

# Delivery of High-Priority Recommended Clinical Preventive Services: Result from a Population-Based Nationwide Study

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## Research article

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# Abstract

## *Background*

Systematic reviews of scientific evidence have identified clinical services that prevent or ameliorate illness and reduce mortality. Most prior studies have considered the provision of a single domain of preventive services such as vaccination or cardiac care and failed to evaluate a systemic approach to preventative care. The study aimed to assess the level of delivery of all high-priority evidence-based preventive services in a publicly funded healthcare setting.

## *Methods*

We conducted a population-based nationwide cross-sectional computer-assisted telephone survey of 1000 Polish adults. Self-reported use of all high-priority clinical preventive services was assessed, including mammography, colonoscopy, blood glucose screening, vaccination, blood pressure screening, and preventive counselling.

## *Results*

Only 6.4% (95% confidence interval (CI): 4.88, 7.92) of adults had received all recommended preventive screening, whereas only 4.3% (95% CI: 3.04, 5.56) had received appropriate counselling. GP visits, blood pressure screening, blood glucose screening, and cervical smear were among the most commonly provisioned interventions, at more than 60%, while flu vaccination, PSA assessment, and preventive counselling were among the least frequently delivered services. Despite the low uptake of preventive interventions, nearly three-quarters of the respondents expect the public health system to provide access to these services, and over 75% is interested in remote access to preventive services using telemedicine platforms and e-consultations.

## *Conclusion*

Our findings suggest that there are significant gaps in the receipt of high-priority preventive interventions. Services that are most commonly not being delivered, such as preventive counselling, need to be emphasized to achieve greater coverage of the population. Further improvements require not only changes in the incentive system for healthcare providers, but also system-level innovation such as telemedicine solutions to deliver preventive services remotely and engage individuals in the monitoring process. The effective preventive strategy will attain the multiple objectives of improving the quality of life, extending the human lifespan, and making the best use of scarce resources.

# Background

Systematic reviews of scientific evidence have identified clinical services that prevent or ameliorate illness and reduce mortality. However, despite the availability of these evidence-based tools and the existing data regarding their economic viability, previous assessments have demonstrated significant

gaps in their receipt. For example, less than half of Europeans receive cancer screening services and preventive counseling<sup>1,2</sup>. Most prior studies have considered the provision of a single domain of preventive services (such as vaccination or cardiac care) and failed to evaluate a systemic approach to preventative care. A recent study by Borsky et al. has shown for the first time that only 8% of adult Americans receive all high-priority, appropriate clinical preventive services recommended for them<sup>3</sup>. To date, there are no studies to show the level of receipt of all recommended preventive services in a publicly funded healthcare setting. In this population-based nationwide cross-sectional study, we assessed the utilization of all appropriate clinical preventive services by adults in a publicly financed healthcare system in Poland.

## Methods

A nationwide cross-sectional study was carried out in May-June 2020 on a representative sample of 1000 Polish adults aged 18 years or older using computer-assisted telephone interviews. A stratified sampling per the demographic structure of voivodeships was used to obtain a representative sample of the population. Target quotas were set for age and sex strata in each geographical region. The interviewers were adequately trained and prepared for the application of the study survey to ensure quality. A data collection supervisor supervised all interviews, and a study coordinator randomly evaluated the recordings of the conversation. The transcripts were not returned to participants for comment and/or correction. No repeat interviews were carried out. The average duration of the interview was 15 minutes. The study survey asked questions about the utilization of thirteen high-priority preventive services that were identified based on expert review of national recommendations. Preventive services were classified into two groups (1) preventive screening and (2) preventive counseling. All recommended preventive services for specific age-sex groups, as well as the reference period for each service, are listed in appendix A. The study survey is available in appendix B. The total number of recommended services differed for each person based on age, gender, and medical information. The minimum number of services one should have utilized is seven, while the maximum is twelve. On average, each individual should have received nine services.

We employed a composite measure to evaluate whether an individual received all appropriate preventive services according to a specific age-sex group. Two data coders coded the data. Statistical analysis was performed using the Statistica v.13.3 (StatSoft). The normality of quantitative variables was verified with the Shapiro-Wilk test. Due to the lack of normal distribution, the statistical significance of differences between the two services groups was assessed using the non-parametric Mann-Whitney U test. Qualitative variables are presented in the contingency tables in the form of counts (n) and fractions (%). The independence of two qualitative variables was verified using the Pearson Chi-squared test. Whenever statistical hypothesis testing was used, a p-value of less than 0.05 was considered statistically significant.

Participants provided their verbal consent at the beginning of the interview. No compensation was provided for participating in the study. The study was approved by the Bioethics Committee of Wrocław

## Results

The study included 1000 participants (520 females and 480 males) over 18 years of age (mean age 47 yrs, SD = 17 years). All clinical preventive services were divided into two groups, preventive screening (cancer screening, vaccination, blood pressure assessment, etc.) and preventive counselling (for obesity, alcohol abuse, tobacco cessation, and depression). Overall, 6.4% (95% confidence interval: 4.88, 7.92) of adults had received preventive screening. GP visits, blood pressure screening, blood glucose screening, and cervical smear were among the most commonly provisioned interventions, at more than 60%. In contrast, flu vaccination and PSA assessment were the least frequently received screening tools. Women were more likely to receive most of the screening interventions. These differences reached statistical significance for lipid screening, colonoscopy, and blood glucose screening (Table 1). However, men were more likely to receive flu vaccination than women (15% versus 10.8%;  $p < 0.047$ ). The percentage of adults receiving all recommended screening interventions by gender and age is presented in Figure 1. In both sexes, older people (aged 70 or more) were almost twice more likely to receive preventive screening than average adults.

**Table 1.** Percentages of adults receiving high-priority clinical preventive services, by sex

Preventive services	All	Females	Males
Screening			
GP visit	73.3	75.6	70.8
Blood pressure	67.8	67.7	67.9
Flu vaccination	12.8	10.8	15*
Lipid profile	59.1	64.9	52.9***
Colonoscopy	19.1	22.7	15.2**
Blood glucose	65.8	71.3	59.9***
Cervical smear	67	67	_a
Mammography	51	51	_a
PSA	26.2	_a	26.2
Counselling			
Obesity	20.3	19	21.7
Alcohol consumption	8.9	6.2	11.9**
Tobacco use	17.4	13.7	21.5**
Depression	19.8	19.8	19.8

*Significance refers to the difference between females and males. PSA is prostate-specific antigen. <sup>a</sup>Not applicable. \*  $p < 0.05$ , \*\* $p < 0.001$ , \*\*\* $p < 0.0001$*

Preventive counselling was significantly less utilized when compared to preventive screening. In total, only 4.3% of all adults received appropriate counselling based on their medical information. Strikingly, only 20.3% of adults with BMI greater than 25 kg/m<sup>2</sup> received obesity counselling, and less than 9% of alcohol abusers were counselled for alcoholism. Interestingly, men were more likely to receive preventive counselling than women. The difference reached statistical significance for alcohol and nicotine abuse counselling.

Overall, only 1.5% (95% CI: 0.75, 2.25) of adults received all appropriate, recommended clinical services (both screening and counselling). Table 2 shows the percentage and 95% confidence interval of the adult population receiving all preventive services, by sex. Given the low rate of the respondents that had received all of the preventive interventions, we examined the percentages of screening and counselling tools that adults had received. In total, 6.2% of individuals received 75–100% of their recommended preventive services, and 28.1% received 0–25% of their recommended services (Figure 2). Females were more likely than males to receive preventive services (40.0% versus 36.0%;  $p = 0.02$ ; Figure 3).

We have assessed the respondents' expectations for the delivery of preventive services. Nearly three-quarters of the respondents expect the public health system to provide access to preventive services. Interestingly, females show significantly higher rates of expectancy than males (76.5% vs. 68.3%,  $p=0.05$ ). Moreover, over 75% of men and women are interested in remote access to preventive services using telemedicine platforms and e-consultations (Table 3).

**Table 2.** Percentage and 95% confidence interval of respondents receiving all preventive services, by sex

	All	Females	Males
Preventive screening utilization = 100%	6.40 [4.88, 7.92]	5.96 [3.92, 8.00]	6.88 [4.60, 9.15]
Preventive counseling utilization = 100%	4.30 [3.04, 5.56]	3.08 [1.59, 4.57]	5.62 [3.56, 7.69]
Preventive service utilization = 100%	1.50 [0.75, 2.25]	0.58 [0.00, 1.23]	2.50 [1.10, 3.90]

**Table 3.** Respondents expectations for the delivery of preventive services, by sex

	Female		Male		All		p-value
	N = 520		N = 480		N = 1000		
	n	%	n	%	n	%	
Do you expect public health system to give you access to preventive services and provide all necessary information?							<b>0.005</b>
Yes	398	76.5%	328	68.3%	726	72.6%	
No	122	23.5%	152	31.7%	274	27.4%	
Would you be interested in telehealth solutions to access preventive services remotely (e.g., via telemedicine platforms, e-consultations, etc.)							0.426
Yes	398	76.5%	356	74.2%	754	75.4%	
No	122	23.5%	124	25.8%	246	24.6%	

## Discussion

The study, for the first time, explored the utilization of an evidence-based package of all recommended preventive services in a publicly financed healthcare system. Our findings suggest that there are significant gaps in the receipt of high-priority preventive interventions. The results are consistent with findings from previous studies that evaluated the uptake of individual preventive services<sup>1,2,4</sup>. We have found that the receipt of preventive screening was highest in older adults aged 70 or more. The finding may be linked with the fact that the elderly are more likely to receive clinical care and medical advice,

both in hospital as well as a primary care setting <sup>5,6</sup>. The uptake of cancer screening services, such as colonoscopy and PSA testing, was surprisingly low, at 15.2% and 26.2%, respectively. We have found significant gaps even among the highly-utilized services such as GP visits, blood pressure screening, cervical smear, and blood glucose screening, where nearly a third of the population had not received preventive care.

Preventive counselling, which ranks among the top cost-saving interventions<sup>7</sup>, is delivered to less than a quarter of the population. The result highlights a wide gap in the delivery of these impactful interventions. The projections show that higher uptake of preventive counselling for tobacco cessation, alcohol misuse, depression, and obesity would add over 1 000 000 QALYs and save billions of dollars <sup>7,8</sup>.

The differences in the receipt of preventive services among men and women were significant. Females were significantly more likely to receive laboratory tests (blood glucose, lipid profile) and colon cancer screening. These results are consistent with previous findings, which indicate that women have higher medical care service utilization than men <sup>3,9</sup>.

Overall, almost 75% of all adults expect the public health system to provide them with all recommended preventive services. The metric shows a high interest among individuals in preventive care. Moreover, in our study, the respondents were willing to employ telemedicine solutions to access preventive care remotely. These results may indicate that a higher utilization rate could be achieved by improving health communication and using new channels of service delivery.

The study is subject to limitations. First, receipt of preventive services was self-reported and may be subject to recall bias. Self-report data tend to overreport utilization rates <sup>10</sup>. However, in our study, rates of service use were consistent with estimates from European data <sup>4</sup>. Secondly, while the results are nationally representative, the sample size did not facilitate more analyses of disparities in receipt of preventive services. Thirdly, to select a representative sample of the Polish adult population, a stratified sampling per the demographic structure of voivodeships was used. However, we set target quotas for age and sex strata in each geographical region. Therefore, the inherent limitations of quota-sampling are present.

Projections of future morbidity and burden of disease indicate that chronic illness will continue to be the most significant contributor to mortality and disability in Europe and high-income countries <sup>11</sup>. It is estimated that almost nine out of ten deaths in the European Union are due to chronic diseases, including cancer, cardiovascular disease, diabetes, and mental illness<sup>12</sup>. The financial load linked with the management of chronic diseases is enormously high, and given that the burden of chronic diseases is continuously increasing, chronic illness will continue to put heavy pressure on national economies. Today, more than 50 million people in Europe have multiple chronic conditions, which incur even higher costs of care and treatment<sup>13</sup>. Clinical preventive strategies are available for many chronic diseases and their value, both health impact and cost-effectiveness remain consistent <sup>7</sup>. Projections show that investment in a high-priority evidence-based package of preventive interventions for the population would

produce over two million additional years of life each year they are provisioned<sup>8</sup>. For example, preventive counselling for tobacco use, alcohol abuse, and depression, which proved to be significantly underutilized in our study, are an expected cost-saving service<sup>7</sup>. Increasing the receipt of evidence-based preventive services results in a reduction of complications of the illness, long-term healthcare costs, and premature deaths.

Despite the mounting evidence, the uptake of preventive services is surprisingly low. The primary reason includes a low level of public awareness about high-priority preventive services, gaps in provider capacity, including long waiting times, and higher focus on diagnosis and provision of treatments rather than preventive interventions among healthcare providers<sup>2</sup>. A recent study has shown that both medical personnel and administrative stakeholders are aware of the health and economic benefits of disease prevention<sup>14</sup>. It is assumed that the low uptake of the preventive services is due to an implementation gap, which is caused by a lack of financial incentives for medical providers to prevent chronic illness. To date, the majority of providers, in particular hospitals and medical professionals, are paid to manage rather than to prevent disease.

In conclusion, despite the current limitations, comprehensive preventive care is attainable. Our data indicate that almost a third of adults reported utilizing more than half of the recommended preventive interventions, and only 0.7% had not received preventive care at all (Appendix C). Services that are most commonly not being delivered, such as preventive counselling, need to be emphasized to achieve greater coverage of the population. Further improvements require not only changes in the incentive system for healthcare providers, but also system-level innovation such as telemedicine solutions to deliver preventive services remotely and engage individuals in the monitoring process. A systemic and rational approach to ensuring that all individuals receive evidence-based preventive services is urgently needed. The effective preventive strategy will attain the multiple objectives of improving the quality of life, extending the human lifespan, and making the best use of scarce resources.

## **Declarations**

### **Ethics approval and consent to participate**

The study was approved by the Bioethics Committee of Wroclaw Medical University. Participants provided their verbal consent at the beginning of the interview.

### **Consent for Publication**

Not applicable

### **Availability of data and materials**

The authors confirm that the data supporting the findings of this study are available within the article

### **Competing interests**

The authors declare no conflict of interests.

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## Authors' Contributions

S.A. and J.G. designed the study. S.A. and J.G. supervised interviews and G.M. evaluated the transcript of the conversation. G.M. verified the analytical methods. S.A. wrote the manuscript in consultation with J.G. and G.M. All authors discussed the results and contributed to the final manuscript.

## Acknowledgments

N.A

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## Figures

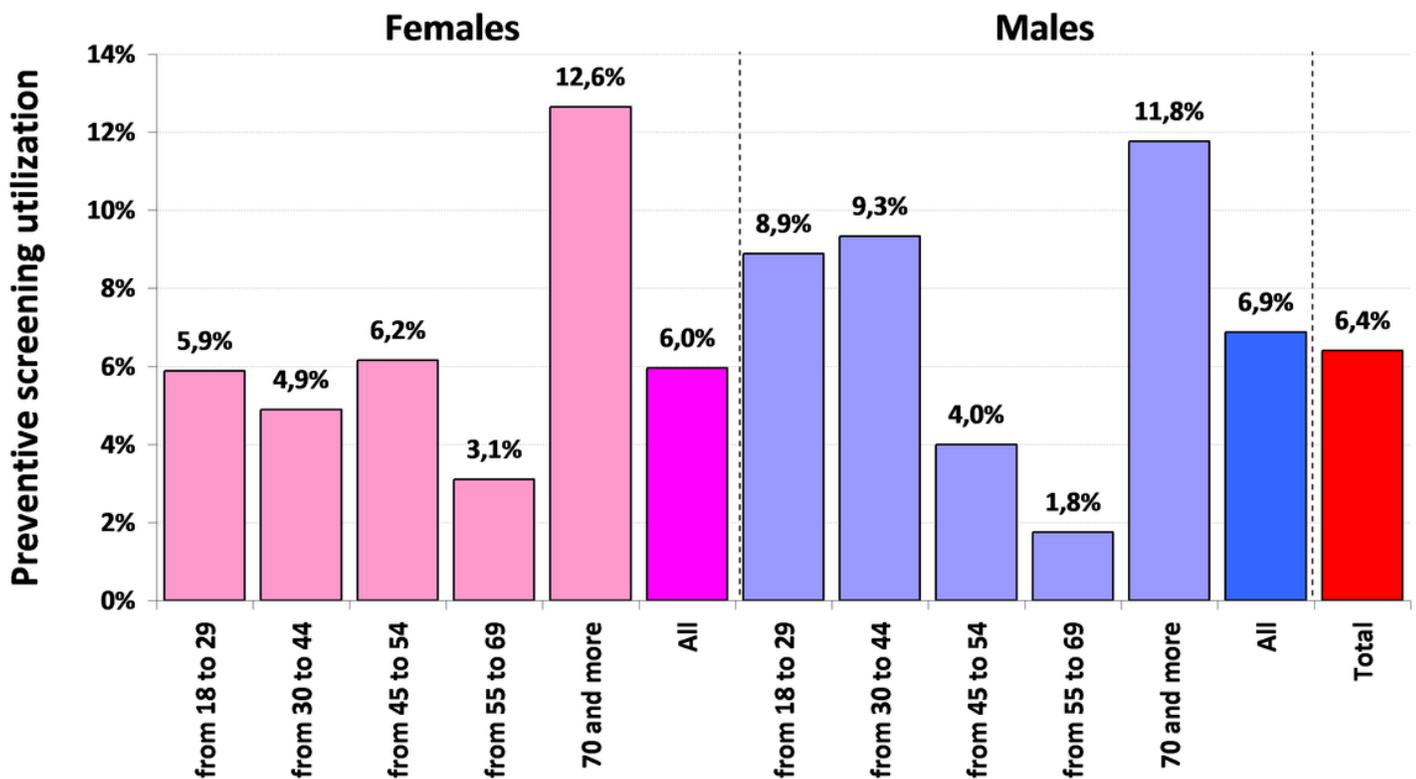


Figure 1

Percentage of adults receiving all recommended preventive screening, by sex and age

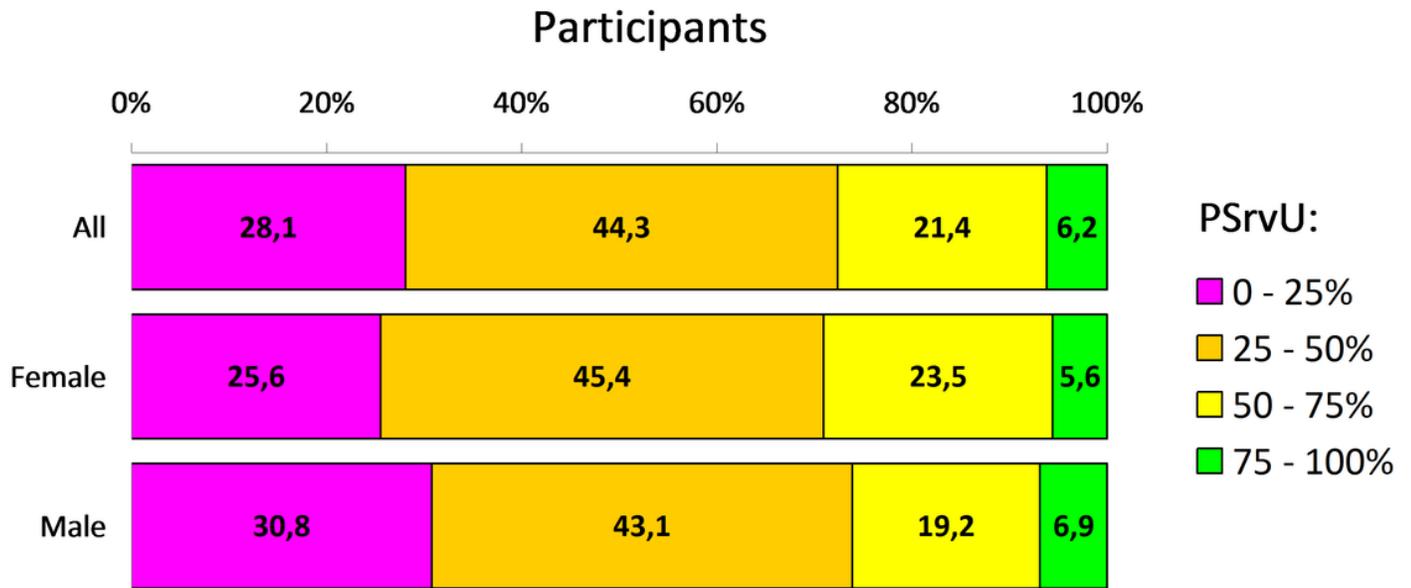


Figure 2

Percentage of adults receiving all recommended high-priority, appropriate clinical preventive services, by sex and quartile of service receipt. PSrvU – preventive service utilization

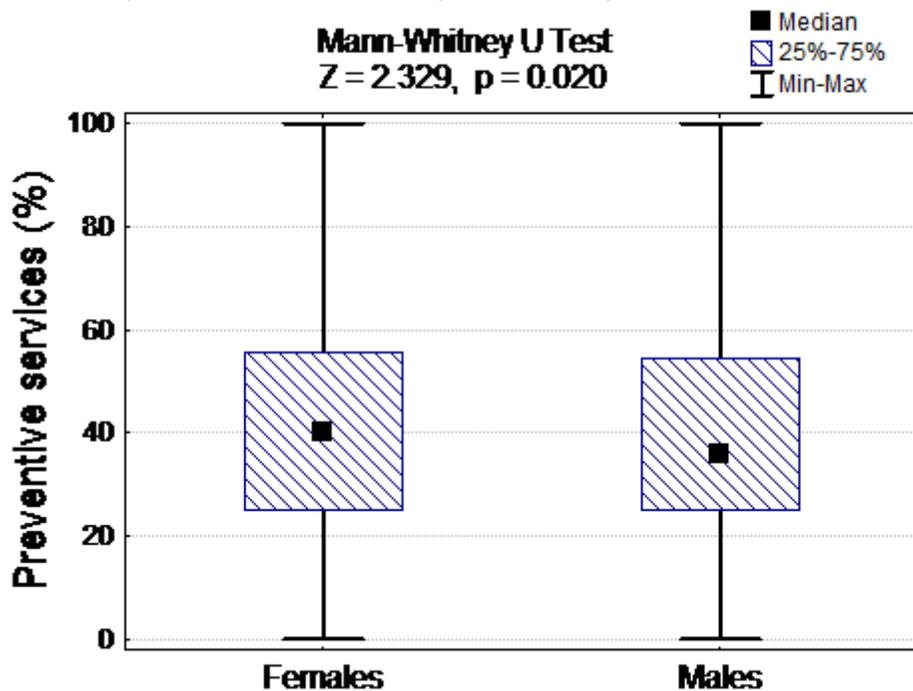


Figure 3

Percentage of preventive services received by adults in groups differing in sex

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [ISSMCOREQChecklistAgrawal.pdf](#)
- [AppendixB.docx](#)
- [AppendixA.docx](#)
- [AppendixC.docx](#)