



Institute for Health  
Metrics and Evaluation

# Social Determinants of Health and Cardiovascular Disease: State of the Evidence

Data landscape report

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# Background

Cardiovascular disease (CVD) continues to be a significant health concern globally, causing substantial morbidity and mortality and addressing this health issue requires more than just focusing on individual behaviors or medical treatments. Social determinants of health (SDOH), the conditions in the environments where people are born, live, learn, work, play, worship, and age, have emerged as crucial factors that significantly impact health outcomes, particularly in relation to CVD.

There are strong associations between SDOH and health outcomes, particularly CVD. To understand these associations, it's crucial to consider three key elements: a **theory of change** or logic model explaining the relationship between risks and outcomes, **scientific evidence** indicating the direction and strength of causality, and the validity and robustness of that evidence, often referred to as **burden of proof**. By leveraging these tools, we can identify evidence-based programs with high impact potential.

The SDOH are multifaceted and intertwined, making it challenging to parse out individual determinant's impact on health outcomes. The **socioecological model of health** provides a useful framework for understanding these complex relationships, recognizing that health outcomes are influenced not just by individual behaviors, but also by an array of social and environmental factors.

In this context, we have identified seven main SDOH domains: **economic stability, education, food security, health and healthcare, built environment, community context, and the environment**. Each of these domains can impact an individual's health in both direct and indirect ways, often compounding each other's effects.

In this report, we aim to compile scientific evidence between SDOH domains and aspects of CVD health, focusing on the socioecological model of health and the seven main domains of SDOH. The goal is to provide a comprehensive understanding of the complex interplay between SDOH and CVD, which will inform the development of effective interventions and policies for CVD prevention and management.

## Seven domains: an approach to organizing social determinants of cardiovascular health.

There is no universally defined or agreed-upon nomenclature for SDOH. Different organizations have developed their own frameworks, leading to domains with varying names and contexts. To systematically categorize and define SDOH pillars, we analyzed 62 frameworks developed by major institutions and advocate for the use of seven main SDOH domains: **economic stability, education, food security, health and healthcare, built environment, community context, and the environment.**

Many domains overlap and contain similar determinants. These domains are not mutually exclusive. For instance, a person's early childhood influences their educational attainment, which in turn affects income, place of residence, access to food, and housing, among others. All these factors play an intersectional role in health outcomes, making it challenging to parse out causal relationships between individual determinants and health outcomes.

Based on our review of existing evidence, we propose the following domains of social determinants for organizing program evaluation related to cardiovascular diseases. Each domain comprises subcategories that map to a) specific causal pathways related to cardiovascular diseases, and b) indicators and metrics that can be incorporated as part of an evaluation framework. Domains can also be used to organize strategies and investments.



Figure 1. The seven domains of social determinants of health (SDOH)

## Causal inference and burden of proof

Causal inference is the process of studying assumptions, study designs, and estimation strategies to allow researchers to draw causal conclusions based on data- in other words, to determine that a given exposure or group of exposures causes a specific outcome. In the case of SDOH, data or scientific evidence would be expected to show a causal association between a given social determinant of health (such as living in poverty, or not having access to health insurance) and a specific health outcome (such as a myocardial infarction).

Objectively judging the impact of SDOH on human physiology and pathophysiology is fundamental to understanding the strength of evidence behind these associations. IHME has developed a [methodology](#)<sup>1</sup> that provides a consistent way to understand, evaluate, and summarize evidence or risk across different risk-outcome pairs.

Bodies of work that guide our search for evidence include the **Sustainable Development Goals (SDG)**, AHA's **Life's Essential 8**, **Healthy People 2030**, and IHME's **Global Burden of Disease (GBD)** study.

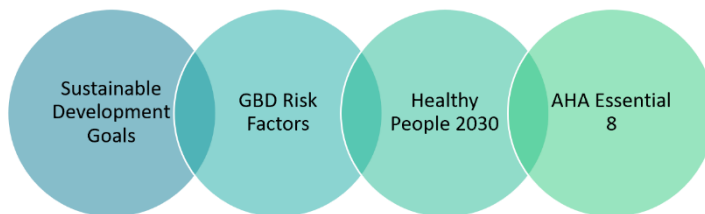


Figure 2. Guiding scientific evidence for examining the relationship between SDOH and CVD.

The World Health Organization's **Sustainable Development Goals (SDG)**<sup>2</sup> include objectives necessary to achieve health, peace, and prosperity for people and the planet. **Life's Essential 8**<sup>3</sup> are key measurements for improving and maintaining CVD health as defined by the AHA. The **GBD study**<sup>4</sup> published by IHME quantifies the relationship and strength of evidence between risk

factors and health outcomes. **Healthy People 2030**<sup>5</sup> sets data-driven national objectives to improve health and well-being over the next decade.

Throughout the report, we include specific Sustainable Development Goals as examples of well-defined and widely accepted SDOH indicators. However, the SDGs are just one of many sources of possible indicators.

## Quantifying the Risk of a Social Determinant: How to interpret risk ratios

In the summaries of the relationships between various SDOH and CVD below, effects are quantified as risk ratios. A risk ratio is a statistical measure that compares the risk of an event or outcome occurring in one group to the risk of the same event or outcome occurring in another group. In the context of CVD and SDOH, a risk ratio would be used to quantify the relationship between SDOH-related factors (such as housing, food security, built environment, or job insecurity) and the risk of developing CVD. A risk ratio of 1 indicates no association between the exposure and outcome, while a risk ratio greater than 1 indicates an increased risk of the outcome among those exposed to the factor of interest.

## The socioecological model of health

The complex interplay between SDOH and CVD can be conceptualized through the socioecological model of health.<sup>6</sup> This model recognizes that **health outcomes are influenced not just by individual behaviors, but also by the interplay of various social and environmental factors.**

At the core of the model is the individual, surrounded by multiple layers of influence. Within these layers are the seven main SDOH domains. Each of these domains are interconnected and can impact an individual's health in direct and indirect ways, often compounding each other.

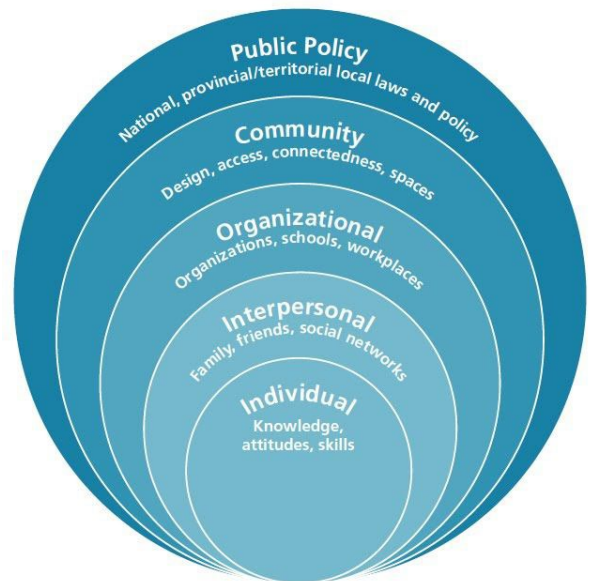
For example, an individual's economic stability can directly impact their ability to afford healthcare, healthy food, and safe housing, all of which are crucial for maintaining good health. However, economic stability can also indirectly affect health by determining the individual's level of education and employment opportunities, impacting their living conditions (built environment), and shaping the community context they live in.

Similarly, the domain of education can directly influence an individual's health literacy, shaping their ability to understand health information and make informed decisions about their health. Concurrently, education indirectly influences health through its impact on employment and income (economic stability), access to and utilization of healthcare services (health and healthcare), and food choices (food security).

The environment domain encapsulates physical elements like air and water quality, which directly impact an individual's health. Indirectly, the quality of the environment influences the built environment, as areas with poor environmental conditions may also lack safe and accessible infrastructure like parks, sidewalks, and grocery stores, thereby impacting physical activity levels and food security.

Finally, the built environment and community context domains encompass elements like housing, transportation, safety, and social cohesion, all of which can have direct and indirect influences on health.

Understanding the intricate interactions between these domains is crucial for identifying and designing effective interventions and policies to improve health outcomes. The socioecological model of health underscores the need for a holistic approach that addresses multiple determinants simultaneously, rather than in isolation. This approach can help tackle the root causes of poor health and reduce health disparities, ultimately leading to improved CVD health at the population level.



A Social-Ecological Model for Physical Activity - Adapted from Heise, L., Ellsberg, M., & Gottemoeller, M. (1999)

Figure 3. An example of the Social Ecological Model of Health

## Theory of change

A theory of change is a critical tool in the field of public health as it provides a comprehensive roadmap for achieving desired health outcomes. It outlines the necessary resources, activities, and processes required to effect change, providing a clear pathway from initial inputs to long-term impacts. In the context of addressing SDOH, a theory of change helps in identifying the mechanisms through which interventions can lead to improved health outcomes, in this case, CVD health. The theory of change not only guides the design and identification of interventions but also **facilitates the evaluation of their effectiveness**. By articulating the expected outcomes and impacts, it enables the tracking of progress and measurement of success. This is particularly important for funding organizations, as it helps to ensure that their investments are leading to the desired impacts. The following is an example of how a theory of change can be constructed for a program focused on addressing food insecurity with the aim of improving cardiovascular health.

### Theory of change example: Fresh produce at the farmer's market

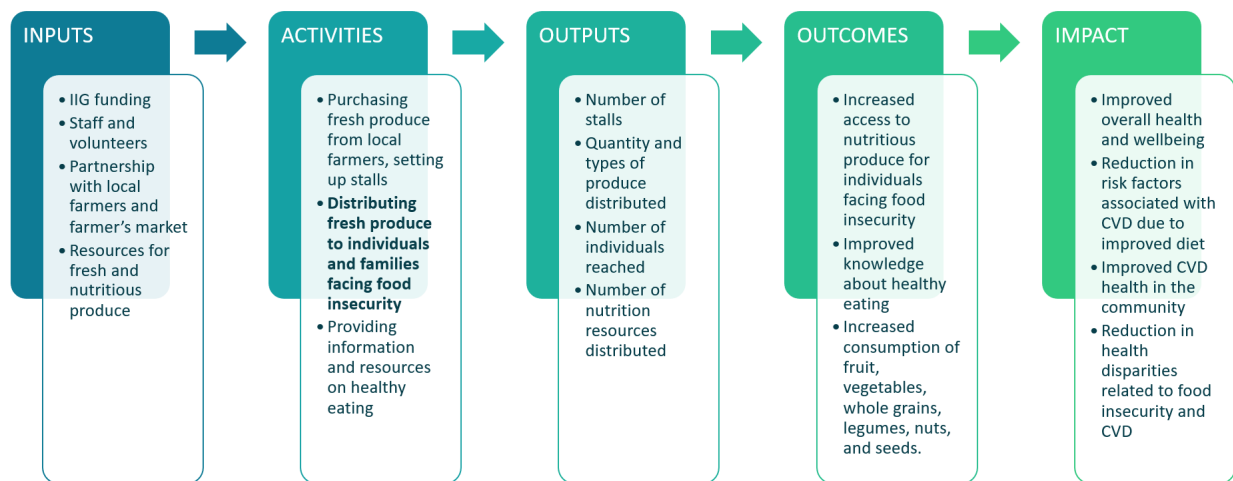


Figure 4. A theory of change model for an example program that distributes fresh produce at farmer's markets.

In the example above, one of the programs is funded to address food insecurity through distributing fresh produce at local farmer's markets. The theory of change for this program begins with securing funding and local resources including staff and partnerships. The **program activities** involve purchasing and distributing fresh produce at the farmer's market and providing information and resources on healthy eating and nutrition. The anticipated **outputs** include the number of produce stalls set up and number of markets attended, the quantity and types of fresh produce distributed, the number of individuals reached, and whether those individuals were affected by food insecurity. Expected **outcomes** include increased access to healthy foods, improved knowledge of healthy eating, and healthier dietary habits. For **long-term impact**, this program aims to improve the overall health and wellbeing of individuals and the community through reducing risk factors associated with CVD.

# 1. Economic stability

Economic factors at both an individual level (income, employment) and macroeconomic level (GDP, social welfare policies) have an enormous impact on CVD outcomes. CVD currently accounts for more than *one-half* of worldwide noncommunicable causes of death, however, more than 80% of CVD deaths worldwide occur in low- and middle-income countries. Economic, social, and cultural changes at the macro level also affect individual behavior, with increased prosperity often leading to increases in CVD risk factors including tobacco use, obesity, hypertension, and diabetes.

## 1a. Income

Income, often studied at the individual level as Socio-Economic Status (SES), has measurable effects on cardiovascular health. Individuals with lower income tend to have a higher risk of developing CVD compared to those with higher income. A [systematic review](#) and meta-analysis of 45 studies found that low income or SES was associated with a 40% increased risk of CVD (pooled risk ratio = 1.40, 95% confidence interval: 1.30-1.50).<sup>7</sup>

A recent meta-analysis found that not only is SES inversely associated with CVD outcomes, but women tend to be more sensitive to income and education in terms of CVD incidence. This negative correlation was found consistently among low- and middle-income countries and high-income countries, although patients in low-income settings are more sensitive to income and education.

## 1b. Employment

Employment and job insecurity has been found to be associated with an increased risk of CVD with risk ratios ranging from 1.34 to 2.4. Factors such as [job strain](#),<sup>8</sup> [job control](#),<sup>9</sup> and job insecurity can impact the incidence of CVD. High job demands and low job control were found to be associated with an increased risk of angina pectoris, a symptom of CVD. In [women](#),<sup>10</sup> those that reported high [job insecurity](#) had a 2.4 times greater risk of CVD compared to women with low job insecurity.<sup>11</sup>

Overall, job insecurity has a strong association with an increased risk of CVD. These findings highlight the importance of addressing job insecurity in the workplace to protect workers' cardiovascular health.



### 1c. Housing

Housing insecurity can impact cardiovascular health in multiple ways, including the impact of housing conditions, affordability, and stability on cardiovascular health.

Individuals experiencing housing insecurity are often more likely to have a higher prevalence of risk factors for CVD, including obesity, hypertension, and diabetes. These are further compounded by the quality of housing options. Poor housing conditions such as inadequate heating, ventilation, and air conditioning can increase risk of CVD.

Moreover, housing affordability and frequent moves or evictions are also critical factors in determining the impact of housing insecurity on cardiovascular health.

### 1d. Recidivism

People who have been incarcerated have high rates of CVD risk factors, such as hypertension and smoking. [CVD is the leading cause of hospitalization and death](#) in this population.<sup>12</sup>

*Table 1.1 Relevant Economic SDG indicators*

SDG Goal	Indicator
1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions.	1.2.1 Proportion of population living below the national poverty line, by sex and age 1.2.2 Proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions
10.1 By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average	10.1.1 Growth rates of household expenditure or income per capita among the bottom 40 per cent of the population and the total population
10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status	10.2.1 Proportion of people living below 50 per cent of median income, by sex, age and persons with disabilities

## 2. Education

[Higher education](#)<sup>13</sup> and income is associated with higher acceptance and compliance with CVD treatment, and higher availability and affordability of CVD management and care. Patients with higher education tend to have easier access to and accept more timely treatment and care services, thereby reducing the risk of CVD.

Some reasons that education level may impact CVD outcomes is that it can increase one's financial circumstances as well as knowledge and awareness about behaviors such as exercise, diet, and smoking which are all top risks for CVD. Higher education is also associated with better access to healthcare and resources for managing and preventing CVD.

The relationship between education and CVD is complex and influenced by many other factors such as socioeconomic status, race and ethnicity, and geographic location.

### 2a. Educational attainment

There is evidence that [educational attainment](#)<sup>14</sup> can have an impact on the development and progression of CVD. Individuals with [higher levels of education](#)<sup>14</sup> tend to have lower rates of CVD and related risk factors such as hypertension, diabetes, and obesity.

In high income countries (USA, Europe), those with low education had a higher chance of cardiovascular events (1.5 risk ratio). Specifically, income level, educational attainment, employment status, and neighborhood socioeconomic factors were all consistently [associated](#)<sup>15</sup> with CVD in high-income countries.

Studies looked at effect of education and/or income on cardiovascular disease in Europe, USA, and Asia. Education effects CVD in US and Europe settings, but in Asia, effect only found among CVD deaths.

### 2b. Quality of education

Educational attainment is the most studied component in this domain, but there is still evidence to suggest that quality of education is linked to health outcomes, specifically CVD risk factors. Higher-quality state-level education had associations with CVD by race, with minorities associated with worse health outcomes regardless of school quality.

*Table 2.1 Relevant Education SDG indicators*

<b>SDG Goal</b>	<b>Indicator</b>
4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education	4.2.1 Proportion of children aged 24–59 months who are developmentally on track in health, learning and psychosocial well-being, by sex 4.2.2 Participation rate in organized learning (one year before the official primary entry age), by sex
4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university	4.3.1 Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex
4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship	4.4.1 Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill
4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy	4.6.1 Proportion of population in a given age group achieving at least a fixed level of proficiency in functional (a) literacy and (b) numeracy skills, by sex

### 3. Food security

Food insecurity, which refers to limited or uncertain access to nutritious and safe food, is a significant public health concern and Goal 2 of the Sustainable Development Goals. Evidence suggests that there is a strong association between food insecurity and CVD.

#### 3a. Food access

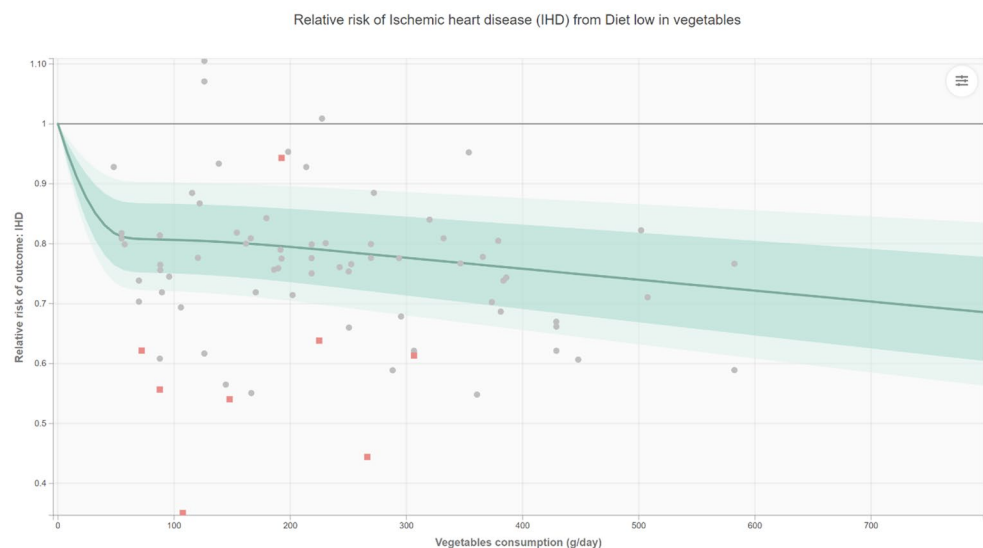
Inadequate access to nutritious foods may lead to dietary patterns that are high in unhealthy processed foods, added sugars, and unhealthy fats, while being low in fruits, vegetables, whole grains, and lean proteins. These [dietary patterns](#)<sup>16</sup> are all associated with an increased risk of developing [CVD](#).<sup>17</sup>

#### 3b. Nutrition

Nutrition plays a crucial role in cardiovascular health. Inadequate nutrition can lead to deficiencies such as insufficient intake of vitamins, minerals, and omega-3 fatty acids. These deficiencies have been shown to potentially increase the risk of developing CVD.

The health effects associated with vegetables is so well known that IHME published a [Burden of Proof](#) study in 2022.<sup>18</sup> Findings suggest that consuming the minimum amount of vegetables (compared to no vegetables) is associated with a 23% decline in ischemic stroke risk and IHD risk, a 29% decline in esophageal cancer risk, a 26% decline in type 2 diabetes risk, and a 16% decline in hemorrhagic stroke risk.

**FIGURE 3B: RISK OF ISCHEMIC HEART DISEASE (IHD) FROM A DIET LOW IN VEGETABLES**



Conversely, a similar [Burden of Proof](#) study on the health effects associated with unprocessed red meat found weak to no evidence between red meat consumption and ischemic heart disease, type 2 diabetes, hemorrhagic stroke, or colorectal and breast cancer.<sup>19</sup>

### 3c. Agricultural production

While the association between agricultural production and CVD is more complex, agricultural practices can have implications for CVD. Excessive use of [pesticides](#) and the consumption of foods containing high levels of pesticides may have adverse cardiovascular effects.<sup>20</sup> Occupational and environmental exposure to certain pesticides were associated with increased risks of 1.8 to 4.5 for acute myocardial infarction and blood pressure increase.

*Table 3.1 Relevant Food Security SDG indicators*

SDG Goal	Indicator
2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	2.1.1 Prevalence of undernourishment 2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)
2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size 2.3.2 Average income of small-scale food producers, by sex and indigenous status
2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of agricultural area under productive and sustainable agriculture

## 4. Health and healthcare

[Cardiovascular health metrics](#) (CVH) proposed by the American Heart Association (AHA), comprising favorable health behaviors and health factors have been shown to be highly associated with low long-term risk of CVD.<sup>21</sup> Target attainment for these CVH include: never smoker or quit smoking, ideal BMI, meeting physical activity guidelines, healthy diet, total cholesterol <200 mg/dL, blood pressure <120/80 mm Hg, and absence of diabetes mellitus. One meta-analysis found that in comparison with individuals meeting 0-2 of these metrics (high-risk individuals), patients meeting 3-4 points CVH metrics had a significantly lower hazard (hazard ratio (HR) of 0.53), and individuals meeting 5-7 points had an even lower HR of 0.28. Half of *Life's Essential 8* fall under this section: managing weight, cholesterol, blood sugar, and blood pressure.

### 4a. Healthcare system access and quality

A review of the [SDOH factors associated with diabetes](#) found that socioeconomic status (education, income, and occupation), built environment (housing, neighborhood, hazardous exposures), food security (access and availability), healthcare (access, affordability, and quality), and social context (social cohesion, social capital, and social support) all demonstrated to have an influence on type 2 diabetes outcomes.<sup>22</sup>

### 4b. Mental and behavioral health

[Severe mental illnesses](#) (SMIs) have been shown to be highly associated with CVD and CVD-linked mortality, with one systematic review of 195 studies finding that, particularly in younger groups, SMI was linked to a near doubling in the rate of ratio of CVD-related mortality.<sup>23</sup>

Individuals with SMIs including schizophrenia, bipolar disorder, and major depressive disorder have increased risk of developing CVD.

## 4c. Health literacy

The prevalence of inadequate health literacy is high, and [inadequate health literacy](#) is associated with increased risk of death and hospitalizations.<sup>24</sup> Patients with inadequate health literacy tend to be [older, lower socioeconomic status, lower educational attainment](#), and more comorbidities.<sup>25</sup>

*Table 4.1 Relevant Health SDG indicators*

SDG Goal	Indicator
3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease
3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol	3.5.1 Coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and aftercare services) for substance use disorders 3.5.2 Alcohol per capita consumption (aged 15 years and older) within a calendar year in litres of pure alcohol
3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes	3.7.1 Proportion of women of reproductive age (aged 15–49 years) who have their need for family planning satisfied with modern methods 3.7.2 Adolescent birth rate (aged 10–14 years; aged 15–19 years) per 1,000 women in that age group
3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.	3.8.1 Coverage of essential health services 3.8.2 Proportion of population with large household expenditures on health as a share of total household expenditure or income

## 5. Community context

Individual and social relationships are important aspects of health and wellbeing and [high social cohesion](#) is documented to have a strong protective effect on CVD health.<sup>26</sup> The community in which one resides has a significant impact on health. Communities with higher socioeconomic status tend to have better CVD outcomes compared to those with low socioeconomic status. Factors such as income, education, and access to resources play a crucial role in determining these outcomes.

### 5a. Social support

Individuals with poor social health were more likely to develop CVD and twice as likely to die from CVD. Poor social health strongly predicted CVD in smokers, big city dwellers, and younger older adults (70-75 years). Among healthy older adults, [social isolation and low social support](#) may be more important than loneliness as CVD risks.<sup>27</sup>

### 5b. Early childhood and adolescence

There is mounting evidence that early life and childhood exposures impact adult health. [Adverse childhood experiences \(ACEs\) are associated with declined CVD health in adulthood.](#)<sup>28</sup> ACEs refer to some of the most intense and frequently occurring sources of stress that children may suffer early in life such as [abuse, neglect, and household dysfunction.](#)<sup>29</sup>



*Table 5.1 Relevant community context SDG indicators*

<b>SDG Goal</b>	<b>Indicator</b>
10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard	10.3.1 Proportion of population reporting having personally felt discriminated against or harassed in the previous 12 months on the basis of a ground of discrimination prohibited under international human rights law



## 6. Built Environment

The physical, human-made environment with which we interact may be related to CVD risk factors through influencing physical activity. Longitudinal studies looking at relationships between built environment and cardio-metabolic health outcomes found strong relationships between [walkability](#) of a neighborhood and obesity, diabetes, and hypertension.<sup>30</sup>

### 6a. Neighborhood

Built environment attributes, such as the presence of parks, sidewalks, and proximity to amenities, significantly influenced physical activity levels and subsequently contributed to the prevention and management of CVD. For example, attributes such as fast-food restaurants and high walkable neighborhood environment were associated, either positively or negatively with [BMI, blood pressure, and metabolic syndrome risk](#).<sup>31</sup> Limited access to supermarkets may incentivize visits to convenience stores or fast-food restaurants, thus increasing the chance of consuming unhealthy foods, with consequential increases in individual BMI and blood pressure levels.

Healthy People 2020 and the Institute of Medicine have identified [public parks](#) and recreation facilities as critical settings for providing recreation activities for children, families, and organizations such as schools and faith-based institutions.<sup>32</sup> The provision, design, and quality of parks is influenced through public policy at all levels of government.

These findings support the notion that well-designed neighborhoods can promote a healthier lifestyle and potentially reduce the risk of cardiovascular conditions.

### 6b. Residential environment

Residential spaces, such as access to [green spaces, walkability, and safety](#), has a substantial impact on CVD outcomes.<sup>33</sup> Factors including [air pollution, noise pollution, long car travel times](#), and availability of healthy food options are all identified as built environment components that contribute to CVD outcomes.<sup>33</sup>

### 6c. Work environment

[Psychosocial work stress](#) as a risk factor for CVD has been the subject of a considerable number of studies.<sup>34</sup> A [review of evidence](#) from 600,000 people in Europe, the United States, and Japan suggests that work stressors such as job strain and long working hours are associated with a moderately elevated risk of coronary heart disease and stroke.<sup>35</sup> Specifically, **those under work stress experience 10-40% higher CVD risk than those without work stress.**

### 6d. Physical infrastructure

Factors such as walkability, availability of public transportation, and presence of recreational facilities are found to be associated with [lower rates of CVD](#).<sup>36</sup> The impact of urban design, transportation systems, and accessibility on CVD emphasizes the need for urban planning and infrastructure development that prioritizes public health and promotes physical activity.

Macroeconomic- Policies can be laws and regulations at any level of government, corporate practices, and rules at institutions such as schools. Changing built environment policies, from neighborhoods to cities, is expected to have a long-term impact on most or all people in those places.

*Table 6.1 Relevant built environment SDG indicators*

SDG Goal	Indicator
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	6.1.1 Proportion of population using safely managed drinking water services 6.2.1 Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap and water
11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	11.2.1 Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities

## 7. Environment

Over [60% of all air, water, and soil pollution-related deaths each year are cardiovascular diseases](#).<sup>37</sup> Air pollution is the leading environmental pollutant causing pre-mature deaths in older age groups, [water pollution contributes to infant mortality](#), and soil is a major trigger of decreased life quality at higher age.<sup>38</sup>

Because of this, environmental factors should be closely considered when designing programs on social and health factors. The “environmental determinants of health” refer to five Sustainable Development Goals: Goal 6) Clean water and sanitation, Goal 7) Affordable and clean energy, Goal 12) Responsible consumption and production, and Goal 13) Climate action.

### 7a. Air quality

Air pollution consistently leads to [increased risk of CVD](#).<sup>39</sup> Additionally, [communities with lower socioeconomic status](#) have a higher risk of CVD creating a disparity in who is exposed to air pollution.<sup>40</sup>

### 7b. Soil quality & hazardous materials

[Soil health is fundamental to human health](#).<sup>41</sup> Agricultural practices that contribute to environmental degradation such as deforestation or excessive use of fertilizers, can indirectly impact CVD by affecting air and water quality. Excess consumption of red meat is associated with both increased risk of CVD and a high environmental impact through deforestation and the release of methane gas.

Table 7.1 Relevant environment SDG indicators

SDG Goal	Indicator
<p>3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination</p>	<p>3.9.1 Mortality rate attributed to household and ambient air pollution                      3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services)                      3.9.3 Mortality rate attributed to unintentional poisoning</p>
<p>11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management</p>	<p>11.6.1 Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, by cities                      11.6.2 Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)</p>



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