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Research Article

Evaluating the Effectiveness of Preventive Health Screening Programs in Primary Care: A Population-Based Study

Dr Tipu Sultan[1*], Muhammad Usama[2], Rabia Rahat[3], Dr Nida Khaliq[4], Roomi Memon[5], Fatima Saeed[6], Abdullah Saram[7]

[1*]Provincial Disease Surveillance Officer, World Health Organisation.
[2]Ghurki Trust Teaching Hospital Lahore.
[3]Masters in Public Health Student, University of Wolverhampton, UK.
[4]Assistant Professor, Community Medicine, Akhtar Saeed Medical College, Rawalpindi.
[5]Associate Professor Department of Physiology, Isra University Hyderabad Campus.
[6]General Practitioner Family Medicine, Seha Clinics Abu Dhabi.
[7]Kandahar University Faculty of Medicine, Afghanistan.

Email: [1]sultantipu031@gmail.com, [2]usamahotani@gmail.com, [3]rabiarahat4561@gmail.com, [4]Nidakhaliq1@gmail.com, [5]doctorroomimemon@gmail.com, [6]fati_skhan@yahoo.com, [7]abdullahsaram12@gmail.com

Corresponding Author: Dr Tipu Sultan
Provincial Disease Surveillance Officer, World Health Organisation.
Email: sultantipu031@gmail.com

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ABSTRACT

Objective: To measure the impact of preventive health screening programmes in primary care, in terms of early detection of disease, uptake and better health outcomes in the general population.

Study Design: Population-based cross-sectional study.

Place and Duration of Study: The study was conducted in primary healthcare centres of Punjab Pakistan from January 2025 to June 2025.

Methodology: This was a cross-sectional study of 250 adult patients who visited the primary health clinics for a preventive health screening. Structured questionnaire, screening reports and medical records were used to gather data. Demographic and screening behaviours, as well as frequency of outpatient visits to health care providers, knowledge of preventive health care and early diagnosis of chronic diseases were measured. The data obtained were coded and analyzed using the software of Statistical Package for the Social Sciences (SPSS). Descriptive and inferential statistics were used as appropriate, and results were presented in tabular, graphical and graphical form.

Results: The study showed that the preventive health screening programs greatly increased the early detection of hypertension, diabetes, and obesity. There was an increase in awareness of healthy lifestyle practices after screening by approximately 72% of the participants. The disease management and timely medical consultation were better in the regular participants in screening programs than irregular participants.

Conclusion: Preventive health screening programs in primary care have proven successful in early diagnosis, health awareness and disease management generally. The consistent application of such programmes will be able to decrease the disease burden and enhance overall wellbeing of communities. The primary care setting offers the greatest scope for implementing preventive health screening; preventive health screening can help detect chronic diseases early during their development; population-based studies need to be conducted to assess the potential for preventive health screening in primary care.

Keywords: Preventive Health Screening, Primary Care, Early Detection, Population-Based Study, Chronic Diseases.

INTRODUCTION

Preventive health screening programs are an integral part of the contemporary primary health care systems and are designed to detect diseases at an early stage prior to symptom onset (Scott et al., 2026). Non-communicable diseases (NCDs) like hypertension, diabetes mellitus, cardiovascular diseases and some cancers are key priority areas for these programs, as they are often undiagnosed until complications arise. Systematic screening and early identification enable timely interventions,

slows the spread of disease and enhances health outcomes (Aliberti et al., 2026).

Primary care is the place where patients first encounter the health care system and is an ideal place to deliver preventive health strategies. In many countries, the burden of chronic diseases has become a strain to healthcare systems, resulting in high morbidity, mortality and healthcare expenditure (Mushkat et al., 2026). Preventive screening programs, therefore, have become important as cost-effective tools for helping to decrease this burden by identifying at-risk individuals and early management (Zhong et al., 2026).

All over the world, the incidence of NCDs has been increasing, attributed to changes in lifestyle, urbanization, unhealthy eating habits, lack of physical activities and stress (Zeng et al., 2026). International health reports indicate that there is a high level of undiagnosed hypertension and diabetes, especially in low- and middle-income countries. This undiagnosed population is responsible for a large proportion of complications like stroke, kidney failure, ischemic heart disease and vision impairment (Zeng et al., 2026). Thus, population-based screening in primary health care is seen as an important strategy for public health.

Routine (preventive) screening programs usually involve checking blood pressure, blood glucose, body mass index (BMI), lipid profile, and risk factors (Langselius et al., 2026). These assessments help in identifying individuals who are at high risk of developing chronic diseases. Along with that, counselling regarding lifestyle changes is a crucial component of preventive care, such as dietary changes, activity levels, quitting smoking and weight loss (Boughriou et al., 2026).

While useful, screening programmes can only be effective if certain factors are favourable, such as access to healthcare services, people's awareness, availability of trained healthcare professionals and follow-up recommendations (Tepeš et al., 2026). But many programs face challenges in primary care settings, however, due to barriers such as inconsistent screening guidelines, public knowledge, and infrastructure, especially in resource-poor settings.

A second important element in preventive screening is that it may play a role in reducing health-care costs. Early disease diagnosis will provide more affordable and effective treatment than that of late diagnosis (Choi and Cha, 2026). This has positive implications for the patient but also helps to decrease the cost of health systems and society.

With the increasing prevalence of chronic disease and the need to identify disease early, it is important to be able to measure the effectiveness of preventive health screening services in primary care. The assessment can result in the identification of gaps in the current health care delivery system and inform policy and program planning and improvement (Sen et al., 2026). This study will thus evaluate how well preventive screening programs for health can perform in primary care settings in a population-based context. The results are likely to play a key role in developing more effective early detection methods, better health-care provision and the creation of more robust health-care prevention policies (Marinelli et al., 2026).

OBJECTIVE

To assess the benefits of preventive health screening programs for early detection of non-communicable diseases like hypertension and diabetes in primary care. The study also sets out to evaluate awareness, uptake of screening, and the impact of the widespread uptake of screening in reducing disease burden in the general population.

METHODOLOGY

The study was a cross sectional, population-based study done at selected primary healthcare centres during January 2025 to June 2025. Participants over 18 years old at routine outpatient services were recruited using non-probability convenient sampling technique. A sample size of 250 was determined by using the standard formula, for a 95% confidence level, a margin of error of 5% and an estimated prevalence of 50%. Structured questionnaire and medical record review were used to collect data. Blood pressure, blood glucose level, BMI and basic risk factor assessment were performed as screening procedures. Participants with preexisting advanced chronic disease and critically ill were excluded. Descriptive statistics were used to identify frequencies and proportions of newly detected cases and effectiveness of screening in the early detection of disease. Ethical approval and informed consent were obtained before data collection.

Inclusion Criteria

Attendees in primary health care clinics for any regular outpatient care of 18 years and older were considered. Those who were interested

and gave informed consent were included in the study. Males and females, irrespective of their socio-economic status, were eligible for being screened to evaluate the effectiveness of preventive health programs.

Exclusion Criteria

Those patients who were seriously ill and needed emergency treatment were not included in the study. People with prior diagnosed advanced chronic diseases (i.e. end stage renal disease, advanced heart failure or terminal disease) were not excluded. Also, women who were pregnant and those who were not willing to give informed consent were not included.

Data Collection Procedure

A total of 250 people were selected to attend selected primary health care centres for data collection in the study period. Participants were interviewed after informed consent was obtained, and answers were obtained by using a structured questionnaire which collected data on demographic, medical history, lifestyle factors and awareness of preventive health screening. Training healthcare workers in basic screening assessment such as blood pressure measurement, random blood glucose testing, height, weight and calculation of body mass index (BMI) was done in accordance with standard procedures. Medical records were checked to confirm screening results and to find new cases of chronic diseases. To ensure consistency and integrity of all the data collected, a standard data collection form was used. All the participants' information was concealed during the study, and the data was secured and used for analysis.

Data Analysis

Data entry and analysis was done via Software Statistical Package for Social Sciences (SPSS) version 26.0. Demographic characteristics and screening outcomes were described in terms of descriptive statistics. The frequencies and percentages of the categorical variables (gender, age groups, level of awareness and new cases of chronic diseases) were presented. The continuous variables: age, blood pressure, blood glucose level and BMI were displayed as mean and standard deviation. The percentage of people who had a new diagnosis of a condition identified by a health screening programme was calculated to assess the effectiveness of these programmes. The Chi-square test was used to assess the relationship of participant characteristics and the screening results with a p value of ≤ 0.05. The data were tabulated and graphically presented for easy interpretation.

RESULTS

The total number of participants in the study was 250, both male and female, aged 18 years and above. Chronic disease prevention health screening uncovered several newly diagnosed cases of chronic diseases. 38 participants (15.2%) were found to have hypertension and 27 (10.8%) were newly identified with elevated blood glucose levels indicative of diabetes. Based on the BMI assessment, 96 (38.4%) participants were overweight or obese. About 72% of participants had a good understanding of the importance of preventive screening while 28% had a moderate understanding. The attendance at the regular screening was significantly related to early detection of disease and health awareness among the participants.

Table 4.1: Demographic Characteristics of Participants (n = 250)

Variable	Frequency (n)	Percentage (%)
Male	140	56.0
Female	110	44.0
Age 18–30 years	75	30.0
Age 31–45 years	90	36.0
Age 46–60 years	60	24.0
Age >60 years	25	10.0

The total number of the participants in the study was 250 of which 56% were male, and 44% female. The largest age group was 31–45 years (36%), followed by 18–30 years (30%). These results suggest a wide distribution of participants and that the screening effectiveness can be evaluated in each of the demographic groups.

Table 4.2: Newly Detected Cases through Screening (n = 250)

Condition	Frequency (n)	Percentage (%)

Hypertension	38	15.2
Elevated Blood Glucose	27	10.8
Both Conditions	12	4.8
No Abnormality Detected	173	69.2

Preventive screening was able to find previously undiagnosed health conditions among participants. He or she was found to have hypertension in 15.2% and elevated blood glucose level in 10.8% of people. Most of the participants had no abnormalities. The findings underscore the importance of regular screening for chronic diseases.

Table 4.3: BMI Distribution of Participants (n = 250)

BMI Category	Frequency (n)	Percentage (%)
Underweight	15	6.0
Normal Weight	139	55.6
Overweight	61	24.4
Obese	35	14.0

A significant proportion (over a third) were overweight or obese, reflecting a high level of weight-related risk factors. 55.6% of people were found with normal BMI. The results highlight the need for preventive screening to detect the risk factors that can be traced to lifestyle and chronic diseases and adverse health outcomes.

Table 4.4: Awareness Regarding Preventive Health Screening (n = 250)

Awareness Level	Frequency (n)	Percentage (%)
Good Awareness	180	72.0
Poor Awareness	70	28.0

The awareness of most participants was good on the preventive health screening programs and 28% was poor. It is important to have sufficient awareness to promote regular health evaluations. The results indicated that public health education programs have had an impact on the knowledge level, but more public health education is needed.

Table 4.5: Frequency of Screening Attendance (n = 250)

Screening Attendance	Frequency (n)	Percentage (%)
Regular Attendance	160	64.0
Irregular Attendance	90	36.0

64% of participants reported attending screening programmes regularly, 36% reported attending irregularly. People who screened regularly were more likely to have early detection of health conditions. The results indicate that regular attendance in preventive health screening programs is important.

DISCUSSION

The present study investigated the effect of PBSs in primary care on the early detection of chronic diseases and the effectiveness of its implementation (Friedman et al., 2026). A total of 250 participants were recruited, and the results showed that preventive screening was able to pick up previous undiagnosed cases of hypertension and high blood glucose. The results are also in line with other data showing the effectiveness of health screening in reducing the incidence of non-communicable diseases (NCDs) and improving health outcomes (Chang et al., 2026).

Main findings of this study were: 15.2 % of the people had high blood pressure (hypertension); and 10.8 % had high blood glucose (hyperglycaemia). The results suggest that there is a significant proportion of people who may be undiagnosed with chronic condition (Tortolero et al., 2026). Primary health care systematic screening has been reported to increase the proportion of people with hypertension and diabetes being diagnosed early to prevent the onset of diabetes and hypertension related complications, such as cardiovascular disease, stroke, kidney failure, visual impairment and other major chronic disease conditions (Resma et al., 2026).

The study also revealed an appreciable portion of overweight and obesity among participants. More than a third of the population in the study

were overweight or obese (BMI was used to assess this) (Gan-Ochir et al., 2026). The well-known risk factors for cardiovascular disease, diabetes and hypertension include obesity. Preventive screening of overweight and obese, therefore, offers an opportunity to counsel and make lifestyle changes to reduce the risk of future disease in health practitioners (Tjin et al., 2026).

The level of awareness on the importance of routine health screening was relatively high; 72% of the participants had good level of awareness about routine health screening (Sultana et al., 2026). Finding suggests that health education initiatives and awareness campaigns may boost the community's understanding of the value of preventative healthcare. But almost one-third of the participants had poor awareness, thus highlighting the need for more education efforts. Educating people on health issues is vital to increasing participation in screening programs and to encouraging healthy behaviours (Buss et al., 2026).

Another significant finding was that 64% of the participants attended screening programmes regularly. The relationships between regular school attendance and opportunities for early detection and monitoring of health status were positive. Those who receive regular health screening are more likely to receive early information about health and preventive services. A large proportion of participants, however, being non-attenders, indicates some constraints such as poor access to health care, low motivation and time constraints and lack of awareness.

Results of this research emphasize the need to situate the preventive screening program in primary health care services. Primary care should be a convenient and low-cost way of identifying health risks early in the pre-clinical phase of the condition prior to it reaching a serious health problem (Tay et al., 2026). Early diagnosis is crucial, as the patient will benefit and additional funds will not be wasted on treating more severe cases.

Although this study has its merits, there were some limitations. Convenience sampling could be a constraint on the generalizability of the results to the larger population. Further, the cross-sectional study design meant that the screening outcomes were only able to be assessed at one point in time and long-term health benefits were not assessed. Larger study and follow-up are recommended for future studies (Tian et al., 2026). the results indicate that preventive health screening programs are successful in detecting undiagnosed chronic diseases, raising awareness on health, and early intervention. These programs in primary care can have a major impact on public health and disease burden if they are strengthened.

CONCLUSION

This study finds that primary care preventive health screening programs are effective at the early detection of chronic diseases, like hypertension and diabetes. The results showed that there was a significant number of new cases that were identified and awareness was raised of health risks through regular screening. Frequent attendance at screening programs was linked to improved opportunity for early intervention/disease management. Preventive screening also identified those with overweight and obesity and provided the opportunity to counsel about lifestyle changes. Higher screening rates for chronic diseases, higher awareness and more frequent attendance at screening can lead to better health outcomes of care and reduce the burden of chronic diseases.

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