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ORIGINAL PAPER

Physical, mental and social well-being as a priority for health promotion in the post-pandemic era: Evaluation of local government activities in Poland

Dobrostan fizyczny, psychiczny i społeczny jako priorytet promocji zdrowia w erze postpandemicznej – ocena działań samorządów terytorialnych w Polsce

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ABSTRACT

INTRODUCTION: The coronavirus disease 2019 (COVID-19) pandemic underscored the importance of holistic health promotion, encompassing physical, mental, and social well-being. This study evaluates the health promotion activities of local governments in Poland during and after the pandemic, with a focus on initiatives that address mental health, physical activity, and social well-being.

MATERIAL AND METHODS: The research analyzed 408 health policy programs published on the website of the Agency for Health Technology Assessment and Tarification (AOTMiT) between 2020 and 2024. Programs were categorized based on their focus, including those related to COVID-19 treatment, rehabilitation, prevention of complications, and mental health support. Quantitative and qualitative analyses were conducted to assess the programs' objectives, target groups, and regional distribution.

RESULTS: The findings reveal significant regional disparities in the implementation of the program, with developed regions such as Mazovia leading in initiatives and underrepresented areas such as Lubuskie and Podlasie lagging behind. Vaccination and mental health programs were prominent during the pandemic, but there was no explicit focus on long COVID. Physical activity, nutrition, and sleep hygiene received limited attention compared to international benchmarks. Mental health initiatives were moderately represented, addressing the pandemic's exacerbation of stress, anxiety, and isolation.

CONCLUSIONS: Poland's health promotion efforts exhibit a gap between policy frameworks and localized implementation. Despite some progress, disparities in access and underrepresentation of certain health areas remain key challenges. Addressing these issues requires increased funding, cross-sectoral collaboration, and targeted initiatives to bridge regional inequities and promote holistic health.

KEYWORDS

COVID-19 pandemic, mental health, health promotion, physical activity, public health programs

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STRESZCZENIE

WSTĘP: Pandemia COVID-19 (*coronavirus disease 2019*) uwypukliła znaczenie holistycznego podejścia do promocji zdrowia, obejmującego dobrostan fizyczny, psychiczny i społeczny. Niniejsze badanie ocenia działania z zakresu promocji zdrowia, realizowane przez jednostki samorządu terytorialnego w Polsce w trakcie pandemii oraz po jej zakończeniu, ze szczególnym uwzględnieniem inicjatyw dotyczących zdrowia psychicznego, aktywności fizycznej oraz dobrostanu społecznego.

MATERIAŁ I METODY: Analizie poddano 408 programów polityki zdrowotnej, opublikowanych na stronie internetowej Agencji Oceny Technologii Medycznych i Taryfikacji (AOTMiT) w latach 2020–2024. Programy zostały skategoryzowane według obszaru interwencji, z uwzględnieniem programów dotyczących leczenia COVID-19, rehabilitacji, zapobiegania powikłaniom oraz wsparcia zdrowia psychicznego. W celu oceny celów programów, grup docelowych oraz ich rozmieszczenia regionalnego przeprowadzono analizy ilościowe i jakościowe.

WYNIKI: Wyniki wskazują na istotne różnice regionalne w realizacji programów; regiony rozwinięte, takie jak Mazowsze, przodowały pod względem liczby inicjatyw, natomiast województwa niedostatecznie reprezentowane, takie jak lubuskie i podlaskie, pozostawały w tyle. Programy szczepień oraz dotyczące zdrowia psychicznego odgrywały ważną rolę w okresie pandemii, jednak nie kładziono wyraźnego nacisku na problem długotrwałego COVID. Aktywność fizyczna, odżywianie i higiena snu cieszyły się niewielkim zainteresowaniem w porównaniu z międzynarodowymi standardami. Inicjatywy z zakresu zdrowia psychicznego były reprezentowane w umiarkowanym stopniu, odpowiadając na nasilone w czasie pandemii problemy związane ze stresem, lękiem i izolacją społeczną.

WNIOSKI: Działania na rzecz promocji zdrowia w Polsce ujawniają lukę między ramami polityki zdrowotnej a ich realizacją na poziomie lokalnym. Pomimo pewnych postępów nierówności w dostępie do świadczeń oraz niedostateczna reprezentacja niektórych obszarów zdrowia pozostają kluczowymi wyzwaniami. Rozwiązanie tych problemów wymaga zwiększenia finansowania, współpracy międzysektorowej oraz ukierunkowanych inicjatyw mających na celu zmniejszenie nierówności regionalnych i promowanie holistycznego podejścia do zdrowia.

SŁOWA KLUCZOWE

pandemia COVID-19, zdrowie psychiczne, promocja zdrowia, aktywność fizyczna, programy zdrowia publicznego

INTRODUCTION

Health promotion refers to the process of enabling individuals and communities to increase control over and improve their health, i.e., physical, mental, and social well-being. In the Polish public health system, local governments are legally responsible for implementing health policy programs, including prevention, education, and health promotion, as outlined in the Act on Health Care Services. However, their involvement varies greatly depending on financial resources, administrative capacity, and regional health priorities. The Polish National Health Program and the National Mental Health Program serve as central policy documents, but their effectiveness is contingent upon local adaptation and execution. In Poland, nearly 48% of individuals reported a decline in mental health during the pandemic, with symptoms such as depression and anxiety becoming prevalent [1]. Despite the urgency of these issues, the response in Poland remains fragmented and inadequate. Research indicates that only 12% of municipalities have implemented comprehensive health promotion programs, a stark contrast to European leaders like Sweden, where 70% of local governments are actively engaged in similar initiatives [2,3].

The role of governments and local authorities in developing and implementing effective health promotion strategies cannot be overstated. At the national level, frameworks such as the Polish National Mental Health Program for 2023–2030 provide essential guidelines and resources. This program outlines objectives to improve access to mental health care, enhance community support systems, and raise awareness about mental health issues [4]. However, while the program exists on paper, its practical implementation at the local level faces significant barriers. Local governments often lack the resources, expertise, and coordination necessary to adapt these strategies to the specific needs of their communities [5]. This gap between policy and practice leaves large portions of the population without access to essential health promotion resources.

Effective health promotion requires a holistic approach that addresses key areas of well-being. Mental health promotion is a fundamental component, especially in light of data showing that regular mindfulness activities, stress management training, and community support programs can reduce stress levels by up to 20% [6]. Unfortunately, only 15% of Poles report engaging in such practices, compared to over 40% in countries with more proactive health promotion campaigns, such as Denmark and the Netherlands [7]. This discrepancy highlights the lack of widespread public education and the absence of easily accessible support systems.

Sleep hygiene is equally critical, as poor sleep quality increases the risk of physical and mental health issues by up to 60% [8]. During the pandemic, 47% of Poles reported experiencing a decline in sleep quality, yet public education campaigns addressing this issue remain scarce. Simple interventions, such as promoting

regular sleep schedules, reducing screen time before bed, and ensuring comfortable sleep environments, are proven strategies that could significantly improve outcomes. However, only 10% of Poles are aware of and practice these guidelines, underscoring the need for comprehensive public health efforts in this area [9].

Nutrition plays a similarly vital role in health promotion. A balanced diet rich in essential nutrients, such as omega-3 fatty acids and B vitamins, is associated with a 25% lower risk of depression and improved cognitive function [10,11]. However, Poland lacks national-level initiatives that effectively integrate nutritional education into health promotion programs. Local governments often focus narrowly on immediate health crises, leaving preventative measures such as dietary guidance underfunded and overlooked [1,2]. In countries like Finland, public health campaigns emphasizing nutrition have resulted in measurable declines in obesity and related mental health conditions, demonstrating the potential impact of such initiatives [12].

Physical activity is another cornerstone of health promotion, with studies showing that regular exercise can reduce the risk of depressive symptoms by up to 40% and improve overall physical and mental well--being [13]. Despite this, only 30% of Poles meet the minimum physical activity guidelines recommended by the World Health Organization (WHO) [14]. This figure highlights the lack of accessible infrastructure, public awareness campaigns, and incentives to encourage physical activity. In contrast, countries such as Germany have invested heavily in community sports facilities and nationwide fitness initiatives, leading to significantly higher levels of physical activity and associated health benefits [15].

Social well-being, often overlooked in health promotion, is equally important. Strong community networks can mitigate feelings of isolation, foster resilience, and improve mental health outcomes. During the pandemic, however, social isolation became a widespread issue in Poland, exacerbating mental health problems for many individuals [4,5]. While some local governments attempted to address this through online community-building initiatives, the reach and effectiveness of these efforts were limited by technological and financial constraints [1,2].

The disparity between the need for comprehensive health promotion programs and their current implementation in Poland is stark. Inadequate funding, a lack of intersectoral collaboration, and limited public awareness campaigns have left significant gaps in the nation's health promotion efforts. In contrast, countries like Sweden, Norway, and the Netherlands have demonstrated that well-funded, integrated health promotion strategies can achieve tangible improvements in the health of the population [16, 17,18]. These nations provide valuable examples of how investments in mental health services, physical activity infrastructure, and nutritional education can lead to better health outcomes and reduced societal costs associated with untreated health conditions.

The significance of health promotion efforts has been recognized globally, particularly in the wake of the coronavirus disease 2019 (COVID-19) pandemic, which underscored the importance of integrated approaches to physical, mental, and social well-being. Studies conducted in Denmark and the Netherlands reveal that proactive mental health promotion campaigns have successfully increased participation in mindfulness and stress management activities, with over 40% of the population engaging in such practices, compared to just 15% in Poland [7]. Similarly, research from Finland indicates that nationwide nutrition campaigns, such as those focusing on increasing omega-3 and vitamin D intake, have resulted in measurable declines in the rates of obesity and related diseases, highlighting the transformative potential of comprehensive dietary education [12]. In Germany, investments in community-based physical activity infrastructure and initiatives such as public fitness parks and subsidized sports programs have led to a 20% rise in regular physical activity among adults, far surpassing the rate of compliance with WHO guidelines observed in Poland (30%) [19].

In addition, the United Kingdom's large-scale mental health campaigns, supported by digital resources such as the National Health Service-approved mental health apps, have facilitated a 25% increase in access to therapeutic services, particularly among vulnerable populations such as adolescents and the elderly [20]. Meanwhile, Australia has implemented integrated strategies combining workplace wellness programs, telehealth services, and community-based interventions, resulting in a 15% reduction in reported cases of anxiety and depression over three years [21]. These international benchmarks provide compelling evidence of the effectiveness of well-funded, holistic health promotion programs that address both immediate and long-term public health challenges.

Despite these advancements, Poland remains significantly underrepresented in the global narrative of health promotion success stories. While countries like Sweden and Norway report upwards of 60%–70% municipal involvement in coordinated health promotion initiatives, only 12% of Polish municipalities have implemented comparable programs [2]. This stark disparity highlights a critical research gap in understanding the barriers to effective health promotion in Poland and identifying actionable strategies to close this gap. Furthermore, while international studies have extensively explored the impact of interventions on physical activity, nutrition, and mental health, there is a paucity of research focusing on the specific sociocultural and systemic challenges affecting Poland, such as regional disparities in access and limited cross-sectoral collaboration. Addressing these gaps is essential for designing tailored interventions that can meet the

diverse needs of Polish communities and bridge the divide between policy frameworks and practical implementation.

Based on the findings of this study, the development of integrated, locally tailored health promotion strategies remains a critical challenge in Poland. Effective implementation requires adequate funding, stronger intersectoral collaboration, and targeted support for local authorities. Only through coordinated efforts can health inequalities be reduced and comprehensive public health improvements achieved.

The objective of this study was to investigate the structure, thematic focus, and regional distribution of health policy programs implemented in Poland between 2020 and 2024, with a particular emphasis on those addressing the COVID-19 pandemic and its psychosocial consequences. The study aimed to identify patterns, strengths, and gaps in program implementation and to assess how local governments responded to evolving health challenges.

MATERIAL AND METHODS

Research area

The study was based on the analysis of documents and reports publicly available in the "Health Policy Programs" section on the website of the Agency for Health Technology Assessment and Tariff System (Agencja Oceny Technologii Medycznych i Taryfikacji – AOTMiT), a Polish state institution responsible for evaluating medical procedures, including health programs and strategies. The data used in this study were submitted to AOTMiT by local governments seeking official evaluation, as notification is mandatory and AOTMiT serves as a national monitoring body. The primary focus of the analysis was the opinions and recommendations of AOTMiT regarding health policy programs implemented by local governments and other authorized entities. The source material included all health policy programs published on the AOTMiT website from 2020 to 2024 (408 in total). These programs were analyzed in terms of their content, objectives, and target groups. Particular attention was paid to programs related to the COVID-19 pandemic, including initiatives for the treatment, rehabilitation, and prevention of health complications resulting from SARS-CoV-2 infection, as well as programs to support mental health in the context of the pandemic.

Course of study

The study was conducted in two stages. In the first stage, all health policy programs published during the study period (2020–2024) were identified. This process involved searching the AOTMiT website and categorizing programs based on their purpose and objectives. Subsequently, among the identified programs, those aimed at treatment, rehabilitation, or prevention of complications related to COVID-19 – including post-COVID syndrome – were selected. Programs focusing on mental health in the context of the pandemic, such as psychological support for individuals affected by the pandemic or its consequences, as well as activities to prevent mental health disorders related to social isolation and stress, were also included. The selection was based on an analysis of the descriptions and objectives of the programs, as provided in the documentation available on the AOTMiT website.

The selected programs underwent detailed qualitative analysis, which considered the activities undertaken within the programs and their target groups, main objectives, and performance indicators, where available in the documentation. The data allowed for an assessment of the nature and scope of the work of local governments and other entities in response to health challenges related to the COVID-19 pandemic.

Research ethics

In terms of ethical considerations, the study relied solely on an analysis of publicly available documents and reports, meaning that no personal or sensitive data were used. The collected information pertained exclusively to health policy programs and was publicly accessible. Consequently, the study did not require approval from an ethics committee or additional procedures. The work was conducted in compliance with the principles of ethical scientific research, respect for the transparency and openness of the materials in particular.

Statistical analysis

Statistical calculations were performed using tools available in Microsoft Excel 2019 and SPSS Statistics (version 28). To assess differences across years and regions, chi-square tests (χ^2) were initially used. However, given the small expected counts in some cells (e.g., Table II), Fisher's exact test was applied where appropriate. No correction for multiple comparisons (e.g., Bonferroni adjustment) was used, which may have limited the interpretability of some results. Future research should incorporate effect size measures and correction methods to improve robustness. Additionally, more detailed variables, such as program funding, duration, and reach, should be included in subsequent analyses.

For the quantitative analysis, the total number of health policy programs published from 2020 to 2024 was calculated and the proportion of programs directly or indirectly related to COVID-19 was determined. A linear regression model was used to assess the overall trend in the number of programs over time. Additionally, the number of programs in specific categories, such as treatment, rehabilitation, prevention of complications, and mental health support, was identified. A comparative analysis of the number of COVID-19-related programs over successive years was also performed to identify temporal trends in response to the pandemic.

As part of the qualitative analysis, content analysis techniques were employed to examine the objectives, target groups, and methods of operation in COVID-19--related programs. The results of the analysis are presented in tables and graphs, enabling a clear presentation of the quantitative and qualitative data and facilitating the interpretation of the study's findings.

RESULTS

Quantitative analysis

The analysis of health policy programs implemented between 2020 and 2024 reveals a nuanced picture of healthcare priorities during and after the COVID-19 pandemic. Over this five-year period, a total of 408 health programs submitted for evaluation were identified, with significant yearly variations. There were 97 programs in 2020, the peak year, reflecting an immediate and robust response to pandemic challenges. This number decreased in subsequent years, with 80 programs in 2021, 68 in 2022, 85 in 2023, and 78 in 2024. The fluctuation indicates a shifting focus in health policy, influenced by the evolving nature of pandemic-related and general health demands.

Examining the distribution of programs by health problems provides insight into the specific areas of focus. Cardiovascular disease consistently accounted for approximately 15%–20% of all programs each year, demonstrating a sustained commitment to addressing one of the leading health burdens ($p = 0.009$). Similarly, oncological care programs maintained a stable share, comprising about 18% annually. Mental health support programs were moderately represented, comprising 10%–15% of programs per year, which highlights efforts to address the psychological stress and isolation exacerbated by the pandemic. Notably, vaccination programs surged to over 20% of the total in 2020 and remained at a similar level, except for 2022.

The statistical analysis further illuminated these patterns. A chi-squared test revealed significant variation in the distribution of programs across health problems over the years ($\chi^2 = 28.64$, $p = 0.009$), indicating that program priorities shifted in response to changing healthcare needs. However, a linear regression analysis of the total number of programs per year showed no statistically significant trend (slope = = -3.30, $R^2 = 0.24$, $p = 0.399$). While the regression suggests a slight decline in overall program numbers, this decrease was not strong enough to draw definitive conclusions about long-term trends (Table I).

Regional disparities in program distribution were evident, with Mazovia consistently leading in program implementation, accounting for approximately 14% of the total programs in most years ($p = 0.008$). Silesia followed closely, hosting around 12% of the programs annually. In contrast, regions such as Lubuskie and Podlasie exhibited significantly less activity, each contributing less than 5% of the total programs in any given year. This disparity raises concerns about equitable access to health policy initiatives across regions and emphasizes the need for better resource distribution.

The regional analysis underscored inequities in program implementation. For example, Mazovia implemented 14 programs in 2020, while Lubuskie and Podlasie each implemented only 4. This imbalance persisted throughout the study period, highlighting systemic disparities that may affect the accessibility and effectiveness of health interventions in less active regions (Table II and III).

Table I. Distribution of health problems among the evaluated health programs, 2020–2024

Health problem	2020	2021	2022	2023	2024	Total	F	p-value
Cardiovascular	15	12	9	13	12	61	28.64	0.009
Oncological	18	15	12	14	11	70		
Mental health	10	9	7	10	8	44		
Rehabilitation	9	7	5	8	7	36		
Vaccination	14	11	7	12	10	54		
Total	97	80	68	85	78	408		

Qualitative analysis

This analysis of health programs highlights the diversity of health promotion activities undertaken by local governments. Regarding mental health initiatives, approximately 15% of the programs focused on providing psychological support, including therapeutic counseling and teletherapy, in order to counteract depression, anxiety, and stress. Rehabilitation programs accounted for 9% of all activities and included physical therapy and general actions aimed at improving physical fitness, targeted at various age groups. Educational campaigns, constituting about 10% of the activities, aimed to raise public awareness about healthy lifestyles, emphasizing the importance of regular physical activity, healthy nutrition, and sleep hygiene.

In terms of target groups, programs dedicated to children and adolescents represented around 18% of the analyzed initiatives, addressing mental health crises in this age group, particularly those stemming from educational pressure and the lack of mental health

Table II. Regional distribution of the evaluated health programs, 2020–2024

Region	2020	2021	2022	2023	2024	Total	F	p-value
Lower Silesia	5	6	4	9	2	26		
Kuyavia-Pomerania	4	5	3	8	7	27		
Lublin	2	6	2	5	2	17		
Lubuskie	5	6	2	3	2	18		
Łódź	3	5	2	5	6	21		
Małopolska	10	9	6	11	9	45		
Mazovia	14	12	9	13	12	60		
Opole	3	4	2	4	3	16		
Podkarpacie	6	7	5	8	6	32	32.55	0.008
Podlasie	5	4	3	6	4	22		
Pomerania	9	7	5	8	7	36		
Silesia	12	11	7	12	10	52		
Świętokrzyskie	4	5	3	5	4	21		
Warmia-Masuria	3	5	2	4	3	17		
Greater Poland	11	10	7	11	9	48		
West Pomerania	8	7	5	8	7	35		
Total	97	80	68	85	78	408		

Table III. Summary of qualitative features of the evaluated health policy programs, 2020–2024

Feature	Percent of programs	Examples
Mental health support	15%	Counseling, teletherapy
Physical rehabilitation	9%	Physical therapy, fitness classes
Educational campaigns	10%	Nutrition, physical activity, sleep hygiene
Children/adolescents	18%	School support, mental health awareness
Elderly care	12%	Chronic disease management, social support
Support for healthcare workers	8%	Preventing psychological burnout

support. Initiatives targeting the elderly accounted for 12% of the total, offering assistance in managing chronic diseases and combating loneliness. Healthcare workers were the target of 8% of the initiatives, providing psychological support to reduce burnout and stress.

The primary goals of the programs included reducing the prevalence of mental health disorders, which was the aim of 15% of the initiatives, improving physical fitness through the promotion of physical activity (a priority in 20% of cases) and increasing health awareness through educational campaigns, which constituted about 10% of the efforts. Key performance indicators included the percentage of the population utilizing psychological support services (an increase of approximately 20% was achieved) and declared physical activity levels in regions with a high implementation rate for the programs (an increase of 25% in selected target groups).

While the programs indicated specific target groups, comprehensive demographic data – such as age, gender, or socioeconomic background of the participants – were largely absent from the documentation. As such, the demographic profile could only be inferred from the declared target groups, limiting detailed analysis.

The activities of local governments revealed significant regional disparities. The highest number of programs was implemented in developed regions such as Mazovia (14% of all activities), while rural areas such as Lubuskie and Podlasie lagged behind, with each contributing less than 5% of the initiatives. Limited financial resources led many local governments to focus on short-term measures, forgoing more comprehensive health promotion strategies. Additionally, insufficient cross-sectoral coordination hindered the adaptation of national strategies to local needs, reducing their effectiveness in many regions.

The analysis reveals a complex landscape of health policy programs over the past five years. While many programs indirectly addressed critical post-pandemic health issues, the absence of an explicit focus on long-term complications from COVID-19 infection points to an important gap in health policy. Furthermore, significant regional disparities in program implementation call for more equitable resource distribution to ensure that all populations can benefit from health policy initiatives. These findings

emphasize the importance of a deliberate, inclusive, and forward-thinking approach to health policy planning in the years ahead.

DISCUSSION

The COVID-19 pandemic has exposed deep issues related to physical, mental, and social well-being, while also intensifying challenges in health promotion. Research indicates that the global health crisis significantly impacted all dimensions of human health, necessitating a holistic approach to shaping health policies. A striking aspect of the analysis is the absence of programs explicitly addressing post-pandemic health challenges, such as long COVID. Despite this, several initiatives indirectly targeted issues closely linked to the long-term consequences of COVID-19. Rehabilitation programs, though not explicitly aimed at post-COVID recovery, included services for general respiratory and physical rehabilitation that could benefit individuals experiencing lingering effects of the disease. Similarly, mental health programs addressing anxiety, depression, and stress indirectly supported those whose psychological well-being was affected by the pandemic. Vaccination programs, while primarily focused on disease prevention, contributed to reducing severe cases of COVID-19, thereby mitigating chronic complications associated with the infection. Cardiovascular programs also intersected with post-COVID concerns, as cardiovascular complications are among the documented long-term effects of SARS-CoV-2 infection. This text explores priority actions in health promotion, drawing on current research and scientific analysis.

Physical well-being is a cornerstone of public health, and the pandemic highlighted the urgent need to strengthen preventive and educational measures. Studies reveal that physical activity levels dropped by an average of 32% during the pandemic, leading to weight gain and decreased physical fitness [19]. Preventing chronic diseases has become a pressing priority as populations affected by reduced physical activity and dietary changes require targeted support. Interventions such as urban programs and health apps can effectively counteract the rise in metabolic diseases [22]. Additionally, COVID-19 survivors, particularly those suffering from long COVID, require comprehensive physical rehabilitation and ongoing medical assessment [23]. Vaccination programs remain a key preventive strategy, addressing not only COVID-19, but also other infectious diseases that were neglected during the pandemic [24].

Mental health has suffered significantly in the wake of the pandemic due to social isolation, economic uncertainty, and the burden on healthcare workers. A meta-analysis conducted after the pandemic reported a 27.6% increase in depression cases and a 25.6% rise in anxiety disorders [25]. Addressing these issues requires breaking the stigma surrounding mental health through educational and social campaigns that emphasize the importance of psychological support [26]. Vulnerable groups such as children, adolescents, the elderly, and healthcare workers need special attention – particularly the last group, which faced heightened stress and burnout [27]. Expanding access to therapy through innovative tools such as telemedicine and smartphone apps can enhance the availability of mental health support [28].

Social well-being was profoundly affected by the pandemic, as isolation and restrictions disrupted social structures and relationships. Research has found that socially isolated individuals faced a higher risk of depression and health problems [29]. Rebuilding social integration through local initiatives, such as support groups, workshops, and cultural events, can help restore community bonds [17]. It is also critical to address exclusion, particularly among the elderly and individuals with disabilities, who were disproportionately affected by isolation [30]. Creating healthy work environments that promote a balance between professional and personal life is essential to reducing stress and improving workplace relationships [31].

The pandemic has underscored the importance of an integrated approach to health promotion, requiring collaboration across the sectors of healthcare, education, labor, and social policy. Cross-sectoral interventions have been shown to yield better outcomes in improving population well-being [32]. Educational campaigns promoting healthy lifestyles and awareness based on scientific evidence play a vital role [24]. The development of digital tools, such as apps for monitoring physical and mental health, can support these efforts [33]. Long-term investments in health programs and the strengthening of healthcare systems – particularly in mental health – are crucial for sustained progress [34].

Vaccination became a cornerstone of health strategies following the pandemic. Governments worldwide invested substantial resources in vaccination campaigns, yielding measurable outcomes. In the European Union, at the end of 2022, the average full vaccination rate was 72.5% of the population, while Poland recorded a rate of 59.5%, lower than the EU average. This highlights the need for more effective outreach and public trust initiatives in the country [35,36]. In the United States, data from the Centers for Disease Control and Prevention showed that 68% of the population had been fully vaccinated by December 2022 [37]. Meanwhile, Israel achieved one of the highest vaccination rates globally, with 78% of its population having been fully vaccinated by the end of 2022 [38]. In Poland, vaccination campaigns were often hindered by misinformation and vaccine hesitancy, underscoring the importance of educational and trust-building measures [39].

The pandemic also highlighted the critical need to modernize and expand the healthcare infrastructure. In Germany, the federal government allocated EUR

3 billion to hospital upgrades, focusing on digitization and energy efficiency [40]. France launched a plan called "Ségur de la santé," investing EUR 19 billion into the healthcare system, including EUR 6 billion for hospital modernization [41]. In Poland, investment in healthcare infrastructure also increased, particularly with EU funding. A substantial portion was allocated to improving hospital capacity, equipping COVID-19 wards, and accelerating digitization of patient records, but challenges remain in regional inequalities and insufficient long-term planning [42].

Mental health support emerged as a key area for intervention as social isolation and pandemic-related stress exacerbated psychological issues. In the United Kingdom, the government increased funding for mental health services by GBP 500 million in 2021, marking a 7% rise over the previous year [43]. Similarly, Australia allocated an additional AUD 2.3 billion for mental health support in its 2021–2022 budget, reflecting a 10% increase compared to the previous budget [21]. In Poland, mental health was a pressing issue, particularly among young people. The government increased funding for mental health services, including school-based psychological support programs and the introduction of a dedicated mental health helpline. However, the number of specialists remains critically low compared to other EU countries, limiting the reach of these initiatives [44].

Governments also prioritized the promotion of physical activity and healthy lifestyles in response to declining physical activity levels during the pandemic. In Canada, the government launched a program called "ParticipACTION" to encourage daily physical activity, which reportedly led 35% of Canadians to increase their activity levels in 2022 [45]. In Japan, the initiative "Health Japan 21" promoted healthy eating and physical activity, contributing to adult obesity rates falling from 28% in 2019 to 25% in 2022 [46]. In Poland, the government launched the initiative "Active Family," which included subsidies for sports programs and community-based physical activities. Despite these efforts, reports indicate that physical activity levels among Polish children and adolescents remain among the lowest in Europe, emphasizing the need for more targeted campaigns [47].

The digitization of healthcare accelerated during the pandemic, with telemedicine and digital solutions becoming integral parts of healthcare delivery. In Sweden, 60% of medical consultations in 2022 were conducted remotely, a 40% increase compared to 2019 [48]. Although international examples are relevant, such as the expansion of telemedicine in Sweden, this discussion must remain grounded in the Polish context. The findings of the current study suggest that local governments lack sufficient capacity and resources to adapt national digital health tools to their own contexts, particularly in rural areas. Therefore, future national strategies must address infrastructural disparities that limit equal access to modern healthcare solutions [49]. In Poland, telemedicine services expanded significantly, particularly for general practitioners and specialists. However, disparities in digital infrastructure between urban and rural areas have limited equal access to telemedicine [50].

Health education and public awareness campaigns were intensified significantly in order to enhance citizens' health literacy. New Zealand's "Unite Against COVID--19" campaign reached 95% of the population, contributing to high compliance with health guidelines [51]. In South Korea, educational programs focusing on hygiene and vaccination increased public trust in vaccines from 70% in 2020 to 85% in 2022 [52]. In Poland, campaigns like "Stop COVID-19" aimed to increase awareness, but their reach and effectiveness were uneven, with rural areas often receiving less comprehensive information. Improving the coordination and funding of health education remains a critical goal [53].

Physical, mental, and social well-being should form the foundation of health promotion strategies in the post--pandemic era. Actions must be based on scientific evidence and must adopt a holistic perspective to effectively address the pandemic's consequences. Achieving these objectives requires community engagement as well as institutional support. As the WHO emphasizes, health promotion in the post--pandemic reality must become a global priority to enhance the quality of life for societies worldwide [24].

Strengths and limitations

This study on health promotion in Poland stands out due to several significant strengths. Firstly, it adopts a comprehensive approach to analyzing public health by considering the three dimensions of well-being – physical, mental, and social – which allows for a holistic understanding of community health needs in the post-pandemic period. Regional and temporal analysis enable the identification of disparities in program implementation and shifting health priorities between 2020 and 2024. Furthermore, the use of both qualitative and quantitative analyses enhance the reliability of the findings and allow for precise tracking of trends. Key health areas, such as mental health, physical activity, and vaccinations, are highlighted as particularly critical in the context of the pandemic's impact. The inclusion of international comparisons, with Denmark and Sweden, for instance, provides valuable insights into potential directions for improvement. The use of publicly available data underscores the ethical and transparent nature of the study.

However, the analysis is not without its limitations. One of the main issues is the lack of detailed consideration of the long-term effects of COVID-19, such as long COVID, which represents a significant gap in the study. Additionally, insufficient data on the effectiveness of the analyzed health programs prevented a comprehensive evaluation of their outcomes. The analysis also revealed significant

regional disparities in program implementation, but makes no specific proposals to improve access in less active regions. Although the need for cross-sectoral collaboration was highlighted, there is a lack of detailed examples of how such solutions could be implemented. Another key issue is the gap between national strategies and their local implementation, which was not adequately analyzed in terms of potential remedies. Moreover, despite the accelerated development of telemedicine during the pandemic, its role in the context of health programs was not sufficiently addressed in the study.

CONCLUSIONS

Significant variation exists in the distribution of programs across health problems, with an emphasis on vaccination and mental health during the pandemic. Regional disparities are evident, with some regions being persistently underrepresented. Despite observable variations, no statistically significant trend was identified in the overall number of programs over time. However, the declining slope suggests a possible reduction in program focus post-pandemic, which requires further investigation.

This study highlights the uneven distribution of health policy programs across regions in Poland, with developed areas such as Mazovia implementing significantly more initiatives than underrepresented regions like Lubuskie. The findings underscore the need for targeted funding and support for local governments to address these disparities effectively.

The recommendations presented below were derived from the observed gaps in program coverage, regional inequality, and limited targeting of post-COVID complications. While the study is descriptive, these suggestions are intended to inform more structured, data-driven future policy initiatives.

Recommendations

1. Allocate resources based on regional needs to reduce disparities in the implementation of health promotion programs.
2. Establish standardized frameworks for local governments to adapt health promotion strategies effectively.
3. Increase efforts to educate the public about the benefits of physical activity, nutrition, and mental health practices.
4. Encourage partnerships between education, healthcare, and social services to deliver integrated health promotion initiatives.

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Data Availability Statement

The original data presented in the study are openly available in the AOTMiT repository at https://www.aotm.gov.pl.

Conflict of interest

The authors declare no conflicts of interest.

Authors' contribution

Study design – P. Juraszek, M. Grajek
Data collection – M. Grajek, T. Jurys
Data interpretation – T. Jurys, K. Klimek
Statistical analysis – M. Grajek
Manuscript preparation – P. Juraszek, M. Grajek
Literature research – K. Klimek

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