a low-calorie diet was followed by even fewer. High salt usage (adding salt to already seasoned dishes was reported by 27% of men and 18% of women) and consumption of fatty meats were reported. Nutrient intake was unbalanced, with better adherence to certain vitamins and proteins (although they were consumed in recommended doses only by 44–80% of the respondents), but excessive consumption of fats, particularly saturated fats, was

noted, with only a small proportion meeting recommended intake levels (below 20% among men and below 30% among women). However, about 55% of participants believed that their diet was appropriate. Minerals crucial for reducing CVD risk, such as magnesium, potassium, and calcium, were underconsumed in the average Polish diet. The intake of calcium and potassium was particularly low, with less than 20% of individuals meeting the recommended levels. Around 30% achieved the advised magnesium intake. Additionally, deficiencies in folate and fiber were notable. The Healthy Diet Indicator (HDI) score, which assesses overall diet quality, is based on WHO guidelines for preventing CVD. It evaluates seven key nutrients including both saturated and polyunsaturated fats, cholesterol, proteins, dietary fiber, as well as the intake of fruits, vegetables, and free sugars. The HDI score ranges from 0, indicating the least healthy diet, to 7, representing the healthiest diet. Higher HDI scores were linked to longer, healthier lives and inversely associated with CVD mortality in Eastern European populations. Waśkiewicz et al., who used the HDI score to evaluate diet quality, showed that most adults in Poland had diets that were below recommended standards, with over 60% having low-quality diets based on their HDI scores (0–3 points, the average HDI value of 3.19 in men and 3.26 in women). In the WOBASZ II study, over half of the male participants and nearly a third of the females consumed fatty meats. About 75–80% of respondents had excessive total fat and saturated fatty acid intake, with polyunsaturated fat intake meeting recommendations for only 30–35% of them. This imbalance in fatty acid consumption could contribute to the high rates of hypercholesterolemia in Poland. Additionally, the study found no significant changes in average intake of fats, cholesterol, and fiber over the past decade, suggesting that reductions in hypercholesterolemia were likely due to increased use of lipid-lowering medications. The WOBASZ studies noted a relative decrease in low high-density lipoprotein levels compared to a decade earlier (reduced by 1.3 and 5.2 percentage points in men and women, respectively), possibly due to increased alcohol consumption, as indicated by national data (during this period, ethanol consumption increased by 8.5% in men and about 39% in women). High hypertension prevalence might be linked to dietary factors, including excessive salt use and low intake of key minerals (i.e., potassium intake was inadequate in more than 80% of men and about 95% of women). Poor consumption of fruits and vegetables, essential for cardiovascular health, was also observed (less than 400 g of fruits and vegetables per day, which is a recommended level, was reported by about 50% of the respondents of both genders. Despite a slight increase in fruit and vegetable intake over the decade, mineral intake remained unchanged. Antioxidant vitamins and those involved in homocysteine metabolism are crucial for CVD risk reduction. The study found that while the average intake of these vitamins in Poland met recommended values, individual intake was often inadequate. Folate intake was particularly low, with about 75% of men and 85% of women not meeting recommendations. Overall, these findings indicate a significant gap between the actual and perceived dietary adequacy among the Polish population, emphasizing the need for enhanced dietary practices for CVD prevention [68].

Cardiovascular diseases prevention

CVD prevention involves actions at both individual and population levels to reduce or eliminate CVD impact and related disabilities. The WHO states that 75% of CVD deaths are preventable through lifestyle changes. Prevention targets high-risk individuals and the broader population, emphasizing long-term strategies. Key recommendations, updated in successive guidelines since 1994, include quitting smoking, increasing physical activity, adopting a healthy diet, managing weight and hypertension, maintaining optimal cholesterol levels, and stress reduction. Significant reductions in coronary artery disease mortality are linked to lifestyle improvements [3]. The INTERHEART study identified nine modifiable risk factors (smoking, hypertension, diabetes, abnormal lipid levels, dietary habits, alcohol consumption, abdominal obesity, low level of physical activity, and psychosocial factors) responsible for most myocardial infarctions. Preventive measures emphasize promoting healthy lifestyles and identifying high-risk individuals, with professional support needed for lifestyle changes [69]. However, healthcare systems often focus more on acute care and less on lifestyle modifications. In the WOBASZ II study, 63.8% of men and 75.3% of women visited a doctor annually, with slightly higher rates in WOBASZ II. General practitioners (GPs) were the most consulted, and there was a significant increase in preventive counseling by GPs between the two study periods (the percentage of at least two preventive consultations during one medical visit increased from 36.6% to 45.5% in men and from 35.3% to 41.2% in women, respectively). Specialists in public medical practices provided the best preventive support. Dif-

ferences in the frequency of preventive consultations offered by GPs versus public specialists were noted, especially for men in both studies and women in the WOBASZ study [70].

GPs are key in CVD prevention due to their frequent contact with patients (two-thirds of the population visit their GPs at least once a year and 90% at least once in five years [71]). However, in the WOBASZ studies, over a third of patients did not receive preventive advice during visits. This lack of support was even noted in 20% of those who had experienced myocardial infarction or stroke. Surprisingly, the lack of preventive support was most frequently reported among individuals with no risk factors, underscoring the need for universal preventive healthcare regardless of a person's health status. During the WOBASZ studies, it was noted that not all patients had their blood pressure checked during GP visits, and this frequency did not increase over time. About 60% of general appointments and over 70% of consultations for CAD or stroke patients included blood pressure measurements. The studies also highlighted the need for more frequent physical activity counseling in GP practices. Despite an increase in such advice, especially for primary prevention, it was still insufficiently provided, ranging from about 10% in low-risk individuals to 30% in those under secondary prevention. In the research conducted by Piwońska et al., physical activity recommendations were more frequently given to men and those with risk factors or chronic diseases. Yet, the percentage of respondents recalling such advice (about one-fourth to one-fifth) was lower compared to the 55% in the EUROPREVIEW survey. American GPs reported challenges in giving exercise advice, including time constraints, lack of specific knowledge on exercise types, and doubts about influencing patient behavior towards healthier lifestyles [71].

What then can we do?

There is a need to improve the detection of risk factors (increasing social awareness through health education beginning at the youngest age — in preschool children — and consistently continued throughout life) as well as their control through the decisive implementation of both non-pharmacological and pharmacological treatment. It is critically important to concurrently implement these previously mentioned four pillars of CVD prevention. Merely increasing the detectability of risk factors without subsequent comprehensive treatment and education will not translate into success or the much-anticipated change in cardiovascular mortality trends. This approach to CVD prevention is certainly valid. However, these methods have previously been implemented within the Polish population with poor results, based on earlier cited epidemiological study findings. International and Polish expert bodies continuously publish newer guidelines on the prevention of CVD, recommending increasingly stringent control thresholds for risk factors, for example, target LDL-C levels. As we have previously demonstrated, in regular, everyday practice, physicians struggle with the full implementation of CVD prevention guidelines. Without proper education of both patients and physicians, this may lead to unnecessary frustration. Therefore, both the physician and the patient should have basic knowledge of why target values are changing and that this epidemiological knowledge is based on Evidence-Based Medicine (EBM).

We want to emphasize that the authors of this study do not deny the need to set new goals, such as for antihypertensive and lipid-lowering therapy, and do not question the results of modern epidemiological studies.

We propose a paradigm shift in the current CVD prevention strategy. Human nature, although seemingly complicated, in reality operates on simple principles. If individuals do not notice quick and tangible effects of their decisions, they do not comply with them, or their persistence in adhering to medical recommendations quickly diminishes. In many countries, driving without wearing seat belts results in financial penalties. Insurance companies, for example, for cars, increase insurance premiums for drivers who drive recklessly because they increase the risk of so-called loss ratio. Using these experiences, one could increase the health insurance premium for patients who do not want to change their modifiable CVD risk factors and decrease the premium for those who achieve the set preventive goals. Additionally, the system of rewarding doctors who achieve the set healthcare goals in their patients could be changed. Introducing a financial incentive for success might best motivate both patients and doctors to reduce the broadly understood therapeutic inertia and ensure significant improvement in the control of CVD risk factors.

Author contributions

M.W. conceived the idea for the manuscript, analyzed the data, interpreted the results, and wrote the paper. M.Z. analyzed the data, A.T. critically revised the manuscript. A.N. conceived the idea

for the manuscript, analyzed the data, interpreted the results. All authors read and approved the final manuscript.

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Conflict of interest

Authors declare no conflict of interests.

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