

## ORIGINAL ARTICLE - PUBLIC HEALTH

## ASSESSMENT OF CARDIOVASCULAR RISK EVENT USING WHO/ISH RISK PREDICTION CHARTS AMONG OUTPATIENTS ATTENDING PRIMARY CARE FACILITY IN TAMIL NADU

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## Abstract

**INTRODUCTION :** The 2030 Agenda for Sustainable Development recognizes NCDs as a major challenge for sustainable development. Non-communicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioral factors. The non-communicable diseases commonly include cardiovascular disease (CVD), various types of cancers, chronic respiratory illnesses, diabetes, and so on which are estimated to account for around 60% of all deaths.

**OBJECTIVE :** To assess the ten-year risk cardiovascular events using WHO/ISH charts among outpatients in primary care facility.

**METHODOLOGY :** Secondary data analysis of the study conducted by J-PAL. All the data collected by the primary study has been included without any inclusion or exclusion criteria. 1260 Outpatient Department (OPD) attendees of four Primary health centers were assessed for risk of encountering a major cardiovascular event such as myocardial infarction or stroke ten years later using the WHO/ISH risk prediction charts.

**RESULTS :** Cardiovascular risk factors like smoking and abdominal obesity was found to be 5% and 60%, lipid parameters like total cholesterol, low and High-Density Lipoprotein values were found to be abnormal in 53%, 29.6% and 10% respectively. Among the study population, patients already diagnosed with diabetes was 246 (19.6%) and based on JNC 8 classification 219(17%) had stage 1 and 65(5%) had stage 2 hypertension. Out of 1260 study participants 76% had lower risk and 24% had moderate risk for the occurrence of cardiovascular events by using WHO/ISH risk prediction charts in the next ten years.

**CONCLUSION :** WHO-ISH risk prediction chart can be used as a tool to predict cardiovascular diseases risk in a low-cost resource settings among asymptomatic individuals.

**KEYWORDS :** Cardiovascular diseases, Risk prediction charts, WHO/ISH.

## INTRODUCTION

The 2030 Agenda for Sustainable Development recognizes NCDs as a major challenge for sustainable development. As part of the agenda, heads of state and government committed to develop ambitious national responses and to reduce premature mortality from NCDs by one third through prevention and treatment.

Non-communicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioral factors. The non-communicable diseases commonly include cardiovascular disease (CVD), various types of cancers, chronic respiratory illnesses, diabetes, and so on which are estimated to account for around 60% of all deaths.<sup>1</sup> Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels. An estimated 17.9 million people died from cardiovascular diseases in 2019, representing 32% of all global deaths. Of these deaths, 85% were due to heart attack and stroke. Over 75% of cardiovascular diseases deaths take place in low- and middle-income countries.<sup>2</sup>

The most important behavioral risk factors of heart disease and stroke are unhealthy diet, poor physical activity, tobacco and harmful use of alcohol. The effects of behavioral risk factors may show up in individuals as raised blood pressure, blood glucose and blood lipids as well it can lead to overweight and obesity. These risks factors can be measured in primary care facilities and most cardiovascular diseases can be prevented by addressing behavioral risk factors at early stages. Identifying those at highest risk of cardiovascular diseases and ensuring they receive appropriate treatment can prevent premature deaths.<sup>2</sup>

WHO/ISH charts are designed to aid the clinicians in implementing timely preventive measures to improve the life expectancy, quality of life of the risk groups and reduction in the burdening of the health system. These charts indicate



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10-year risk of a fatal or non-fatal major cardiovascular event (myocardial infarction or stroke), according to age, sex, blood pressure, smoking status, total blood cholesterol and presence or absence of diabetes mellitus.<sup>3</sup> This study was conducted to assess the ten-year risk of fatal or non-fatal cardiovascular event using WHO-ISH risk prediction chart among patients attending Outpatient Department (OPD) in a primary care center.

## METHODS

This secondary study analyzes data derived from a larger primary investigation, which was conducted with after ethical clearance. The primary study (DPH-JPAL-ML STUDY) employed random sampling techniques across various blocks within the Tiruchirapalli district from 19 July 2023 to 23 September 2023, selecting four blocks at random and the study was conducted among 1260 study participants aged above 40 years. Subsequently, one primary health center per block was chosen randomly, and patients attending routine outpatient clinics were recruited as study participants after providing informed consent in the local vernacular language. All consecutive patients attending the general outpatient department were included in the primary study. This secondary data analysis utilizes the entirety of the data collected during the primary study, without any additional inclusions or exclusions.

WHO/ISH risk prediction charts are a series of color-coded charts recommended by the WHO guidelines for CVD prevention. Different charts are available for the 14 WHO epidemiological sub regions around the world. In our study to estimate the ten year CVD risk, WHO/ISH (laboratory- based) chart of SEAR D (Asian region) has been used with the parameters of age, diabetic status, smoking status total cholesterol and Systolic blood pressure.<sup>3</sup>

After obtaining the informed consent, study participants were interviewed face-to-face using the questionnaire adopted from WHO-STEPS survey.<sup>4</sup> Also, each of the participants were subjected to anthropometric measurement (waist circumference); assessment of blood pressure, and laboratory investigations (lipid profile). Lipid profile was measured using fasting blood samples of the study subjects using an Olympus AU400 auto analyzer. The set cut-off values for lipid profile were adopted as per WHO guidelines. The data collected was entered in MS excel and was analyzed using SPSS version 20.0. Descriptive statistics using frequencies and percentages were calculated for categorical data.

## OPERATIONAL DEFINITIONS

Smoking was defined as the use of any smoke form of tobacco product in the last six months.<sup>4</sup> Diabetic status was defined by individuals who were under treatment with oral hypoglycemic agents/ insulin was labeled as diabetic irrespective of their blood glucose status.

Blood pressure was measured using a digital blood pressure monitor (Omron) by using the Oscillo metric technique as recommended by NCD surveillance of Integrated Disease Surveillance Project (IDSP), Government of India. It was measured in right upper limb in supine position or sitting on a chair with back straight and with arm resting on a table at the level of the heart with appropriate size cuff.

The first reading of blood pressure was taken after 5 minutes of rest and subjects were diagnosed to be hypertensive (if systolic blood pressure  $\geq 140$  mm Hg and/or diastolic blood pressure  $\geq 90$  mm Hg or taking antihypertensive medication).

Waist circumference was measured at a level midway between the lowest rib and the iliac crest using microcopies tape with sensitivity of 0.1 cm. Subjects with a waist circumference of  $\geq 102$  cm (male) and  $\geq 88$  cm (females) was said to have abdominal or truncal obesity.<sup>12</sup>

The ten-year risk of a fatal or non-fatal cardiovascular event was classified based on the scores obtaining by plotting the collected data in the WHO/ISH risk prediction chart. The risk was classified as low, moderate or high when the score was below 10, 10 to 20 or above 20 respectively.<sup>4</sup>

## RESULTS

A total of 1260 study subjects were assessed for the cardiovascular risk factor using WHO-ISH charts. Majority of study participants were females 795 (63%) (Fig 1) and most of participants (235) were between 40 to 44 years of age.

CVD risk factors like smoking and abdominal obesity was found to be 5% and 60% (Table 1) among the study participants, lipid parameters like total cholesterol, low and High-Density Lipoprotein values were found to abnormal in 53%, 29.6% and 10% respectively in the study (Table 2). Among the study population, patients already diagnosed with diabetics was 246 (19.6) and based on JNC-8 classification, 492 (39%) had pre-hypertension, 219 (17%) had stage 1 and 65 (5%) had stage 2 hypertension (Fig 2). Among the participants, 76% had lower risk, 23% had moderate risk and 1% had high risk for the occurrence of cardiovascular events by using WHO/ISH risk prediction charts in the next ten years. (Table 3)

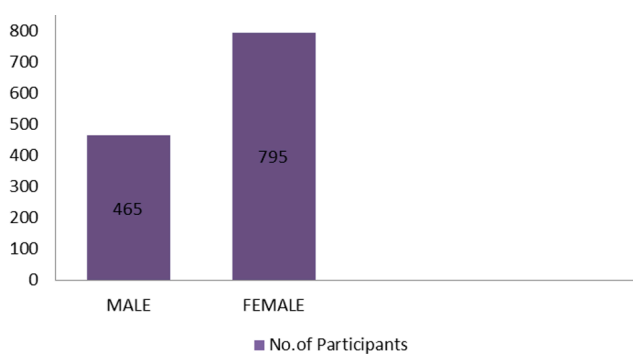


Figure 1 : Distribution of study participants based on Gender (n=1260)

Table 1 : Distribution of waist hip ratio among participants (n=1260)

Waist –hip ratio	Frequencies (%)
HIGH	756(60%)
LOW	504 (40%)

Table 2 : Baseline characteristics of study participants (n=1260)

Variables	Present (%)	Absent (%)
Diabetes mellitus	246(19.7)	1013(80.3)
Hypertension	284(22.5)	976(77.5)
High HDL	126(10)	1134(90)
High LDL	371(29.6)	889(70.4)
High cholesterol	668(53)	592(47)

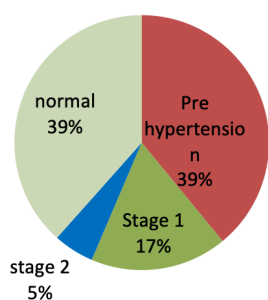


Figure 2 : Distribution of study participants based on JNC 8 classification (n=1260)

Table 3: Ten-year risk of a fatal or non-fatal cardiovascular event according to WHO/ISH risk prediction chart (n=1260).

CVD risk	Frequency	Percentage
Low	954	76%
Moderate	294	23%
High	12	1%

## DISCUSSION

The present study observed that 76% of the individuals had low risk, 23 % had moderate risk and 1.0% of them had high risk of developing a fatal or non-fatal cardiovascular event in ten years, as per the risk prediction charts. Similar findings were observed by application of the WHO/ISH risk prediction charts in various studies. Almost 17% of the study subjects had moderate or high risk for a cardiovascular event in a study done by shrivatsav et al in a rural population of Puducherry<sup>5</sup> Savitharani et al, in their study done among support staff of a tertiary hospital in Mysuru reported that 1.7% had ten-year risk of CVD which was contradictory to our study findings.<sup>6</sup>

The risk factors of CVD like diabetes and hypertension were 19.7% and 36% among study subjects which was similar to a study conducted by deori et al in a rural population of Lucknow were prevalence of diabetes and hypertension was 15.6% and 34% respectively.<sup>7</sup> Similar study done by otgontuya in Mongolia had diagnosed 44% to be hypertensive among study population.<sup>8</sup>

Of the lipid parameters in our study, 10% of subjects had abnormal HDL level and high total cholesterol, high LDL was present in 53% & 29.6% subjects respectively which was contradictory to the study done by Ghorpade et al were high cholesterol and LDL was 25.6% and 22.7 % respectively.<sup>9</sup> The present study identified that age, abdominal obesity, raised systolic blood pressure, known case of diabetes and raised cholesterol values as significant factors associated with CVD risk which was similar study done by Norhayati et al in Malaysia showed that diabetes and hypertension plays a vital role in occurrence of CVD.<sup>10</sup>

## CONCLUSION

WHO-ISH risk predication chart can be used as a tool to predict the risk for occurrence of cardiovascular diseases risk in low-cost resources settings among asymptomatic individuals. This helps in planning preventive measures at primary levels to reduce the burden of non-communicable disease in the future.

## RECOMMENDATIONS

As the WHO-ISH charts yield useful information in predicting cardio vascular disease, this tool can be utilized at primary care level utilising data from MTM –line list portal by addition of missing factors like total cholesterol. This will help in categorizing the risk of the individual to mitigate the magnitude of fatal or non-fatal cardiovascular event.



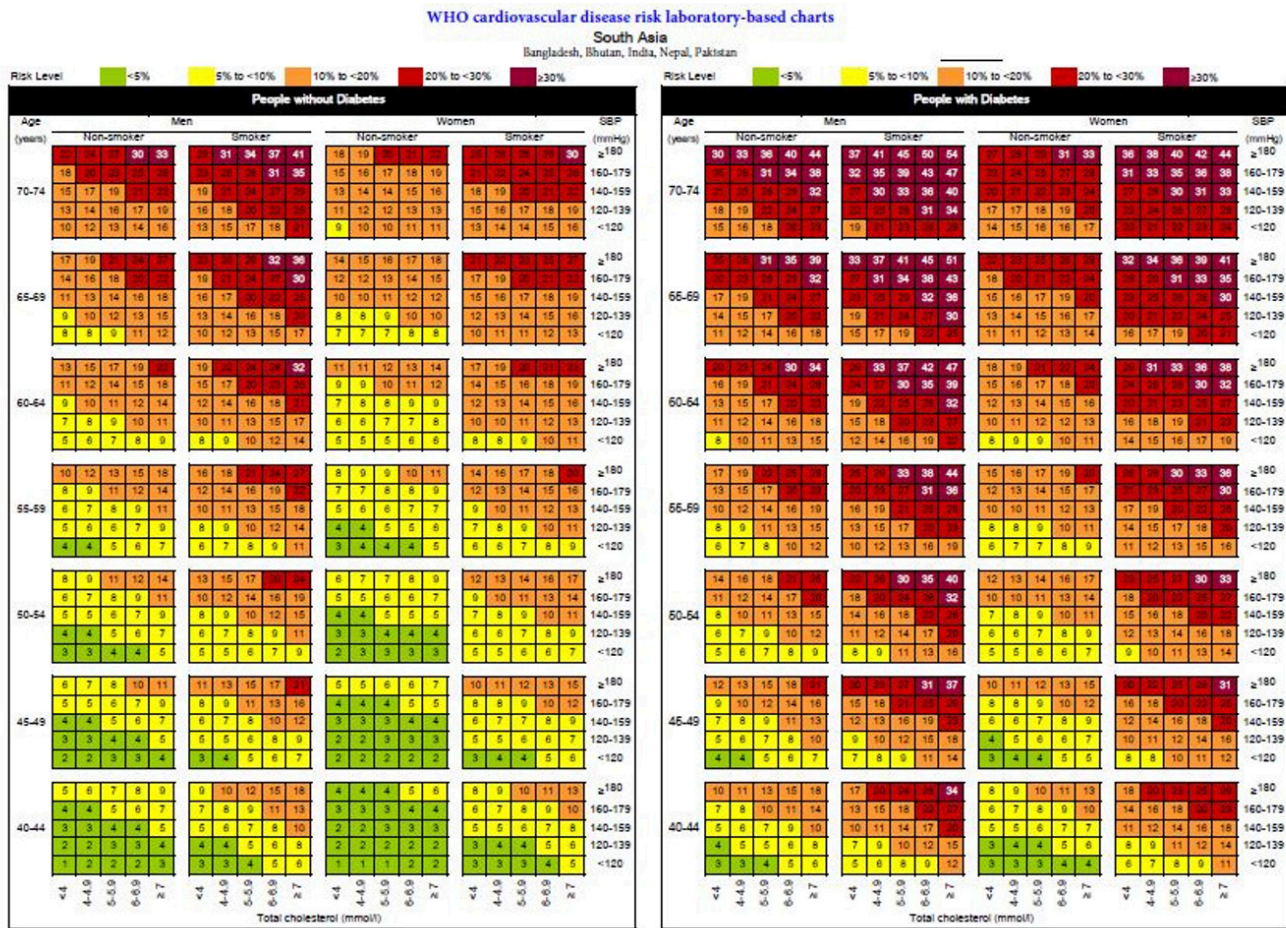


Figure 3 : DWHO –Cardiovascular risk chart (laboratory based)

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