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Health Inequality
A Comprehensive Exploration

Edited by Yuvaraj Krishnamoorthy

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Contributors
Aleena Khalid Ghori, Anam Bibi, Anila Mubashir, Brianna Clark, Clarissa Peyton, Cynthia Johnson, Earl Stewart Jr, Erum Bibi, Esmaeil Fattahi, Esra Daharlı, Hernan Malaga, Kimberly D. Williams, Mupakile Chrispin, Shaneeta Johnson, Yuvaraj Krishnamoorthy

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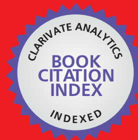

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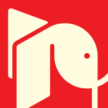

Meet the editor

Dr. Yuvaraj Krishnamoorthy is a public health expert, currently working as an Honorary Consultant and Unit Lead for the Evidence Synthesis Unit in PROPUL Evidence. He has extensive expertise in the field of evidence synthesis, health economics, health policy, and systems research. He has received numerous national and international accolades including the Young Scientist Award from the Epidemiology Foundation of India, the Best Researcher Award from Tamil Nadu Dr. M.G.R. University, Emerging Voice for Global Health, Belgian DGD Scholarship, India Health Policy and Systems Research Fellowship, FAIMER fellowship, and more. He has served in various editorial roles for several international journals like *PLoS One, BMC Public Health*, *JMIR Public Health and Surveillance, International Health*, *Heliyon, PLoS Global Public Health*, and others.

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Preface

In the ever-evolving landscape of global health, the issue of health inequality stands as a stark reminder of the challenges and disparities that pervade our societies. *Health Inequality – A Comprehensive Exploration*, unravels the complexities of this critical subject. It provides an expansive view, bringing together various dimensions and perspectives to offer a nuanced understanding of health equity and its myriad implications.

The book commences with Chapter 1, "Introductory Chapter: Setting the Stage for the Multidimensional Puzzle of Health Equity", which lays the foundation for the discussions that follow. This chapter is instrumental in establishing the context and significance of the subject, inviting readers to engage with the multifaceted nature of health inequalities.

Following this, Chapter 2, "Understanding the Concept of Health Inequality", dives into the theoretical underpinnings of health disparities. It serves to elucidate the foundational concepts that are essential for grasping the broader implications of the topic. This chapter is pivotal in setting the conceptual framework that guides the subsequent discussions in the volume.

Chapter 3, "Is Health for All Possible?" poses a critical question that challenges and provokes thought about the feasibility and practicality of achieving universal health coverage. This chapter explores the overarching goal of health equity, scrutinizing the realities and hurdles in its pursuit.

The exploration continues with Chapter 4, "Smokeless Tobacco Use and Health Inequity: Unraveling the Mechanisms". This chapter offers a focused examination of how specific health behaviors, such as smokeless tobacco use, contribute to and exemplify health inequities. It provides an in-depth look at one of the many tangible manifestations of health disparities.

The volume then shifts to a more localized perspective with Chapter 5, "Perspective Chapter: Health Inequalities in Zambia – A Comprehensive Exploration". This chapter provides a case study approach, delving into the specific context of Zambia, thereby offering insights into how health inequalities manifest in a particular geographical and socio-cultural setting.

Continuing from the specific case study of Zambia, the book then expands its scope to a global level with Chapter 6, "Perspective Chapter: Addressing Global Health Inequalities – A Public Health Perspective". This chapter broadens the discussion to encompass global health disparities, emphasizing the role of public health frameworks and policies in addressing these issues. It offers a comprehensive look at how health inequalities are addressed on a global scale, highlighting the importance of systemic approaches and international cooperation.

Finally, Chapter 7, "Perspective Chapter: Climate Change and Health Inequities", takes an innovative turn by linking environmental issues with health disparities. It explores the profound impacts of climate change on health, particularly focusing on how these changes exacerbate existing health inequities. This chapter underscores the urgency of addressing climate change not just as an environmental issue, but also as a significant determinant of health outcomes, especially for vulnerable populations.

In *Health Inequality – A Comprehensive Exploration*, each chapter builds upon the last, creating a cohesive narrative that encapsulates the multifaceted nature of health inequalities. This book is not just a collection of individual perspectives but a coordinated effort to comprehensively explore health inequities. It aims to enlighten, educate, and inspire action among its readers, ranging from healthcare professionals and policymakers to academics and students.

This preface sets the stage for a journey through the diverse landscapes of health inequality. As you turn these pages, you will be confronted with the harsh realities of health disparities but also with the hope and possibilities that knowledge, understanding, and concerted action can bring. It is our hope that this volume will not only contribute to the academic discourse on health inequalities but also ignite a spark for change in the real world.

As the narrative progresses, the book delves deeper into the intricacies of health inequality, unraveling the layers and revealing the interconnectedness of various factors that contribute to this global challenge. The chapters are meticulously crafted to provide a comprehensive understanding while also highlighting the specific areas where health disparities are most pronounced.

Health Inequality – A Comprehensive Exploration is not just an academic treatise; it is a call to awareness and action. The volume brings to the forefront the critical importance of addressing health inequalities, not only for the sake of individual well-being but also for the collective health of our global community. It underscores the moral imperative to strive towards a world where health equity is not just an ideal but a reality.

Each chapter in this volume is a piece of a larger puzzle, and together they form a vivid picture of the current state of health inequality across the globe. The book takes readers on a journey from the theoretical foundations of health equity to the practical challenges and solutions in addressing these disparities. It provides a platform for a diverse range of voices and perspectives, enriching the discourse with insights from different cultural, geographical, and professional backgrounds.

Moreover, *Health Inequality – A Comprehensive Exploration* serves as a valuable resource for those who are actively involved in shaping health policies and practices. It offers evidence-based insights and analysis that can inform better decision-making and strategies to tackle health inequalities effectively. The book is designed to be accessible to a broad audience, ensuring that its messages resonate beyond academic circles and reach those who are in positions to make a real difference.

As the final page of this preface unfolds, it is essential to reflect on the overarching purpose and potential impact of *Health Inequality – A Comprehensive Exploration*. This

book is a tapestry of insights, research, and perspectives, each contributing to a richer understanding of the complex and multi-dimensional nature of health inequalities.

The book is designed to serve as a catalyst for change, encouraging readers to think critically about the underlying causes of health disparities and the strategies needed to address them. It challenges conventional views and pushes the boundaries of our understanding, urging a re-evaluation of existing health policies and practices in light of the evidence and discussions presented.

Furthermore, this book is a testament to the power of collaborative knowledge and interdisciplinary approaches in tackling global challenges. The diverse range of topics covered in this book, from the impact of environmental factors like climate change to specific health issues such as tobacco use, underscores the need for a holistic approach to health equity. It highlights how health is influenced by a myriad of factors, often extending beyond the traditional boundaries of the healthcare sector.

Health Inequality – A Comprehensive Exploration also serves as an educational tool, providing valuable insights for students and educators alike. It is an essential addition to the libraries of academic institutions and a useful resource for courses focusing on public health, social justice, and global health issues.

In closing, this preface extends an invitation to embark on a journey of discovery and understanding through the pages of this volume. It is a journey that promises to enlighten, challenge, and inspire. The hope is that this book will not only contribute to the academic discourse but will also resonate with a wider audience, sparking conversations and actions that contribute to reducing health inequalities worldwide.

Yuvaraj Krishnamoorthy
Honorary Consultant,
PROPUL Evidence,
Chennai, India

Section 1

Foundations and Perspectives of Health Inequality

Chapter 1

Introductory Chapter: Setting the Stage for the Multidimensional Puzzle of Health Equity

Yuvaraj Krishnamoorthy

1. Introduction

The journey for health equity is as old as public health itself. Across the eras, continents, and the cultures, societies have grappled to ensure that all their members have equitable access to the resources essential for good health. This issue is deeply rooted in the age-old attempt to strike a balance between the individual rights and collective welfare. Health equity, in its modern context, strives to ensure that all individuals have an equitable chance to reach their maximum health potential, and no person should face preventable barriers in realizing this goal (**Figure 1**) [1].

2. Understanding health equity

The World Health Organization (WHO) defines health equity as the "absence of unfair and avoidable or remediable differences in health amongst population groups defined socially, economically, demographically, or geographically" [2]. These differences, often referred to as health disparities or health inequalities, can arise from social, economic, environmental, and structural disadvantages.

3. The deep-rooted drivers of health disparities

It is critical to understand that the health disparities are not entirely a product of individual choices or the genetic predispositions. Wider systemic factors play a role, casting long shadows over health outcomes (**Table 1**). Structural determinants, such as political, economic, and legal institutions, dictate the distribution of resources and power in the societies [3, 4]. These determinants feed into intermediary determinants like material circumstances, behavioral factors, and biological factors.

For example, consider a single mother working two jobs in a city, where public transportation is sparse and unreliable. The structural determinant of inadequate urban infrastructure can result in her spending long hours commuting, reducing the time she can allocate to her family, exercise, or preparing nutritious meals. Furthermore, the lack of affordable healthcare in her community, another structural factor, might mean she avoids regular medical check-ups. Meanwhile, intermediary determinants come into play when her limited budget restricts her to purchasing

Figure 1.
Health equity.

Factors	Description
Economic Status	Individuals with lower income levels have higher risks of various diseases and reduced access to quality healthcare.
Education Level	Higher education is associated with better health outcomes and knowledge about health.
Environmental Factors	Pollution, lack of access to clean water, and inadequate housing can directly impact health.
Access to Healthcare	Inequalities in access to quality healthcare can lead to preventable diseases and deaths.
Social and Cultural Norms	Discrimination, biases, and cultural beliefs can lead to health disparities amongst different groups.

Table 1.
Factors influencing health disparities.

cheaper, processed foods rather than healthier alternatives. Over time, these compounded circumstances can lead to health issues like obesity, hypertension, or diabetes. Such contexts often disproportionately affect marginalized populations, perpetuating cycles of health disparities.

A vivid illustration of health inequities is the difference in life expectancy observed amongst various countries and within countries themselves. For instance, a child born in Sub-Saharan Africa has a life expectancy nearly 20 years less than a child born in North America [5]. Even within countries with high average life expectancies, differences persist. Urban vs. rural environments, socioeconomic status, education level, and racial/ethnic backgrounds are amongst the myriad factors that influence these disparities.

The crucial aspect of these disparities is that they are not only unjust but often preventable. Achieving health equity requires actions to eliminate such disparities, particularly those that are most unjust or unfair.

4. The importance of addressing health equity

Ensuring health equity benefits not only those at a disadvantage but also society at large. It leads to better health outcomes, increased work productivity, reduced healthcare costs, and improved social cohesion [6]. From an economic perspective, health inequities translate to tangible losses. For example, the economic loss from health inequalities in the European Union is estimated to cost over 1.4% of GDP [7]. Addressing these disparities, thus, becomes both a moral and economic imperative.

5. Global perspectives on health equity

Across the globe, the challenge of health equity manifests differently, reflecting the diverse social, cultural, and economic landscapes of regions. In high-income countries, health disparities often emerge from systemic inequalities, like racial or economic segregation, and differences in access to care. In contrast, low- and middle-income countries grapple with foundational health infrastructure challenges, further widened by factors like political instability or natural disasters [8]. Nevertheless, global health initiatives have recognized the importance of health equity. Organizations, both governmental and non-governmental, are investing in grassroots initiatives, capacity-building, and policy reforms aimed at narrowing the health equity gap on a global scale [9].

6. Towards a comprehensive exploration

It is important to delve into the root causes of health disparities, investigate the role of policy and practice in perpetuating or mitigating these disparities, and explore innovative solutions from around the world. From the role of genetics and social determinants of health to the influence of global governance structures, the

exploration should endeavor to offer a multidimensional understanding of health equity, enabling stakeholders from various sectors to collaborate effectively in building a more equitable global health landscape.

7. Concluding thoughts

Health equity is more than just a buzzword—it is a commitment to ensuring that every individual has a fair shot at leading a healthy life. As we delve deeper into this topic, let us remember that the journey towards health equity requires the collective effort of communities, policymakers, healthcare professionals, and individuals alike.

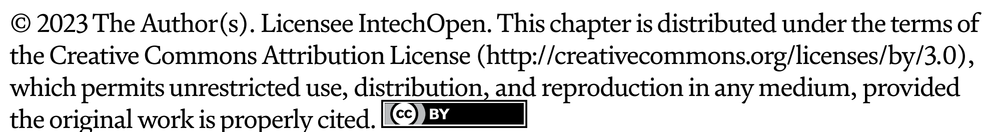
Author details

Yuvaraj Krishnamoorthy[1,2]

1 Department of Community Medicine, ESIC Medical College and Hospital, Chennai, India

2 PROPUL Evidence, Chennai, India

*Address all correspondence to: yuvi.1130@gmail.com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Chapter 2

Understanding the Concept of Health Inequality

Erum Bibi, Anila Mubashir, Aleena Khalid Ghori and Anam Bibi

Abstract

Health inequality cannot be fully comprehended until the understanding of the concept of health inequity. The former is an unfair allocation of healthcare resources, and the latter is moral in nature. The marginalized individuals, groups and populations in developed and underdeveloped nations remain devoid of equal access to vital healthcare services based on their economic status, gender, age, ethnicity, and class, which determine how an individual would receive health equality. These disparities have the power to wield impact across generations, exert rippling effects on the entire nation, and, remarkably, affect minorities, specific gender, race, ethnicity, class, and individuals with disabilities. Particularly when the world has faced the changes during COVID-19, the governments implementing identifiable strategies to exercise nationwide interventions are somehow successful in decreasing these health disparities, even though still a systematic and structural action plan is to be mandated to achieve long-lasting change by addressing the health determinants of inequality. In the modern era of artificial intelligence, there is a dire need for healthcare organizations to advance and appraise their digital policies and accessible connectivity modes through a wide variety of determinants associated with the digital gap, financial and remote accessibility, and device preferences to the disadvantaged people, especially in rural areas.

Keywords: health inequity, global health, public health, government policymakers, healthcare professionals, globalization, digitalization

1. Introduction

Health inequality is a prevailing global concern that pertains to the unequal distribution of health resources, but it cannot be better understood until we comprehend the foundational concept of health inequity for the terms "health inequalities" and "health inequities" are used precisely in Literature. According to WHO (2000), health inequality can be understood as "systematic differences in the health status of different population groups" [1]. Health inequity/injustice refers to biased, unfair, and unnecessary health inequalities that are not unavoidable or natural but are the ultimate outcome of human behaviour; however, inequality generically depicts the uneven dissemination of resources [2]. Health inequity can also be deduced as a specific subset of health inequality which passes a moral judgement that the health

inequality is ethically objectionable [3]. These inequities and inequalities wield substantial social and economic impact on marginalized and disadvantaged individuals, demographic groups, and nations. Health inequality denotes that certain groups of individuals may experience more excellent rates of diseases, reduced access to quality healthcare, and poorer health outcomes compared to other more advantaged and privileged groups. This can pave the way for unfair dissemination of health resources among individuals, eventually continuing a cycle of disadvantage, partial prospects for prevention and treatment and barriers to well-being for those who are facing systemic impediments [4].

Understanding inequality is imperative as it encapsulates the nature of the disparities manifest in intersectional, intergenerational, and interterritorial phenomena. Health inequality is intersectional because inequalities have the power to interact. It is intergenerational for passing over time from one generation to another. Lastly, it is considered to be as interterritorial as holds geopolitical and spatial implications [5].

The two prospective modules of health inequalities are emphasized across the world: inequalities that occur among groups of the same society, and inequalities between nations. The higher the level of health inequality, the poor life expectancy, low productivity, poor education and what is not expected from a geopolitical nation [4]. This inequality poses a threat not only to the developing country individuals with lower socioeconomic status but also to the policymakers matters that even the developed countries have not come out of the race of intersectional, intergenerational, and interterritorial inequality [6].

2. Historical perspective and contemporary perceptions

Health equity and equality were a keystone of the Sustainable Development Goals (SDGs) and a cornerstone of the Millennium Development Goals (MDGs) [6]. In 1948, for the first time, the notion of health as an individual's right was highlighted in the United Nations General Assembly's Universal Declaration of Human Rights and since then, has been echoed in laws, treaties, policies, national constitutions, domestic/internal laws, and agendas in countries across the globe [7]. This concept further laid the foundations for equality in health. Meltsner's article, "Equality and Health," first coined the term "health equality" in 1966 [8]. Further, the matter of health inequalities got attention for the first time with the publication of the Black Report in the United Kingdom [9]. Black subsequently developed, elaborated, and refined these primary philosophies about artefact, structural, behavioural, and cultural inequalities [6]. Further, the WHO distinguished health equality as precedence in the formation of the Commission on Social Determinants of Health in 2005, which gathers and integrates international data on the social dynamics of health/well-being and endorses arrangements that report health disparities [10].

The United Nations (UN) has endorsed the explicit significance of health inequality by propagating the agenda of the United States to address inequality in gender-related health disparities and healthcare since 2015 [7]. Social Class theorists proposed a series of studies in the United States to explore how an individual or community structure can be better pronounced in terms of collaborations between different individuals and how they create biases against each other [11], resulting in the classification of social groups which helped in explaining the core indicators for health inequality between socially advantaged and marginalized groups [12]. Moreover, this series of scientific exploration led theorists to inquire about

the influence of social class on the ecological mapping of schizophrenia [13] and variances in the management of mental illness [14].

Two epidemiological theories by Antonovsky (1967) [15] and Kitagawa & Hauser (1973) [16], respectively, from 1966 to 1990, identified societal class disparities in mortality as pivotal works. The era between 1991 and 2018 can be marked as a period of development and expansion in "social epidemiology" as a new perspective to tackle health inequalities. Diverse theorists from across the world played a leading role: 30 percent of researchers were from the Netherlands, many theorists (50.0%) were from the United Kingdom, and 40.0% were from the United States. However, this period gave rise to the prevailing social factors of healthcare structure and the health services deployment framework and triggered legislative and scientific interventions through public health law-enforced actions [6, 12].

3. Theoretical framework for understanding health inequalities

Health inequalities tend to travel from one generation to another, and from one country to another, yet they characterize the completest and most profound discriminations. For instance, in the United Kingdom, variations in the healthcare sector and its grounds were intensely inspected in detail in the late 1980s and have been the categorical motivation of policymaking till 1997 [17]. The Black Report [9] identifies four fundamental theories highlighting how the discrimination started. These were artefact, selection, structural, and behavioural [9]. The ideology of health inequality cannot be grasped deeply until we attempt to evaluate the existing theories and models that evolved historically, comprising the most current explorations, using rudimentary epidemiological reasoning concerning relationship, causation, and confounding. The detailed discussion of these theories is as follows:

3.1 The artefact theory

This theory tends as a statistical artefact to assess the connection between indicators of social position and health consequences emphasizing the social status which has been classified over time. Though this model has been critically challenged by the Black Report [9] for the pervasive evidence of inequalities in health outcomes, it has added more adequate information regarding diverse statistical trials of social standing such as social class, annual income, area scarcity, qualification, and occupational group [6]. Modern research demonstrates that as compared to the notion of the Black Report, the significance of artefact theory in assessing mortality differentials is greater, impactful, and principally complex [6, 18]. This theory believed that within different social groups, any divergence in healthcare would depend on the method of measurement of both social class and health [19, 20]. However, these health inequalities are frequently contemporary even when diverse practices are engaged when determining an individual's social class [21, 22].

3.2 Selection theory

Selection theory proposes a reverse causation that there is an observed linkage between social selection/status and poor health [23, 24]. This theory paves the theoretical framework for longitudinal theories, which attempt to assess pre-morbid social prominence through a connection [25] with consequent rates of illness (morbidity)

and death (mortality) and is also a major proponent of intelligence by presenting the hypothesis that intelligence and health are closely correlated with each other based on chance reverse causation, genetic endowment, and early life experiences [26, 27]. The chance can be reduced because of the accumulative and statistically significant indication of a relationship [28, 29] whereas reverse causation indicates dissimilarities in pre-morbid intelligence caused by differences in health outcomes. Intelligence due to genetic makeup determines health along with other variables like education, social status, and income. Early life experiences or stressors have the tendency to affect the relationship between health and intelligence [30, 31]. Once the association between health and intelligence is significantly accounted for predictors of socioeconomic status, consequently, in some cohort studies this connection with mortality declines and vanishes entirely in others [32].

Although the Black Report rejects this theory, it continues to impact the latest research in this domain. The two supplementary concerns confront the position of human intellect as the primary source of health inequalities. The former is the "Flynn Effect" [33, 34], which is an increase in the levels of intelligence observed in several people, while the latter is variances in the levels of intelligence between populations over time. Hence, socioeconomic, and circumstantial descriptions are more expected to explain the altering population distinction in the trials of intelligence [35].

3.3 Cultural and behavioural theory

Cultural theories propose that culture shapes behavioural patterns, which further tend to become intergenerational, fixed patterns, and rather defiant to remediation. If we look at Durkheim's theory of "anomie" [36, 37], Oscar Lewis's "culture of poverty" [38], and more prominently, the "dependency culture" [39], theory of Charles Murray [40], which denote that culture shapes the behaviour and its choices. Each philosophical paradigm debates that few underprivileged populations are inclined to cultivate abnormal cultural patterns that have damaging and harmful inferences for societal and ultimate health outcomes [41]. For instance, Lewis' concept of a "culture of poverty" is self-perpetuating, which allows for better health-related equalities if the stronger structural environment is changed. While Murray's, notion of a "culture of dependency" suggests new responsibilities for the poor on the part of a government. The new reforms in the United Kingdom are already implementing those laws for the equality of underprivileged people [6].

Cultural-behavioural features are frequently interrelated, as proposed by Bourdieu (1983) in his conception of habitus [42]. "Habitus" is conveyed and expressed in everyday existence choices, preferences, mindfulness, and consumption patterns. Discrepancies in approaching social capital, cultural, and economic are fundamental to the improvement of habitus patterns according to social class. According to Bourdieu, there exists a significant relationship between higher levels of educational execution and health-encouraging behaviours.

Health equalities are primarily suffered by differentiations in the occurrence of specific health-related behaviours such as diet, physical activity, smoking, and unlawful drug and alcohol consumption between groups of the dominant cultures. Many analysts advocate that risk factors like smoking elucidate a large amount of the inequality in health consequences; surprisingly, the most disadvantaged countries have the most frequent smokers [41, 42]. Unhealthy and risky behaviours such as smoking/tobacco consumption, having five times higher prevalence in lower socioeconomic status groups, lead to behavioural risks and increasing mortality rates [43].

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Similarly, the damage produced by tobacco is a key factor in the life expectancy gap between advantaged and disadvantaged countries. Additionally, the bond between adverse behaviours and poorer socioeconomic status has nearly faded over the passage of time in some of the populations without diminishing the association between mortality and lower social status [44].

3.4 Structural theory

The structural theory provided a dominant paradigm in the United Kingdom in the 1970s [6, 18, 45]. The theory proposes that if an individual meets uncertainty in socioeconomic circumstances such as power, income, class, wealth, and environmental access throughout his life, he/she faces huge disparities in health outcomes [46, 47]. The structural theorists working on health inequalities do not see much relevance in culture and intelligence; however, they do appraise a correlation between structural elements and health predictors, but they are not successful in identifying the contributory roots of health inequalities [48]. This hypnotizes that the profound levels of structural equality led to fewer health inequalities, so the secret is to give more resources to the communities to reduce structural inequalities as those with more capital and resources enjoy life expectancy and access to good healthcare [49, 50].

The power imbalances lead to health inequalities, which raises further questions about the systems and how they perform well in tackling those health disparities [51–53]. Some theorists have urged that for the last 30 years, the propagation of health discrimination is directly concomitant to the shrinking of wider self-governing controls over the desired primacies of the rich and dominant [6, 54].

4. Factors contributing to health inequality

The determinants that form the core cause of health inequality are global, interdependent, multifaceted, and diverse, with the tendency to evolve. Health inequalities or inequities can be catalogued in two main clusters (**Figure 1**) [55].

The influence of structural inequalities tends to make a person or population either resource-rich or resource-poor. Good education is a crucial factor of health that generally affects race and socioeconomic status and significantly shapes the life

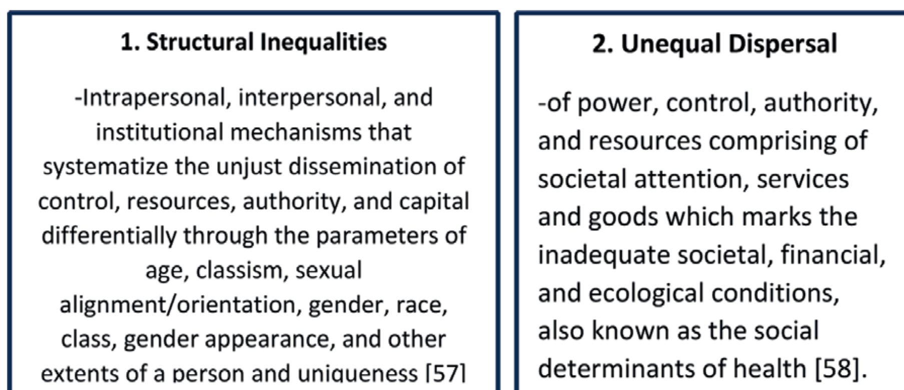

Figure 1.
Two categories of health inequality.

trajectory and the health of children and adults; similarly, race and class-differentiated access to clean, safe, resource-rich neighbourhoods, and schools is an essential ingredient in producing health inequality. These structural inequalities boost the large and avoidable differentiations in health metrics like life expectancy and follow everyone "from womb to tomb" [56].

It is common for African American females to give birth to malnourished and low-weight infants who experience higher child death rates, which do not align with any genetic or biologic differences, even after considering socioeconomic factors [57]. One of the leading factors is "stress," which is dealt with differently by societies, leading to these persistent differential birth outcomes [58]. One of the leading indicators of life expectancy is graduation after attending high school, which differs hugely in the divisions of class, race, and ethnicity, as do the rates of academic institution and occupational school participation. This shapes future income, employment, and individual and intergenerational wealth [59].

In elementary school, there are consistent differences across racial and ethnic divisions, especially in adverse childhood experiences like chronic stress and trauma. These early-age traumas affect a child's school performance and learning ability through environmental exposures, which ultimately bring differences in the intelligence quotient of an individual (IQ) [60]. Structural inequities also influence hiring policies based on colour, gender, racial, and physical ability divisions. Not only this, but these inequalities also impose explicit and implicit bias in lending policies, which lead to differences in asset development, home possession, and small corporate growth. Moreover, these systematic and structural inequalities tend to influence national strategy and governmental decision-making, and the most vital characteristic of our democracy and polling selection. Consequently, these prejudices create discrepancies in healthcare service delivery and affect the efficiency of care provided, including a dearth of social competency. It is evident that the better health of populations is widely contingent on the elements of health. Health inequities exist. In short, these structural and systematic disparities incorporate culture, governance, policy, and law and signify race, gender, or gender character, class, ethnicity, sexual orientation, and other domains [61].

Drawing a line between the predictors of inequalities in developing and non-developing countries is essential, as they both experience inequalities at different levels. The Organization for Economic Cooperation for Development (OECD) [62] highlights that inequalities in health status have been reported because of low-income and other major socioeconomic factors. Developed countries took themselves out of this muddle through education, healthcare knowledge, and skill training. On the contrary, in the Middle East, Sub-Saharan Africa, and South Asia, the epidemiological transition is still in its early stages to shift the burden of disease from communicable to non-communicable conditions [63]. With very limited resources and evidence-based healthcare interventions, they are aiming at reducing the socioeconomic causes of the inequalities in chronic diseases. On the other hand, in Asian countries especially Pakistan, inequality in health is inescapable. Pakistan is ranked the lowest, i.e., 5%, representing that Pakistan spends less capital than sub-Saharan countries on healthcare, living necessities, life expectancy, education, and child health equality [64]. The WHO's eye-opening analytics reveal that all the destitute countries classified as the lowest in child health equality are present in sub-Saharan Africa. However, unfortunately, Afghanistan and Pakistan are territories with higher child mortality rates, considering the reasons as difficult and accessible rural and urban locations, low literacy, poor education, gender disparity, and poverty [1, 64].

5. Intersectionality in health inequality

In the 1980s, the governments of different countries commenced considerable attention to the disparities in the health sector; however, still marked differences in the provision of health facilities can be witnessed in the modern era [65], especially addressing different social identities such as gender, race, class, disability. This idea of "intersectionality" was originally proposed by Kimberlé Crenshaw to emphasize how fundamental legal and policy concepts of discernment disregarded the legal laws of Black American women [66]. According to him, it refers to the crucial perception that class, race, gender, ethnicity, sexuality, nation, skill, aptitude, ability, and age function not as solitary, conjointly distinguishing entities but rather as mutually building facts [67]. Not only disparities in health are higher in gender, but longstanding structural and systemic inequalities and inequities entrenched in ethnicity and racism have been documented for decades.

In United States [68, 69], the data show that AIAN, Hispanic, and Black people were subject to worse health as compared to White people. Similarly, White people accounted for 7 percent of non-insurance for health services as compared to non-elderly Hispanic (19%) and AIAN (21%) as of 2021. Again, in the same year, White adults 52% were privileged to avail of mental health services, whereas Black received 39%, Hispanic only 36%, and Asians with 25%, respectively, showing great inequality in the provision of this facility. Approximately, very less individuals among Hispanic (62%), AIAN (59%), and Black (58%) received flu vaccine during 2021–2022 in contrast to 46% White adults.

In 2010, Japanese men expected 70.6 years of full health life expectancy, twice as long as Haitian men, with a 27.8 average life expectancy [69]. On the other hand, statistics of India again depict such health disparities among upper- and lower-income classes after statistically accounting for the contributing variables: gender, age, and other social factors, where 86% of poor Indian families are more likely early than the wealthiest fifth of Indian families [68, 69].

Over the years, global health advocators have inclined the whole world to create equality for gender, especially during the COVID-19 pandemic which posited challenges that are unparalleled to the cultures at large in terms of morbidity and mortality [70]. Gender inequalities are significantly associated with lifestyle choices, gender biases in health systems, healthcare access, health-risk behaviour patterns and inequities in clinical data collection resource distribution, and health research. Different international organizations have strived to create a balance to diminish this disparity, and the United Nations Development Program (UNDP) is one of those which has approved "Gender Equality" as its 5th Goal in the Sustainable Development Goals (SDGs) 2015–2030 [71].

Women face poorer health than men as they face a greater risk of major depression and anxiety-related disorders, while the risk of cardiovascular diseases is higher in men. Age-standardized mortality rates are more likely to be higher in the male gender than in females, excluding diabetes. Similarly, the risk factors for smoking prevalence and high blood pressure are higher in men than in women suggesting these disparities may be linked to gender stereotypes. The world is striving towards decreasing gender inequalities; however, the disparity in the health sector is notably greater and vast in Eastern Mediterranean and African regions than in the United Kingdom, United States, and Europe [72].

The world's 1.3 billion (16%) population experiences disability in any form today. Persons with special needs deserve health's highest attainable standards.

The socio-ecological model of disability theorizes that an individual's environmental, social, and physical predictors and the interplay of these factors influence one's outreach to health facilities. Though the new world is realizing and progressing in providing them with modern health standards, these individuals have challenging life patterns with poorer health facilities, higher early death ratios, and mobility issues in day-to-day life [73, 74]. Approximately 80% of individuals with disabilities are nationals of low- and middle-income countries where the provision of health services is inadequate; thus, prospering health inequities in those disadvantaged geopolitical countries is challenging. In most of such destitute countries, women with disabilities suffer more than disabled men, while children with disabilities reported adequate levels of mortality rate (80%) [75]. The 2018 Learning Disabilities Mortality Review [76] found that the average mortality age for men is 60, whereas 59 for women respectively between 2017 and 2018. People with disabilities are in dire need of proper rehabilitating programmes which give them equal rights in laws and policies in healthcare.

6. Consequences of health inequality

Research [59, 70, 75] highlights that health inequalities have significant economic implications:

- These disparities have the tendency to lead to high healthcare costs and marked losses to productivity, advancement, welfare, growth, and development, no matter what the current economic conditions of a country could be.

- It is imperative that specific investments in such programmes to reduce health disparities would have significant economic benefits.

- The patent revolutions and progression can be viewed in globalization, financial markets, trade agreements, and commercialization of health services due to these costs and benefits [61, 75].

7. Effects of globalization

An individual's health, healthcare system providers, and positive health outcomes are not spared from the complicated effects of globalization. These positive and negative effects must be scrutinized when plummeting the disparities in health between rich and poor people [77, 78]. There are also threats to global health as the transmission of infectious diseases brought on by people's increased morbidity can now be accounted for as the greatest danger to everyone. Other global and natural systems such as animal and/or ecosystem health and their effects on human health should not be overlooked when discussing globalization and its effects [78]. At all imaginable spatiotemporal scales, it is the interactive co-evolution of numerous technological, cultural, economic, institutional, social, and environmental trends. As we are neglecting and underestimating the global system, which may be out of date, the identification of all potential health effects of globalization development goes far beyond the existing aptitude of our mental capability to apprehend the dynamics of our global system [79].

The wide globalization framework includes global markets, global communication and information dissemination, global mobility, cross-cultural interaction, and

global environmental changes, which affects the healthcare systems [79, 80]. The provision of quality healthcare may be significantly impacted by the growing trade in health services. Although some developments are thought to increase consumer choice, others are thought to pose long-term risks, including the creation of a two-tiered health system, the transfer of medical professionals from the public to the private sector, unequal access to healthcare, and the undermining of national health systems. Potential health risks include the sale of illegal drugs and the provision of online access to controlled substances. Additionally, as a result of labour migration from developing to developed regions, the globalization process may also cause a "brain drain" in the health sector [80, 81]. However, it is generally accepted that faster economic growth will accelerate advancements in healthcare. The spread of information has led to an increase in (technological) knowledge, which can help with disease prevention and treatment of all kinds [77, 81].

8. Role of technology in health inequality

The healthcare system is under the increased burden of addressing health inequalities through equal provision of high-standard digitalization by reducing the biases against age, specific class, ethnicity, community, culture, and financial status [82]. Through this process, more and more disadvantaged individuals and groups can be engaged with healthcare services, but this is solely possible if these technological advancements do not increase the accessibility concerns as the main aim is to make digitalization in the capacity of especially those who are financially or educationally not well quipped [83]. To deal with this problem, the modern digital framework should include self-referrals, delivery of face-to-face diagnosis along with treatment, remote modality, and easy digital accessibility to communities that are hard to reach. For that purpose, digital education is a must!

Few countries that are experts in digitalization have put equal efforts to embark on the provision of easily operating smart devices to marginalized populations [77]. This strategy has worked for a few of the nations; however, in developing countries where buying mobiles or tablets, access to broadband, telehealth pods, and signals connectivity in rural areas is still questionable, consequently making this initiative a big failure. This could be dealt with by expanding groundwork grants to improve support in increasing Internet connectivity near or in the patients' homes [77, 82].

One of the leading factors to address the concern of digitalization is to have a better comprehension of the social determinants. By scrutinizing these social indicators, organizations may ensure that they are working on and escalating the right/accessible technology, digital equipment, and infrastructure to support populations simultaneously, interacting with the patients on the basis of their health priorities. Through this, they can collect ample data, which will help them to have easy access to not only patients' detailed clinical profiles but also a fair idea of sociodemographic profiles along with the population's complete health profiles [84]. These platforms, assisted by machine learning, would align the development of composite risk scores and a patient's proper care plans. Eventually, this digital homework can educate health systems and healthcare service providers in excluding care variation and disparity along multiple dimensions of health inequality [85]. This will not only provide a workable framework but also means to eliminate waste in healthcare provision. Once the healthcare systems establish a great number of metrics aligned with the visibility of health equity and equality performance, the next stage is the assessment of scorecards

and dashboards, then identification of outlier performance, and finally, the systems could then work to loopholes and close gaps. Further, proactive risk scores assessment can be scrutinized to assess how to connect patients with useful resources to prevent unnecessary hospital arrival and the doctor's office [83–85].

9. COVID-19 and health inequality

The COVID-19 pandemic urged us to invent and imply new technical modalities to use digital channels for the successful delivery of healthcare services virtually by learning from COVID-19 control solutions of social distancing and lockdowns. This new crisis made us learn from new ideas, refining them and turning them into detailed systemic modalities that enhance access of marginalized individuals towards technology usage. During those lockdowns in COVID-19 healthcare organizations could deliver their facilities remotely. Although it was something new in crisis, the world learnt the ways to reach the possibility of connecting rural patients to the healthcare system virtually. After the pandemic, lockdowns are not a matter of urgent concern, yet the solutions devised during the pandemic continue to connect and treat patients across the globe. Using that paradigm, we can still enhance health equality [84].

The rapid popularization of some technologies and approaches focuses on maintaining health equality by connecting marginalized populations to healthcare professionals. The leading approach is telemedicine. Though remote doctor-patient consultations will never suffice the need for physical visits and hospitalization, they can help medical triage and respond to the patients' needs more swiftly, efficiently, and professionally. Seeing a physician digitally at home improved access to those living in remote areas by reducing mobility concerns, transportation issues, and unusually long working schedules [85].

Healthcare Technological development has replaced some older equipment with smaller and portable devices for areas with less developed infrastructure, limited Internet access, or even lack of electricity. For example, the Butterfly iQ handheld ultrasound scanner is a prominent product that largely serves patients in Africa who have difficulty visiting physicians [84, 86].

A well-devised and efficient supply chain model plays an integral part in accomplishing health inequality. Without this, healthcare users will not be able to have access to the medications and vaccines they need at the right time. Cloud, as one of the prominent digital technologies, improves visibility, rerouting medicine, delivery, and the possibility of reacting to unexpected crisis situations. By the usage of a fit-for-purpose algorithm, most time- and cost-effective delivery routes can be planned, especially for rural communities [86].

10. Addressing health inequality

Do a person's cultural, economic, and social predictors influence [87] whether they would experience health equality or inequality? In this context, we must understand that *Health inequalities are unfair* due to the unequal dispersal of social resources and determinants such as income, employment, access to education, basic health facilities. *Inequalities have the power to affect everyone.* Circumstances that lead to

significant and prominent health disparities have spillover effects on all individuals in a society. For instance, violence, crime, the spread of any contagious disease, and the devastating outcomes of alcohol and drug misuse. *Inequalities are avoidable* [88]. A government that takes advanced and preventive measures in improving health policies by considering alternative strategies such as healthcare funding, social welfare benefits, and tax policy finds identifiable modes to reduce health inequality. Thus, a serious national action plan is mandatory for policy interventions [89].

11. How to utilize digital technologies to improve health equality?

To achieve equality and avoid discrepancies in the provision of health, a focus should be highlighted on the patient's perspective on the effort they put into to urge for digital as compared to the perceived effort necessary to participate. Therefore, a strong focus on both positive health outcomes and patient experience with the technology is necessary.

Recently, Imielski [83] has proposed a digitalized health equality framework for this purpose, which is based on six key components (**Table 1**).

12. Recent successful strategies for tackling health inequality: Global case studies

Several countries have been successful in implementing pertinent policies, plans, and strategies to tackle health disparities, though there is no one-size-fits-all solution (**Figure 2**) [92]. Cuba: (Franco-Giraldo et al., 2019).

S. No.	Key components	Explanation
10.1	Accessibility	The first stage is to design an alternative solution for those who have no reliable Internet access, email addresses, smartphones, or computers.
10.2	Affordability	The primary and ongoing affordable funding allocation to design solutions that are sustainable to the targeted population.
10.3	Trust	Few people have trust issues to share their sensitive information through digital channels, so a patient's trust is to be gained for both the organization itself and digital solutions.
10.4	Digital literacy	Not every individual can use new modern applications and devices, especially people with disabilities, uneducated, and older age individuals. This can be addressed by providing training to assist the patients in becoming more familiar with the technology.
10.5	Engagement channels	The clients should be engaged through web browsers, mobile apps, etc., and ensuring flawless patient experience across all digital channels is the key.
10.6	Personalization	Suitable use access is mandatory since their needs differ significantly. A seamless and comprehensive digital design to cater to multiple users to build patients' trust for an enjoyable user experience.

Table 1.
Six key components of a digitalized health equality framework.

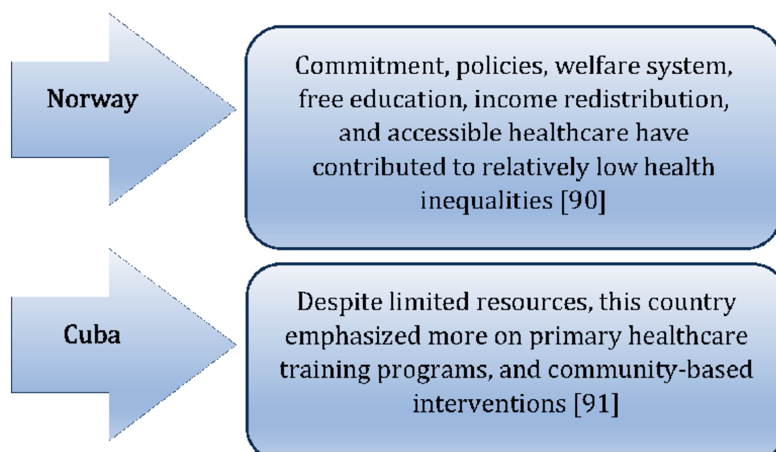

Figure 2.
Countries implementing successful strategies [90, 91].

13. Future directions and research agenda

Health inequality is a universal concern that means the whole world is, on one hand or the other, facing the same disparities in the health sector for a certain population of their country. WHO [1, 92] is creating awareness through its different surveys and annual reports to present a workable solution to this gigantic concern, and entire nations cannot be successful until they follow WHO's priorities. The first positive step towards success starts with prioritizing three things: better living standards for the poorer population, equal allocation of resources, and measuring the public health issue with a workable intervention.

The second step should be creating coordination between different healthcare and its specialities through different experimental and quasi-experimental investigations to assess complex interventions' impacts on socioeconomic discrimination.

The third step would be to familiarize inequality impact cost-effective appraisals for evidence-based interventions in the health sector and to guarantee better access to low-cost pharmaceuticals. This will necessitate evaluating and improving the patent and property rights directives and support provision for developing country capability to assess and exchange for appropriate drug access.

The fourth step could focus on developing better risk adjustment measurements for primary care of disadvantaged small areas. These healthcare centres may generate data on multiple morbidities to assess additional healthcare needs.

The fifth agenda is an assessment of social determinants. Adding, refining, and improving new indicators is another endorsement, which may disintegrate national inequality into between-area and within-area components. Similarly, it investigates the practice of statistical development of nonlinear functional forms, control methodology, and direct standardization methods.

Finally, there is a need for a worldwide evaluation and monitoring system to assess the root causes of health inequalities related to social determinants such as income group, region, ethnicity/race, age, and gender. Policies that promote an action plan to improve social, economic, cultural, and environmental determinants at all stages, initiating from organization to community to county, state, and nation, are successful in meeting the drastic effects of structural inequities. For this, we must choose a small

set of key indicators for worldwide monitoring, which requires support for national data collection and analysis. This may inform equally multifarious, complex, and operational evidence-based interventions to endorse health equality.

14. Conclusion

It is crucial to accept the fact that health equality does matter for accomplishing targets of global public health. The numerical statistics can be mechanically achieved while the real-time data are left behind, and this is how the less privileged members of a nation can be neglected and bypassed. We should remember that inequality within a geopolitical boundary of a country exacerbates overall health. Fairness in health equality is posited to be the most persuasive argument in favour of exercising strategies to reduce disparities in health. Though the underlying mechanisms boosting the rise of health inequalities are not perfectly comprehended, enhancing equity would diminish the subjugating "spillover effect" on the nations at large. Subsequently, equality of the right to access healthcare services and evading ethnic, racial and gender bias is the dire need of structural and systematic reform resulting in applicable design to meet the basic needs of the disadvantaged geopolitical populations/groups/nations.

The right political interest in implementing nationwide strategies to lessen health inequalities is required with updated and latest knowledge. In this regard, governmental and non-governmental organizations are required to collaborate. New theories about bringing change in health disparities should have emerged with a vision to discover what and where necessary action to be taken, what might work, and whom to involve. In the areas where the causal pathway of illness is known, the scientific evidence must be refined in terms of gathering population health data, monitoring already implemented policies and explorations, planning new theories and policy options and evaluating the outcome of the distribution of health measurements across the whole population.

Another strategy is to endorse specific national areas of policy for food items that cause ill health but are somehow mandatory in modern daily usage—for instance, enhancing smoke-free cooking stoves and fuel usage. Further research is needed to explore effective strategies for banning or reducing the consumption of 'junk' food, sugary drinks, tobacco, alcohol, and similar products.

Specifying endorsements for a workable Aid-supported national action plan and implementation in the health sector. This action plan can remove user charges for fundamental and basic health facilities for disadvantaged users. It will advance the dissemination of facilities throughout regions and different populations. More emphasis could be given to the delivery of precautionary and preventive health facilities and education. A vital balance can be imposed between primary health and secondary healthcare, which will ultimately require streamlining the education of medical personnel.

Another valuable suggestion is to have more and more strategic planning on how to react to the crisis. There should be adjustment and sustaining programmes to protect access to health, education, and employment for the marginalized. We should learn from the transition of emerging countries in the 1980s and 1990s how they sustained expenditure on health and education, especially rudimentary necessities.

A deep understanding of the social determinants of health equality will be indispensable for healthcare organizations. Through this, governments and enterprises can peep into the provision of the right technology, facilities, and infrastructure to

support patients. To spur the development of digital technology, the data gathered through machine learning related to clinical profiles, population, and sociodemographic profiles will contribute to health systems and healthcare providers in eliminating care variation along multiple magnitudes. Lastly, this cannot be achieved until we classify, accept, and prevent all sources of discrimination, be it age, gender, race, ethnicity, or any disability.

Conflict of interest

The authors declare no conflict of interest.

Author details

Erum Bibi*, Anila Mubashir, Aleena Khalid Ghori and Anam Bibi
Applied Psychology Department, National University of Modern Languages, Rawalpindi, Pakistan

*Address all correspondence to: erum.bibi@numl.edu.pk

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Chapter 3

Is Health for All Possible?

Hernan Malaga

Abstract

There are two ways to get health for all: combating structural poverty by social justice and combating circumstantial poverty by sanitary justice. The present work shows how we can do these two ways with examples that come from Latin American countries. Alma Ata enunciated the way, through primary health care, solving through it the essential problems of local health, which would be achieved through the strategy of healthy communities and those that seek universal coverage of health services. Healthy communities promote the satisfaction of basic needs for a dignified life, and therefore the inequalities in health determinants. Thus by improving family nutrition will disappear, and if the barriers to access to health services are reduced, universal access to them will be achieved, of equal quality in the face of equal need. Social justice interventions are potentially emancipatory. There are a lot of significant interventions as law 100 of Colombia to obtain universal access to has social justice, but very few of them break the barriers to access, meaning a lack of sanitary justice. Therefore, even after satisfying universal access to health services, differences in health equity persist.

Keywords: structural poverty, circumstantial poverty, social justice, sanitary justice, health for all

1. Introduction

Childhood anemia, primarily caused by iron deficiency, affects 47% of children under the age of 4 in Peru, with higher rates observed in municipalities with unsatisfied basic needs and lower rates in developed areas [1]. To address these disparities, social development is crucial in reducing the inequalities reflected in these health outcomes.

In 1978, Alma Ata introduced the concept of health for all, focusing on primary health care at the local level. However, despite efforts, essential health problems remain unresolved, and the recent pandemic has disproportionately impacted the less educated and economically disadvantaged populations, exacerbating circumstantial poverty (**Figures 1** and **2**) [2]. As a result, social determinants and access to health services remain unjustly denied to urban populations, calling for corrective measures. The pandemic has further highlighted social exclusion, particularly for vulnerable populations residing in marginalized areas. Many of them relied on informal jobs, which became scarce due to economic constraints, pushing them deeper into poverty. Thus, addressing health equity becomes crucial in mitigating health inequalities and fostering healthy communities.

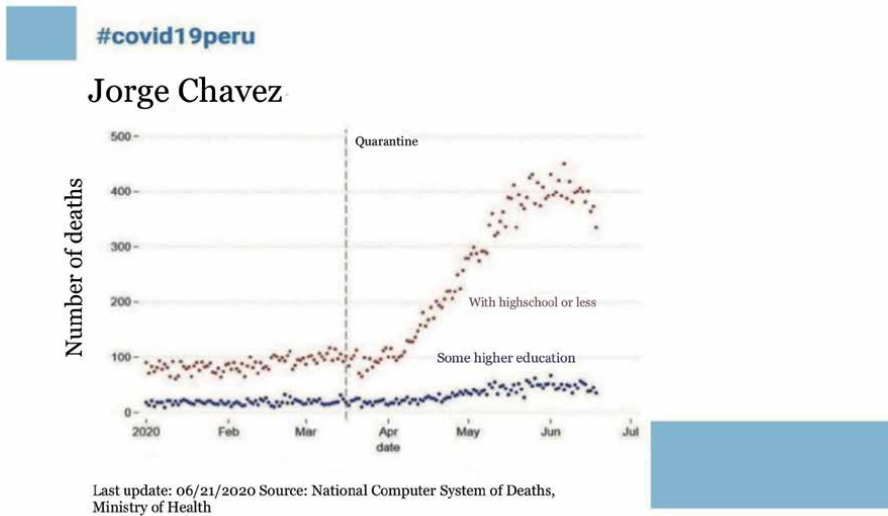


Figure 1.
Deaths from COVID-19, according to level of education, Lima, Peru (first wave, no vaccination available).

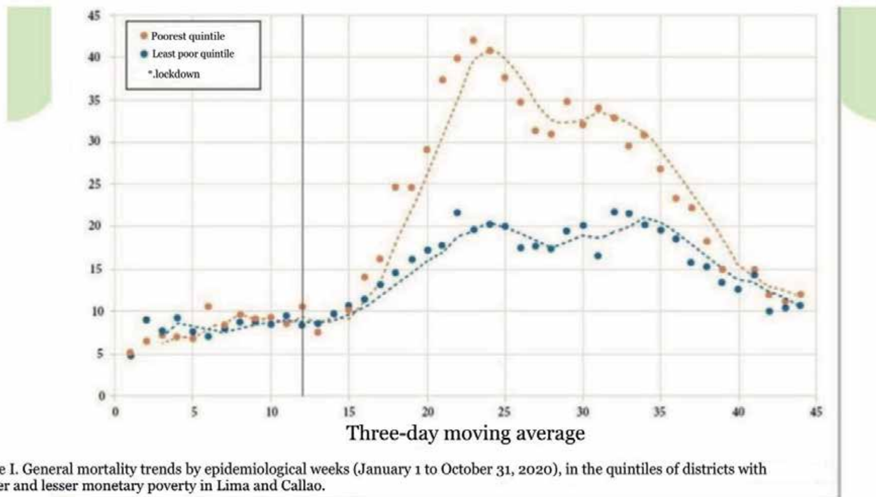


Figure 2.
Deaths from COVID-19 according to poverty level, (first wave, no vaccination available).

This work aims to explore strategies to combat health disparities, focusing on the importance of social development, equitable access to health services, and the significance of healthy communities in fostering health for all. By addressing these issues, we can work toward reducing health inequality and ensuring a more just and equitable healthcare system for all individuals, regardless of their socioeconomic background or geographic location.

Achieving health for all involves striving for health equity, which means reducing extreme social gaps and ensuring the highest level of health for every individual. Health equity recognizes the needs of those disadvantaged by social, economic, or environmental factors, allowing them a fair opportunity to achieve their full health

potential, regardless of their social position. Previous studies in England revealed that even with universal access to health services, health inequities persist, highlighting the importance of addressing underlying social determinants of health [3].

This chapter focuses on studies conducted in Colombia, Venezuela, and Paraguay, examining the relationship between basic needs, health services, and various pathologies in different populations. It demonstrates how social injustice has resulted in poor living conditions and a higher prevalence of diseases associated with structural poverty, reflecting historical exclusion by the state. Additionally, the lack of health justice is evident in population groups facing barriers to accessing healthcare services. The chapter presents successful case studies of achieving health equity and emphasizes how health inequity affects crucial factors such as low birth weight, infant mortality, and reduced life expectancy. Addressing health equity is imperative for reducing health disparities and improving the overall well-being of populations. By dismantling barriers to access and addressing social determinants, we can strive toward a more just and equitable healthcare system where everyone has an equal chance to lead a healthy life.

2. Types of exclusion

This study examines two significant categories of exclusion: (a) stemming from structural disparities in various aspects of life, such as peace, education, food security, housing, employment, and access to essential services, termed social injustices; and (b) arising from unequal and inadequate access to healthcare services, referred to as sanitary injustices.

2.1 Methods for investigating structural poverty

Studies were conducted in Venezuela and Colombia [4, 5] to analyze the correlation between unsatisfied basic needs within municipalities and the prevalence of diseases associated with structural poverty, including neonatal tetanus, diarrhea, malnutrition-related mortality, and median age at death.

The five basic needs are as follows:

a. *Inadequate housing*: This pertains to deficiencies in the physical conditions of urban or rural residences.

b. *Lack of basic public services*: This refers to households without access to fundamental amenities.

c. *Critical overcrowding*: This is defined as having more than three people per room, excluding the kitchen, bathroom, and garage.

d. *Lack of school attendance*: This includes families with at least one child aged 7–11 years, related to the head of the household, who does not attend school.

e. *High economic dependency*: This applies to homes where there are more than three individuals per employed person, with the head of the household having completed a maximum of 2 years of primary education.

A household meeting any of these conditions is classified as poor, and if two or more conditions are met, both the household and its members are considered to be in a state of extreme poverty [5].

The analysis performed was limited to descriptive statistics. As these studies were based on primary data sources gathered by the Department of Statistics of the Public Ministry and the Ministries of Health, they do not involve individuals but rather communities. Obtaining informed ethical consent was not necessary unless specific large populations were explicitly named.

The distribution of the neonatal tetanus was concentrated in the more underdeveloped areas of the country. Then the Minister of Health prioritized its control in those districts, through the vaccinations of pregnant women (**Figure 3**).

These studies also revealed five different strata of infant mortality in Colombia that determined a 50-year difference in chronological development between the extreme strata [5], meaning that Valle had at that time 22.8 per 1000 against Choco with 91.4 per 1000 of infant mortality (**Figure 4**).

In Paraguay, maternal mortality showed a distribution in which the delay in arriving at the service and deaths at home were the main causes of it (**Table 1**) [6].

Social exclusion, as evidenced by the neglect of rural communities by the state, creates barriers to accessing timely healthcare services, leading to social injustice. To address this, promoting universal access to social and environmental conditions that significantly impact health becomes essential. The life opportunity approach, centered around ensuring minimum survival conditions for all individuals, offers a viable solution [7]. It is worth noting that a significant proportion of illnesses and excess mortality stem not from personal habits or lifestyles but rather from the lack of opportunities for improvement [8]. The pursuit of a social minimum entails providing essential requirements for all individuals over time, a concept advocated by Rawls as the basic structure of society. Key components, such as school attendance, nutrition security, and efficient communication routes, are pivotal in affording individuals a chance at life [9].

In 1978, the primary health care strategy emerged as a vital means to achieve health for all by the turn of the millennium. This approach focused on addressing

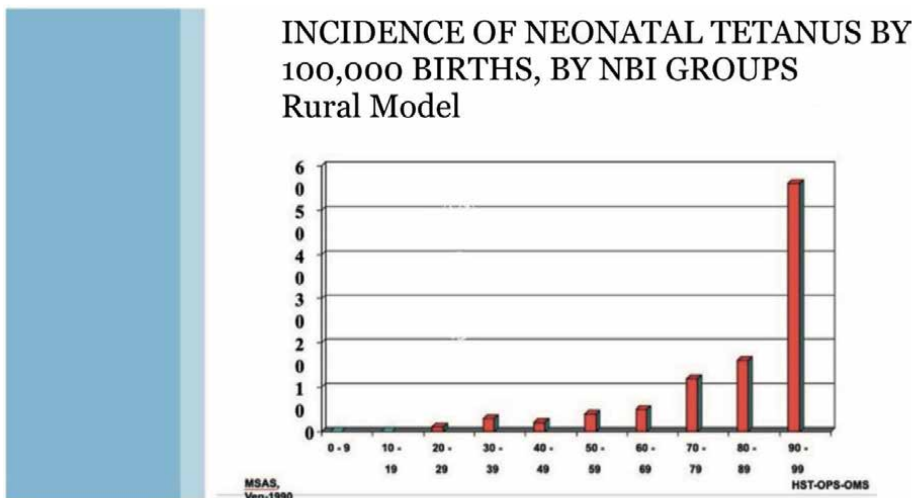


Figure 3.
Neonatal tetanus incidence per 100,000 births according to living conditions.

Figure 4.
Mortality rates by UBN strata in Colombia.

Cause	2001		2002	
	F	%	F	%
Delay in arrival at service	60	46	66	41
at home	41	31	30	18
Resolving deficiency of services	30	23	66	41
Total	131	100	162	100

Source: Inf.de la "vigilance epidemiological of health and mother mortality" Min de Salud [6].

Table 1.
Maternal mortality in Paraguay.

essential health issues at the local level, with full social participation, intersectoral collaboration, appropriate technologies, and cost-effectiveness within the community. The overarching objective was to attain health equity and narrow gaps in crucial health indicators, including child mortality, chronic child malnutrition, maternal mortality, and life expectancy [10]. The 1986 Ottawa Charter, developed by advanced nations, outlined fundamental prerequisites for health, encompassing peace, education, decent employment, food security, housing, and basic sanitation—qualities that define social justice and provide the foundation for dignified living [11]. The Charter of Bogotá further emphasized the importance of access to welfare [12].

The Ottawa Charter articulated five core lines of action: formulation of healthy public policies, reorientation of health services to prioritize prevention and health promotion, creation of favorable environments, reinforcement of community action, and the development of personal skills to facilitate lifestyle changes. This perspective was later enriched by incorporating the concept of life opportunity, particularly relevant for populations living in poverty across the continent. The result was the emergence of a new public health paradigm that delved into health determinants, intervening in risk factors and promoting protective factors. The United States

Institute of Medicine, in 1988, explicitly stated the mission of public health: to ensure conditions conducive to good health [13].

Marchand et al. [8] elucidated the mission's objectives as follows:

- Achieve the highest level of health across the entire population.
- Reduce extreme health disparities.
- Direct attention toward the most vulnerable social groups in the community.
- Once the above objectives are met, extend interventions to the wealthier populations.

To address social injustice effectively, we have implemented a systematic intervention procedure:

- Selection of excluded communities.
- Collaborative brainstorming with the community to identify problems and potential solutions.
- Identification and prioritization of concerns.
- Conducting comprehensive household surveys to establish intervention baselines.
- Engaging with financing organizations for project support.
- Presentation of projects to the entire community.
- Execution of projects.
- Rigorous evaluation of intervention impacts [14].

A healthy community is defined by its collective efforts, where citizens, institutions, and organizations work together to ensure the health, well-being, and quality of life of all its inhabitants.

Peru has a comprehensive characterization of unsatisfied basic needs, encompassing crucial socioeconomic data of families, such as marital status, family group, land tenure, access to drinking water, excreta disposal, electricity, education level of the mother, occupation of the head of the family, family income, and the number of people per bedroom (**Figure 5**). Correlating this data with chronic malnutrition in the municipality of Pachacamac revealed a significant correlation between life quality and chronic malnutrition rates among 4-year-old children in four communities [15]. These findings have led us to select Manchay as the district for developing a strategy focused on nurturing healthy communities, which will be further elaborated in this chapter.

2.1.1 Experience in Biscucuy, Portuguesa, Venezuela

A successful initiative to combat structural poverty and improve living conditions was observed in Biscucuy, Portuguesa. The town faced a significant health challenge

SOCIOECONOMIC DATA OF THE FAMILY (add the values that are in parentheses of each data, to obtain the score)				
CIVIL STATUS	*FAMILY GROUP*	*HOUSING TENURE*	*WATER FOR CONSUMPTION*	*DISPOSAL OF STOOL*
(5) Widower	(5) More than 9 members	(5) Rent	(5) Irrigation ditch	(5) Fresh air
(4) Cohabitant	(4) 7 to 8 members	(4) Guardian/hosted	(4) Tanker truck	(4) Canal ditch
(3) Divorced	(3) 5 to 6 members	(3) Social plan	(3) Well	(3) latrine / silo / blind pit
(2) Married	(2) 3 to 4 members	(2) Rent sale	(2) Public network inside the home	(2) Public bathroom
(1) Single	(1) 1 to 2 members	(1) Owned	(1) Public network outside the home	(1) Own bathroom
ELECTRIC POWER (EP)	*MOTHERS LEVEL OF EDUCATION*	*OCCUPATION OF HEAD OF THE FAMILY*	*FAMILY INCOME*	*NUMBER OF PEOPLE PER ADDRESS*
(5) No power	(5) None	(5) Not busy	(5) Less than 400	(5) 6 and more members
(4) Lantern (no power)	(4) Primary	(4) Casual work	(4) From 401 to 800	(4) 5 members
(2) EP temporal	(3) Secondary	(3) Uninsured employee	(3) From 801 to 1200	(3) 4 members
(1) EP permanent	(2) Technician	(2) Hired without insurance	(2) From 1201 to 1600	(2) 3 members
	(1) Professional	(1) Professional or producer	(1) From 1601 to more	(1) 1 or 2 members

Figure 5.
Family classification sheet of the Ministry of Health, Peru.

with a double incidence of bronchial asthma and four times the national average of infectious respiratory diseases, attributed to severe air pollution caused by coffee threshers [16]. In response to this critical issue, a healthy policy was devised and implemented by the local government, with the mayor leading the efforts.

The intervention plan aimed at relocating 80% of the coffee threshers within 3 years and diversifying crops by 30%. This decision was not without its challenges, as it involved convincing the largest roasters and coffee grinders to move away from the town's perimeter area. The local government's commitment to the well-being of its citizens was evident, with a firm stance that Biscucuy could not be left without coffee cultivation. The mayor at that time said: we must reconcile economic activity with the health of the population, and we believe that this is possible.

By successfully executing this intervention, Biscucuy witnessed a notable improvement in air quality and a subsequent decline in bronchial asthma and infectious respiratory disease cases. The positive outcome of this endeavor underscored the importance of addressing environmental factors and fostering a conducive atmosphere for the overall health and prosperity of the community.

This experience in Biscucuy serves as a valuable example of how intervention measures focusing on improving living conditions can lead to tangible and positive impacts in the fight against structural poverty. By prioritizing the well-being of the population and taking proactive steps to address environmental challenges, local governments can play a crucial role in fostering sustainable development and enhancing the quality of life for their citizens.

This municipality, Development besides: soup kitchens, self-construction of houses, ecological farms with kitchens based on natural gas, an educational radio, etc. [17].

2.1.1.1 Argentina-Paraguay healthy borders

This process involved three essential networks:

a. *Community*: The selection of beneficiaries was a collective effort undertaken by the entire community rather than being solely controlled by political authorities. An exemplary program, "Hands to the Garden," distributed 20 four-week-old laying hens or 10 seeds to establish a 10 × 10 meter garden, fostering self-reliance and community involvement. This program, initially existing in Argentina, served as a model for Paraguay.

b. *Bridge*: The White Garbage initiative enabled the exchange of recyclables such as cardboard, plastic, and glass for milk, inspired by a successful program observed in Brazil during a prior Argentine-Paraguayan delegation visit.

c. *Binding*: Notably, the President of the Republic of Paraguay extended cooperation to support this initiative, emphasizing the importance of government involvement in fostering healthier communities [18].

2.1.1.2 Manchay gardens healthy community experience

Collaborating with Ricardo Palma University, Manchay implemented several health promotion projects, with a primary focus on food security. The most developed project centered on raising laying hens, which commenced with a generous $5000 donation from the Proniño Foundation, entirely managed by the university. Training in backyard bird handling and cooperatives was provided to community members, leading to the successful distribution of over 6000 laying hens among more than 100 families between November 2014 and February 2020. The impact was evident when the first production campaign positively affected childhood anemia. Initial examinations showed 44% of 16 children to be anemic, while by the end of production, there were no cases of anemia among these children [14, 19]. Furthermore, a subsequent sample of 30 children from the local early education school revealed zero instances of anemia.

Subsequently, the breeding of guinea pigs was promoted to improve the traditional dish "arroz tapado," commonly consumed in the community. The project distributed 100 guinea pigs to 20 homes, providing four females and one male in each household (**Figure 6**). This initiative exemplified a sustainable approach to enhance dietary diversity and nutrition. In conclusion, the experience in Manchay highlights the transformative potential of interventions that harmonize economic activities with public health initiatives. By engaging communities, fostering self-sufficiency, and promoting innovative projects, it is possible to uplift living standards and create healthier, empowered societies.

The community of Manchay, under the guidance of Pastor Julio Piña, has been actively engaged in several projects aimed at improving the well-being of its inhabitants and fostering sustainable development. Among the initiatives implemented are food security projects, canine bite control, adolescent pregnancy prevention, and judo training for children. To address food security, Pastor Julio Piña conducts vegetable-growing courses every 6 months, encouraging community members and

Figure 6.
Breeding Guinea pigs.

residents from neighboring areas to establish family orchards. As a result of these efforts, a thesis is currently being developed to assess the impact of these projects on the population's food security. Recognizing the high incidence of canine bites, the community took proactive measures to control the issue. With an estimated 615 dogs in the population, averaging 1.25 dogs per household, and 70% being male dogs, the annual bite incidence was 6%. To mitigate the problem, a castration goal of 80 male dogs was set, and 18 castrations have been successfully performed. The initial surgery session received the support of Dr. Jack Weber, a recipient of the EMI Award.

Moreover, the community initiated an adolescent pregnancy control project with the aim of reducing the frequency of such pregnancies by 50%. To achieve this goal, activities were designed to utilize free time productively, including engaging in sports, reading (with the establishment of a library), recreational activities, and avoiding school dropout. For those who had already left their studies, the project focused on providing vocational training and promoting responsible parenthood. Counseling sessions were offered to educate adolescents on ways to prevent pregnancies and delay the onset of sexual relations. In addition to these vital efforts, the community sought to promote social equity among its children. In the first semester of 2017, a tatami (mat) was constructed in the community center, and from that point onward, the community encouraged children to practice judo every Saturday. This endeavor aimed to foster a sense of discipline, unity, and physical well-being among the young residents (**Figure 7**).

The multifaceted approach taken by the community of Manchay reflects the power of community-led initiatives in driving sustainable development and improving the

Figure 7.
Judo teaching.

overall quality of life. Through their dedication, collaboration, and proactive measures, they have demonstrated that positive change is possible when communities come together to address critical issues and foster growth and prosperity for all residents.

In their unwavering commitment to fostering a safe and harmonious community, the residents of Manchay recognized the significance of reducing family and community violence. A multifaceted approach was undertaken, targeting the lack of lighting in a sports center, addressing concerns related to young smokers' meeting spots, and enhancing safety measures throughout the area.

To create a safer environment, the community proactively addressed the issue of inadequate lighting in the sports center, which had become a meeting place for young smokers. The lack of proper illumination not only posed safety risks but also facilitated anti-social activities. The community came together to correct this situation, with residents actively participating in the process. They worked diligently to improve the lighting conditions, making the sports center more inviting and secure for all. Additionally, rounds were organized within the community, with residents collaborating and keeping a watchful eye on the area, especially in spots known to attract young smokers. By actively engaging with their surroundings, the community demonstrated their commitment to maintaining a safe and peaceful environment.

To further enhance safety, alarms were installed in strategic locations, providing a quick and effective means to alert residents in case of any potential threats or emergencies. This measure not only deterred potential offenders but also bolstered the sense of security among community members. Recognizing the importance of expert advice, retired officers from the police and army, along with a citizen of San Juan de Miraflores, offered valuable guidance on violence prevention. Their experience and knowledge in

Figure 8.
Productive projects, ceramics.

handling security matters proved invaluable in developing strategies to curb violence within the community. This comprehensive approach showcases the power of community-driven initiatives in tackling complex issues like violence. By actively collaborating, identifying problems, and implementing practical solutions, the residents of Manchay have exemplified the strength of communal effort in creating a safer and more secure environment for everyone. Their dedication to enhancing the quality of life within the community serves as an inspiring model for other neighborhoods to follow.

In 2016, a significant step was taken toward generating sustainable development in the community of Manchay. With the objective of creating productive projects that could contribute to the community's prosperity, the Direction of Social Projection and Community Extension at the university, led by Professor Dominino Vilca, collaborated on an impactful initiative. Thanks to the generous donation of a ceramic oven by the Proniño charity foundation, community members were trained in the art of manufacturing molds and handicrafts. This endeavor opened up new economic opportunities for the community and the university alike. The handcrafted products were later sold within the community, enabling the participants to earn an economic income. This initiative proved transformative for five families, significantly improving their living conditions (**Figure 8**) [14].

The project exemplifies the potential of productive endeavors in driving positive change and promoting sustainable development. By empowering individuals with valuable skills and providing them with the necessary tools, the collaboration between the university and the community showcased how economic opportunities can be harnessed to uplift the quality of life for families. Moreover, beyond the immediate financial benefits, the project fostered a sense of pride and self-sufficiency within the community. By creating marketable handicrafts, community members gained a deeper appreciation for their talents and cultural heritage. This interplay between economic empowerment and cultural preservation further strengthened the fabric of the community.

Through the collective efforts of the university, Professor Dominino Vilca, the Proniño charity foundation, and the participating families, the project exemplified the spirit of collaboration and the potential for sustainable development. It serves as a powerful testament to how community-driven initiatives can create a positive ripple effect, leading to lasting improvements in living conditions and overall well-being.

The legacy of this project continues to inspire others to harness their skills and resources for the greater good of the community.

Indeed, the three examples demonstrate the efficacy of the healthy community strategy and emphasize the importance of full community participation, intersectoral collaboration, and seeking collaboration beyond the municipality. These key elements play a vital role in fostering sustainable development and enhancing the overall health and well-being of the community.

3. Public health policies

Public health policies play a pivotal role in shaping the health outcomes of populations, and their implementation may be overseen by various bodies beyond the Ministry of Health. Local governments and other ministerial departments also contribute to policies that have a profound impact on people's health. These policies have demonstrated significant effects, particularly in urban centers, where certain health indicators are closely linked to specific initiatives. For instance, the mortality rate per 100,000 inhabitants due to firearms is notably higher in developed municipalities [20]. This highlights the role of urban policies and local governance in influencing public safety and well-being. By addressing the factors contributing to violence and firearm-related deaths, communities can create safer environments and protect their residents from harm. In Lima, specific evidence illustrates the effectiveness of healthy public policies in curbing mortality rates in various areas. A notable example is the establishment of a healthy public policy in December 2011, which led to a substantial decline in traffic-related fatalities, suicides, and homicides (**Figure 9**). Particularly noteworthy was the reduction in fatalities among young men. This positive impact was achieved through measures such as restricting liquor sales hours, which contributed to a safer and healthier urban environment [21].

The success of these public health policies underscores the importance of collaborative efforts and cross-sectoral cooperation. It demonstrates that positive health outcomes can be achieved when various stakeholders, including local governments and other ministerial bodies, align their efforts to address critical health issues. It is evident that public health policies extend beyond the healthcare sector and encompass diverse areas that impact community well-being. By adopting evidence-based approaches and prioritizing the health of their citizens, governments, and policymakers can create lasting positive change. These policies, when informed by research and tailored to local contexts, have the potential to enhance

Victims	Before F and % 2015	After F and % 2017	RR	Confidence limits	X^2_{1gl}(probX^2)
Car crashes	326 54.5	272 36.7	1.49	1.30-1.70	35.00000
Suicide	114 58	78 43	1.36	1.1-1.67	8.220003
Homicides	232 60	173 47	1.29	1.12-1.48	13.2700003
Total	672 58	457 49	1.38	1.26-1.50	55.1300000

Figure 9.
Results of the restriction of liquor sales hours in relation to violent deaths, metropolitan Lima.

the overall health and quality of life for all members of society. The experiences in Lima and other cities highlight the transformative power of public health policies when implemented in a collaborative and coordinated manner, leading to healthier and more vibrant communities.

3.1 Methodology for studying circumstantial poverty: Understanding short-term poverty

Short-term or circumstantial poverty, as measured through the economic income of inhabitants, provides valuable insights into the division between extreme and non-extreme poor and the non-poor. This type of poverty can fluctuate over time, and to study it effectively, comprehensive assessments are conducted. In Paraguay, these studies are carried out through collaboration between the Directorate of Statistics and Censuses for economic statistics and the Ministry of Health for access to services.

4. Results

The findings of the study reveal stark disparities between different quintiles of the population. In the poorest quintile, the prevalence of extreme poverty is alarmingly high at 77.5%, while it did not exist in the fourth and fifth quintiles. This emphasizes the urgency to address the challenges faced by the most vulnerable members of the population. Access to essential services, including healthcare, also highlights significant inequities. In the poorest 20% of the population, there are only 1.6 doctors per 10,000 inhabitants, whereas the richest 20% enjoy a significantly higher ratio of 6.5 doctors per 10,000 inhabitants (**Figure 10**). This disparity in access to medical professionals underscores the need to bridge the gap between different socioeconomic groups.

PARAGUAY: HEALTH PROFESSIONALS AND NUMBER OF BEDS PER 10 THOUSAND INHABITANTS (DEL MSP AND BS), 1999 (%)

	Number of health professional doctors	Number of beds	Number of non-medical
QUINTILES			
20% poorest	1.6	0.7	6.1
next 20%	2.7	1.0	7.1
next 20%	3.6	1.3	7.8
next 20%	4.8	1.6	8.7
20% richer	6.5	2.1	9.8
Total	3.9	1.3	7.9

Figure 10.
Health professionals and number of hospital beds according to current poverty levels.

Furthermore, inequitable access to healthcare is evident in vaccination coverage. The poorest 20% of the population had a vaccination schedule coverage of only 47.4%, while the richest 20% enjoyed a much higher coverage of 83.9% [22]. Such disparities must be addressed to ensure equal access to vital healthcare services for all segments of the population. Overall, there is a clear pattern where health services tend to reach higher coverage in large cities, leaving small and rural areas with significantly lower coverage rates. This disparity poses challenges for vulnerable communities residing in remote regions, highlighting the importance of implementing targeted interventions to improve access to healthcare services in underserved areas. To address circumstantial poverty effectively, it is essential for policymakers and relevant authorities to comprehend the root causes of these disparities and design targeted interventions that prioritize the needs of the most vulnerable segments of society. By leveraging data-driven insights and implementing equitable policies, countries like Paraguay can work toward reducing short-term poverty and promoting sustainable development for all citizens.

4.1 Understanding access to services: Disparities and correlations

In Venezuela, the correlation between mortality from tuberculosis and unmet community needs highlights the critical importance of access to services. The data revealed that areas with limited access to healthcare and essential services experienced higher mortality rates from tuberculosis [4]. This correlation underscores the urgent need to address disparities in access to healthcare resources and ensure that all communities have equitable access to life-saving services.

In Peru, the findings were equally revealing. The study demonstrated that infant mortality rates decreased in developed municipalities but increased in municipalities with lower levels of development. The disparity in median age of deaths was striking, with stratum 1 reaching 67 years and stratum 5 only reaching 44 years in 1999. This stark contrast in life expectancy emphasizes the profound impact of socioeconomic disparities on health outcomes (**Figure 11**) [23]. In regions characterized by both

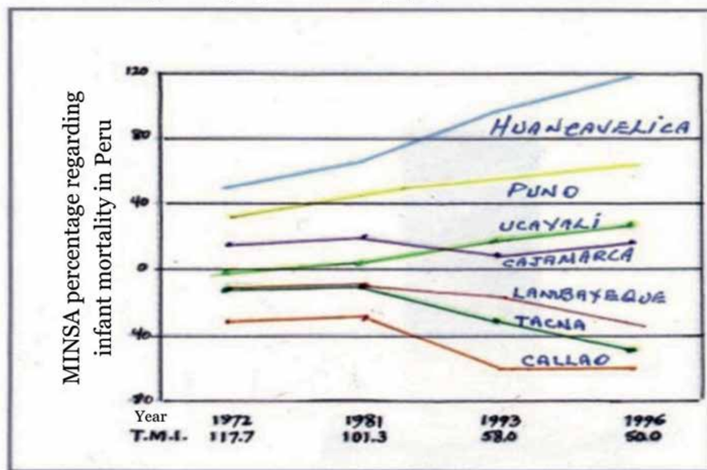


Figure 11.
Infant mortality gaps in different regions of the country, Peru.

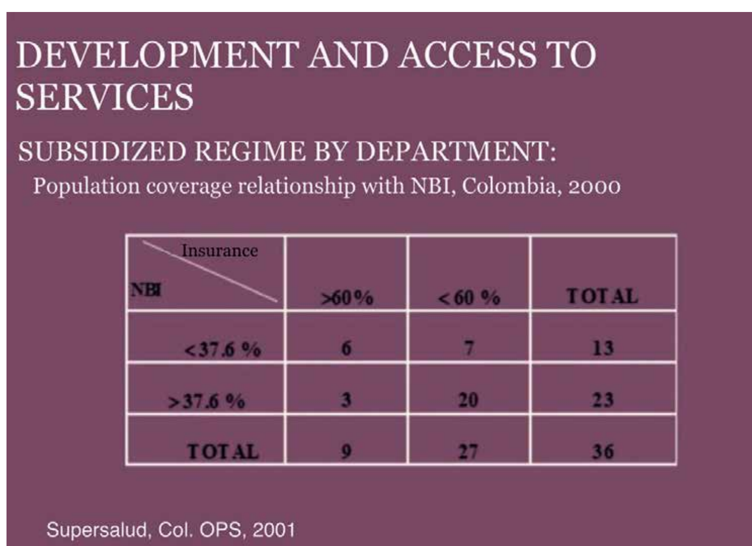
structural and circumstantial poverty, the challenges are compounded. The excluded departments, experiencing both forms of poverty, face complex barriers to improved health and well-being. Addressing these multifaceted challenges requires comprehensive and targeted interventions to uplift the most vulnerable communities and improve their access to essential services.

The correlations observed in both Venezuela and Peru highlight the interconnectedness of access to services and health outcomes. Disparities in healthcare access can lead to differential health outcomes and contribute to health inequalities among different strata of the population. Understanding and addressing these correlations are crucial steps in advancing public health policies that promote equity, reduce poverty-driven health disparities, and foster a healthier and more equitable society. To address these challenges effectively, it is imperative for policymakers and stakeholders to prioritize efforts that improve access to essential services, healthcare, and resources in underserved communities. By targeting resources to areas with the greatest needs and implementing evidence-based interventions, countries can work toward reducing health disparities and promoting better health outcomes for all citizens, regardless of their socioeconomic status or geographical location.

4.2 Access barriers

Health service reforms that include universal insurance as a goal may produce more inequities in access, since the highest insurance was observed in municipalities with a lower prevalence of unsatisfied basic needs (**Figure 12**) [24].

Evidence suggests that resources allocated for the poor have not always reached the most excluded municipalities. Instead, these resources seem to have been primarily invested in municipalities with a higher percentage of basic needs satisfied. This disparity raises concerns about the effectiveness of resource allocation and the impact it has on addressing poverty-driven health disparities. In Colombia, the implementation of the SISBEN (Beneficiary Identification System) reflects the country's efforts



NBI \ Insurance	>60%	<60 %	TOTAL
<37.6 %	6	7	13
>37.6 %	3	20	23
TOTAL	9	27	36

Figure 12.
Insurance levels according to level of municipal life condition, in response to law 100 of Colombia.

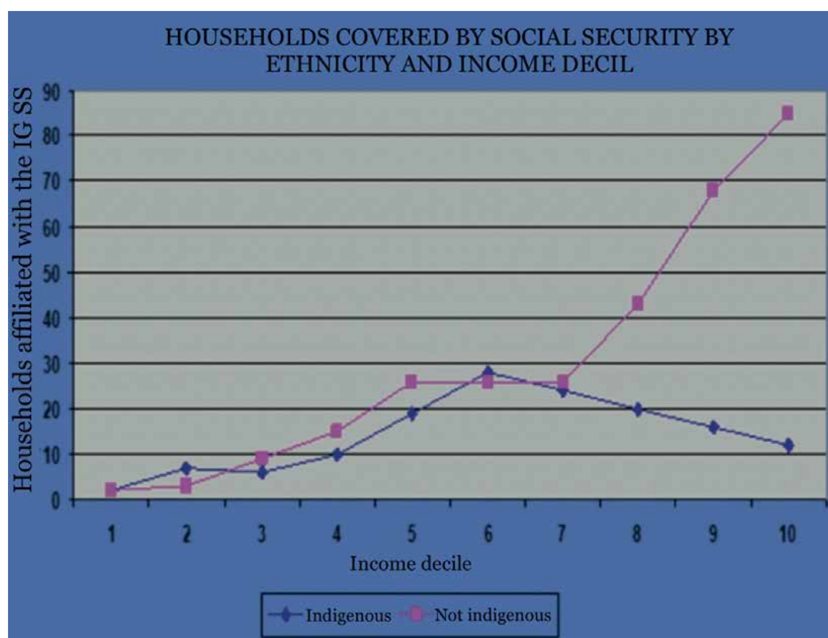


Figure 13.
Levels of health insurance according to ethnic groups, Guatemala.

to ensure targeted assistance to those in need. However, concerns exist regarding the system's accuracy in distinguishing between individuals who require assistance and those who do not. The goal of eliminating type 1 errors (inclusion of those who do not need assistance) can inadvertently lead to type 2 errors (exclusion of those most in need) [25]. Balancing these concerns and ensuring that resources reach the most vulnerable communities remains a crucial challenge. Ethnic barriers further compound the issue of access to insurance in some regions. In Guatemala, disparities exist between indigenous and non-indigenous populations (**Figure 13**), illustrating the need for targeted interventions that address the specific needs of different ethnic groups. To ensure equity in healthcare access, policies and interventions must be sensitive to the cultural and social contexts of diverse communities.

Moreover, barriers related to education can hinder access to insurance and healthcare services. In outbreaks of immuno-preventable diseases, such as diphtheria, unvaccinated children and young people in certain areas faced the consequences, despite vaccines being available in health services. Educational barriers can lead to low vaccine uptake and hinder the reach of preventive measures. Addressing these disparities requires a multifaceted approach. Policymakers must be attentive to the specific needs of marginalized communities and develop targeted interventions that account for cultural, social, and educational factors. Investing in educational initiatives that promote health awareness and preventive measures can empower communities to make informed decisions about their health. Furthermore, transparent and efficient resource allocation processes are essential to ensure that assistance reaches those who require it the most. Rigorous evaluation and continuous improvement of existing identification systems, such as SISBEN, can help optimize the distribution of resources and ensure that they reach the most excluded municipalities and vulnerable populations. By working collaboratively with communities, healthcare providers, and

stakeholders, countries can overcome barriers to insurance and healthcare access. Emphasizing equity, inclusivity, and evidence-based policy decisions will pave the way for a more equitable and effective healthcare system that leaves no one behind.

4.3 Combating circumstantial poverty: Challenges and interventions

Despite various interventions aimed at expanding services for underserved populations, they often fall short in breaking the barriers of circumstantial poverty. In Colombia, the recognition that advancements in insurance for the poor were primarily observed in large cities (**Figure 12**) prompted the Minister of Health to issue a decree directing resources toward insurance for the poorest municipalities with a high percentage of unsatisfied basic needs. However, further assessment was hindered by a change in the presidency, leaving the actual impact of this policy change uncertain.

5. Conclusion

- There exists a positive correlation between structural poverty and diseases associated with poverty, signifying the importance of addressing essential minimums in excluded populations. Health equity is achieved by allocating resources based on different levels of need, prioritizing those with the greatest need, rather than equal distribution for all. Interventions focused on social exclusion must address the specific needs of diverse communities.

- A positive correlation between risk factors for chronic and social diseases and the lowest percentage of unsatisfied basic needs was found. This suggests that public health policies should prioritize addressing inequalities prevalent in developed municipalities, such as implementing restrictions on liquor sales hours, to combat health disparities.

- A negative correlation between short-term poverty and social and sanitary justice highlights the urgency of targeting populations with the least satisfaction of basic needs. To ensure health justice, interventions should focus on improving access to basic sanitary measures and healthcare services for these vulnerable communities.

- Social injustice's impact on health persists even when health services are equitably distributed. Understanding and addressing the root causes of social injustice are crucial for achieving meaningful health outcomes for all.

- Combating social exclusion requires a primary focus on structural poverty, followed by addressing circumstantial poverty. Targeted interventions that consider the specific needs of excluded populations are essential for reducing health disparities.

- Addressing individual exclusion can eliminate individual risks, and achieving high vaccination coverage through health education programs contributes to health justice. Lowering barriers to access to healthcare services, such as education and healthy public policies, is essential to ensuring equitable healthcare for all.

- Further studies should be conducted to address barriers to access to health services. Health education programs can address issues like low service utilization, and education and decent employment can help combat ethnic differences in healthcare access.

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Author details

Hernan Malaga
Department of Public Health, Veterinary Medicine School, Ricardo Palma University, Lima, Perú

*Address all correspondence to: hernanalfredom@gmail.com

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Section 2

Specific Dimensions and Global Challenges in Health Inequality

Chapter 4

Smokeless Tobacco Use and Health Inequity: Unraveling the Mechanisms

Esmaeil Fattahi

Abstract

This book chapter delves into the intricate relationship between smokeless tobacco use and health disparities. Through a comprehensive exploration of the underlying mechanisms, this chapter aims to shed light on the factors contributing to the inequities in health outcomes associated with smokeless tobacco consumption. By investigating the socio-economic, cultural, and psychological dimensions, we seek to unravel the intricate web of factors that perpetuate these disparities. The chapter also examines the impact of public health policies, awareness campaigns, and interventions on mitigating the health inequity arising from smokeless tobacco use. Through a multidisciplinary approach, we aim to provide valuable insights that can inform policy-making and public health strategies to address these disparities effectively.

Keywords: smokeless tobacco, health disparities, mechanisms, socio-economic factors, cultural factors, public health policies

1. Introduction

The use of smokeless tobacco presents a unique challenge in the realm of public health [1–3]. Unlike combustible tobacco products, the nuances of health disparities related to smokeless tobacco use have garnered less attention. This chapter seeks to unravel the mechanisms underlying the disparities in health outcomes observed among users of smokeless tobacco products. The introduction sets the stage by highlighting the significance of investigating this issue, particularly within the context of health inequity [4–6].

The pervasive issue of health inequity is deeply entwined with the complex landscape of smokeless tobacco use, a prominent public health concern that has garnered increasing attention. While the well-established health risks associated with conventional tobacco products like cigarettes are widely recognized, the intricate dynamics that underlie health disparities stemming from smokeless tobacco use remain a subject of intensive exploration. This chapter aims to untangle the intricate mechanisms connecting smokeless tobacco consumption with the overarching challenge of health inequity, offering insights into the factors that drive these disparities [5, 7].

Health inequity, denoting the unjust and avoidable differences in health outcomes among diverse population segments, encompasses disparities in health access, treatment outcomes, and healthcare quality that arise from systemic social, economic, and environmental factors. Given the widespread nature of smokeless tobacco use, comprehending its intersection with health inequities is pivotal for devising targeted interventions and policies that can ensure equitable health outcomes for all individuals [8, 9].

Recent research has begun to unveil the intricate mechanisms through which smokeless tobacco use becomes intertwined with health disparities. Socio-economic determinants such as income, educational attainment, and occupation play a pivotal role in shaping initiation, prevalence, and cessation patterns of [8] smokeless tobacco use across various communities. Concurrently, cultural norms and societal expectations contribute to the formulation of individual attitudes and behaviors towards smokeless tobacco, thereby impacting usage rates and subsequent health consequences. Moreover, unequal access to healthcare resources, limited exposure to public health interventions, and barriers to cessation programs further compound the disproportionate burden of smokeless tobacco-related health concerns among marginalized populations [2].

Through a comprehensive interdisciplinary exploration, this chapter endeavors to dissect the complex mechanisms driving health inequities related to smokeless tobacco use. By delving into the socio-economic, cultural, and psychological dimensions of this issue, we aspire to illuminate the factors that sustain these disparities. Furthermore, we will critically evaluate the effectiveness of public health policies and interventions aimed at addressing these inequities and fostering healthier behaviors [5, 9].

In essence, unraveling the intricate mechanisms that intertwine smokeless tobacco use and health inequities is pivotal for devising well-informed strategies that address the root causes of these disparities. By shedding light on these mechanisms, this chapter contributes to the broader initiative of mitigating health inequities and ensuring that all individuals, irrespective of their tobacco usage or socio-economic status, can access optimal health outcomes [2, 7, 9].

2. Socio-economic factors and health disparities

Socio-economic factors form the bedrock upon which patterns of smokeless tobacco use and its consequential health effects are etched. This pivotal section delves into the intricate interplay of income, education, and occupation, laying bare the disparities in exposure, access to cessation resources, and the overarching impact on health [8, 10, 11]. The prevalence of smokeless tobacco use looms as a pressing public health concern, prompting a profound inquiry into its nexus with health disparities. At the heart of this discourse lie socio-economic determinants—income, education, and occupation—wielding a profound influence in sculpting the contours of smokeless tobacco usage, thereby magnifying the stark disparities in health outcomes [2, 8, 11].

2.1 Income disparities

Low-income individuals often face barriers to accessing healthcare services and smoking cessation programs, which can exacerbate the health effects of smokeless

tobacco use [12]. This subsection examines how income influences both smokeless tobacco initiation and cessation, contributing to health disparities [13, 14].

Income disparities significantly influence the prevalence and consequences of smokeless tobacco use. Lower-income individuals often face challenges in accessing healthcare services, cessation resources, and health education. The affordability and availability of smokeless tobacco products can further drive higher usage rates among economically disadvantaged communities. As a result, health risks associated with smokeless tobacco use are magnified among those with limited financial resources. Strategies to address income-related health disparities must consider targeted interventions that address economic barriers and provide equitable access to resources for all individuals, regardless of their socio-economic status [7, 12].

2.2 Educational disparities

Education levels influence awareness about the health risks of smokeless tobacco use. This section discusses how lower education levels may lead to a lack of knowledge about the associated risks and hinder informed decision-making [5, 15, 16].

Educational disparities contribute to variations in smokeless tobacco use behaviors and awareness of associated health risks. Individuals with lower levels of education may lack comprehensive information about the potential harms of smokeless tobacco, hindering their ability to make informed decisions. This knowledge gap can lead to higher prevalence rates within this subgroup, perpetuating health disparities. Effective interventions should focus on tailored education campaigns that bridge the information divide and empower individuals across all educational backgrounds to make healthier choices regarding smokeless tobacco use [16].

In essence, understanding the intricate interplay between socio-economic factors and smokeless tobacco use is essential for addressing health inequities. By acknowledging the influence of income, education, and occupation on usage patterns and health outcomes, policymakers and public health advocates can design targeted strategies to mitigate disparities and promote healthier behaviors within affected communities [7, 16].

2.3 Occupational disparities

Occupation-related factors, such as workplace culture and stress, can impact smokeless tobacco use. This subsection explores the links between occupational environments and the prevalence of smokeless tobacco use [17, 18]. The intricate relationship between occupation and smokeless tobacco use unveils an important dimension in the broader context of health disparities. Occupational disparities play a significant role in influencing patterns of smokeless tobacco consumption and its associated health outcomes. Understanding the complexities of how different work environments shape tobacco use behaviors can provide insights into addressing health inequities among diverse occupational groups [17, 18].

Occupational disparities introduce nuanced dynamics that affect smokeless tobacco use behaviors. Workplace cultures, stressors, and the availability of tobacco products can influence initiation, prevalence, and cessation patterns. Certain occupations may inadvertently encourage smokeless tobacco use due to factors such as peer influences, job-related stress, and perceived cultural norms within the workplace. These disparities can lead to differential health outcomes and contribute to the unequal burden of smokeless tobacco-related health issues among various occupational groups [18, 19].

For example, studies have shown that high-stress professions, such as those in emergency services or healthcare, may have higher rates of smokeless tobacco use as a coping mechanism. Additionally, industries with a culture of smokeless tobacco use, such as some construction or manufacturing sectors, may have higher initiation rates among workers [20, 21].

Addressing occupational disparities in smokeless tobacco use requires targeted interventions that account for the specific challenges faced by different occupational groups. Workplace policies and interventions should aim to create supportive environments that discourage tobacco use and promote cessation. Tailoring educational campaigns and providing access to cessation resources within workplaces can empower individuals to make informed choices regarding their tobacco use. By acknowledging the role of occupational disparities, public health initiatives can work towards mitigating health inequities and promoting healthier behaviors within the diverse landscape of the workforce [18, 22].

In conclusion, exploring the relationship between occupation and smokeless tobacco use sheds light on an often-overlooked aspect of health disparities. By recognizing the impact of workplace environments on tobacco use behaviors and addressing the unique challenges faced by different occupational groups, we can strive towards a more equitable distribution of health outcomes related to smokeless tobacco use (**Figure 1**) [18, 19, 22].

3. Cultural factors and health disparities

Cultural norms and practices surrounding smokeless tobacco use can contribute to disparities in health outcomes. This section delves into the cultural aspects that influence initiation, consumption patterns, and cessation behaviors [23].

Cultural factors wield a profound influence on smokeless tobacco use, opening a crucial avenue for understanding the intricate web of health disparities that emerge from these behaviors. The connection between cultural norms, societal expectations, and smokeless tobacco consumption is pivotal in unraveling the mechanisms that contribute to health inequities across diverse communities. Delving into these cultural dimensions provides insight into designing interventions that address the unequal distribution of health outcomes related to smokeless tobacco use [11, 17].

3.1 Cultural acceptance and norms

Cultural acceptance of smokeless tobacco use within certain communities can normalize the behavior. This subsection examines how cultural norms influence perceptions of risk and shape usage patterns [24, 25].

Cultural norms and societal expectations play a pivotal role in shaping individuals' attitudes and behaviors towards smokeless tobacco. Communities with a historical acceptance or normalization of smokeless tobacco use may have higher prevalence rates, resulting in a disproportionate health burden. Moreover, cultural practices, rituals, and peer influences can reinforce smokeless tobacco consumption within certain groups. These cultural dynamics contribute to the perpetuation of health disparities by influencing initiation, continuation, and cessation patterns. Understanding the interplay between cultural factors and smokeless tobacco use is essential for designing effective interventions. One-size-fits-all approaches may overlook the nuanced influences of cultural contexts. Tailored interventions that

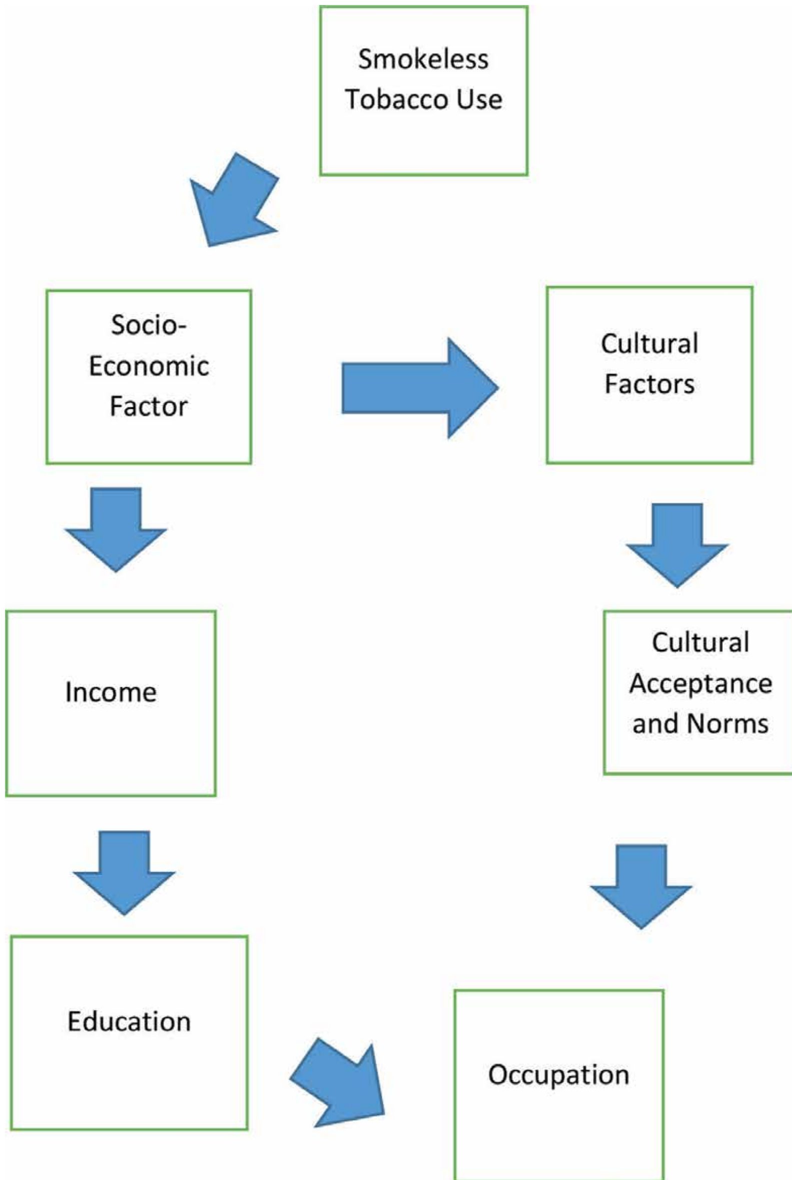

Figure 1.
Occupational disparities: related influential factors and impacts.

consider cultural sensitivities, beliefs, and practices can empower communities to make informed decisions about smokeless tobacco use. Engaging community leaders, leveraging culturally relevant messaging, and involving local institutions can enhance the effectiveness of interventions and promote healthier behaviors within specific cultural settings [25].

In conclusion, unraveling the intricate relationship between cultural factors and smokeless tobacco use sheds light on the mechanisms that contribute to health disparities. Acknowledging the influence of cultural norms and developing culturally sensitive interventions are pivotal steps toward mitigating health inequities related

to smokeless tobacco use. By addressing these cultural dimensions, public health initiatives can work towards fostering healthier behaviors that resonate with diverse communities [25].

3.2 Gender and smokeless tobacco use

Gender roles and expectations can impact smokeless tobacco use differently among men and women. This section explores how gender influences initiation, consumption, and cessation practices [11, 26].

Exploring the intersection of gender and smokeless tobacco use unveils a complex realm within public health, marked by patterns that contribute to health disparities. Gender plays a significant role in shaping smokeless tobacco consumption behaviors, reflecting societal norms and expectations [27]. Understanding how gender influences initiation, prevalence, and cessation of smokeless tobacco is essential for addressing the distinct health inequities that arise from these patterns [27].

Gender norms and expectations contribute to distinct patterns of smokeless tobacco use among different genders. Societal perceptions of masculinity and femininity can influence initiation, continuation, and quitting behaviors. For instance, smokeless tobacco use may be more prevalent among men due to associations with traditional notions of masculinity. Conversely, societal pressures related to appearance and social acceptance may influence women's tobacco use choices. These gender dynamics contribute to the unequal distribution of health risks, with potential long-term consequences [27, 28].

Recognizing the influence of gender on smokeless tobacco use is pivotal for developing effective interventions. Tailoring prevention and cessation efforts to resonate with gender-specific concerns can yield better outcomes. By acknowledging the gendered nuances in attitudes towards tobacco, public health initiatives can address the barriers and facilitators of quitting within different genders. Engaging with communities through culturally sensitive and gender-specific messaging can encourage open conversations and empower individuals to make informed choices about their tobacco use behaviors [28].

In conclusion, delving into the realm of gender and smokeless tobacco use uncovers a unique avenue for understanding health disparities. By recognizing the ways gender norms and expectations influence tobacco consumption patterns, public health interventions can be better equipped to address the unequal burden of health outcomes. Tailoring strategies that respect gender dynamics can contribute to a more equitable distribution of health benefits and healthier behaviors across diverse gender identities [27, 28].

4. Public health policies and interventions

Public health policies and interventions are essential tools for addressing smokeless tobacco-related health disparities. This section evaluates the effectiveness of various policy approaches, awareness campaigns, and interventions aimed at reducing the prevalence of smokeless tobacco use and mitigating its health impact [3, 29, 30].

Navigating the realm of smokeless tobacco necessitates a comprehensive understanding of the role of public health policies and interventions. This dynamic landscape encompasses a range of strategies aimed at reducing the prevalence of smokeless tobacco use, mitigating health disparities, and fostering healthier behaviors

within affected communities. Exploring the diverse array of policies and interventions sheds light on the multifaceted approach required to address the complex challenges posed by smokeless tobacco [3, 24].

Public health policies serve as a critical foundation for addressing smokeless tobacco use. Regulations that limit advertising, sales, and accessibility of smokeless tobacco products play a crucial role in curbing initiation rates, particularly among vulnerable populations. Public health campaigns that raise awareness about the health risks associated with smokeless tobacco use also contribute to changing attitudes and behaviors. The synergy of policies and awareness initiatives is essential for curbing the prevalence of smokeless tobacco use and promoting a culture of informed decision-making [3].

Evidence-based interventions form the core of public health efforts to address smokeless tobacco use. These interventions encompass a range of strategies, from school-based educational programs to community support initiatives. Engaging communities through culturally sensitive approaches ensures that interventions resonate with the target audience, encouraging them to make informed choices about tobacco use. By leveraging evidence-based practices, public health initiatives can empower individuals to quit smokeless tobacco and build healthier lives [24, 30].

While public health policies and interventions have made significant strides, challenges persist. Adapting to evolving tobacco products and marketing strategies requires continuous vigilance and updates to regulations. Moreover, addressing health disparities requires tailored interventions that acknowledge the unique challenges faced by different populations. Future directions must prioritize innovation, collaboration, and data-driven decision-making to design effective strategies that not only reduce smokeless tobacco use but also contribute to the overall improvement of public health outcomes [24, 30].

In conclusion, public health policies and interventions play a pivotal role in the fight against smokeless tobacco use. By regulating access, raising awareness, and empowering communities, these efforts contribute to a healthier society. Recognizing the challenges and adapting strategies to the ever-changing landscape of tobacco use is essential for achieving equitable health outcomes and reducing the impact of smokeless tobacco on individuals and communities [24, 30, 31].

4.1 Regulation and advertising restrictions

This subsection discusses the role of regulations and advertising restrictions in curbing the appeal of smokeless tobacco products, particularly among vulnerable populations [32, 33]. In the realm of smokeless tobacco, the critical role of regulation and advertising restrictions cannot be overstated. These mechanisms serve as crucial safeguards against the proliferation of smokeless tobacco use, especially among vulnerable populations. Understanding the impact of regulations and advertising restrictions is paramount for dismantling the influence of smokeless tobacco and fostering healthier communities [34].

Regulation forms the cornerstone of efforts to combat smokeless tobacco use. Policies that govern the manufacturing, sales, and marketing of smokeless tobacco products play a pivotal role in reducing accessibility and curbing initiation rates. By setting age restrictions, enforcing packaging warnings, and limiting product availability, regulations create barriers that discourage both uptake and continuation of smokeless tobacco use. The convergence of evidence-based policies and regulatory measures is essential for dismantling the allure of smokeless tobacco products, particularly among youth [33, 35].

Advertising restrictions are instrumental in mitigating the influence of smokeless tobacco marketing. Limiting the promotion and advertisement of smokeless tobacco products curtails their appeal, particularly to impressionable audiences. By curbing promotional activities that glamorize tobacco use, regulations undermine the normalization of smokeless tobacco, thereby reducing its allure. The synergy of advertising restrictions and public health campaigns contributes to shaping social norms that discourage the initiation and perpetuation of smokeless tobacco consumption [31, 35].

Regulation and advertising restrictions serve as key components of comprehensive strategies aimed at safeguarding public health. By creating barriers to initiation, curbing advertising influence, and fostering informed decision-making, these measures contribute to a culture of reduced smokeless tobacco use. The evolution of policies to address new challenges posed by emerging tobacco products is crucial for maintaining the effectiveness of regulation and advertising restrictions. Ultimately, a robust regulatory framework coupled with vigilant enforcement is essential for curbing the impact of smokeless tobacco and promoting healthier lifestyles [31, 36].

In conclusion, regulation and advertising restrictions play an indispensable role in combating smokeless tobacco's influence. Through evidence-based policies and limitations on promotional efforts, these mechanisms contribute to reducing initiation rates and dismantling the allure of smokeless tobacco products. The synergy of regulation, advertising restrictions, and public awareness campaigns forms a formidable arsenal against the tobacco industry's tactics, fostering a healthier future for individuals and communities [31, 36].

4.2 Cessation programs and awareness campaigns

Effective cessation programs and awareness campaigns can promote healthier behaviors. This section examines the impact of such initiatives in reducing smokeless tobacco use and improving health outcomes [30]. The fight against smokeless tobacco's adverse effects hinges on the potency of cessation programs and awareness campaigns. These pillars of public health endeavor to empower individuals to quit smokeless tobacco use and educate communities about its perils. Understanding the significance of effective cessation strategies and impactful awareness initiatives is vital for achieving a tobacco-free future and reducing the burden of health disparities [34, 37].

Cessation programs stand as guiding beacons for individuals seeking to break free from smokeless tobacco's grip. These programs offer tailored strategies, resources, and support networks to empower users on their quitting journey. By addressing the physical, psychological, and social aspects of addiction, cessation programs enhance the chances of successful quitting. Collaborations between healthcare professionals, counselors, and community organizations amplify the impact of these programs, ensuring that individuals receive the comprehensive assistance they need to overcome their tobacco dependence [38].

Awareness campaigns wield the power to shift societal attitudes towards smokeless tobacco use. By disseminating factual information about the health risks, social consequences, and potential pitfalls of tobacco consumption, these campaigns challenge misperceptions and debunk myths. Engaging multimedia platforms, compelling narratives, and relatable stories amplify the reach of awareness campaigns, fostering an informed citizenry that is more equipped to make tobacco-free choices.

By normalizing quitting behaviors and emphasizing the benefits of a tobacco-free life, awareness campaigns inspire change on both individual and communal levels [34].

Cessation programs and awareness campaigns synergistically contribute to a tobacco-free future. As cessation programs provide tailored support for quitting, awareness campaigns disseminate vital information that bolsters motivation and decision-making. By investing in the development of evidence-based cessation strategies and crafting compelling awareness messages, public health initiatives can drive societal transformation. The concerted efforts of these programs and campaigns hold the potential to unravel the grip of smokeless tobacco, promoting healthier lives and contributing to a society that champions well-being over addiction [34, 37].

In conclusion, cessation programs and awareness campaigns constitute essential tools in the fight against smokeless tobacco. Through tailored support and widespread education, these mechanisms empower individuals to quit and foster informed communities. By amplifying the impact of these efforts, public health initiatives can pave the way for a tobacco-free future that benefits individuals, families, and societies at large [34].

5. Concrete solutions and innovative recommendations

While it is essential to identify the factors contributing to smokeless tobacco use and associated health disparities, it is equally important to offer concrete solutions and innovative recommendations. Here are some specific strategies that can be implemented to address this complex issue:

5.1 Targeted workplace interventions

5.1.1 Concrete solution

Collaborate with employers to implement workplace wellness programs that specifically address tobacco cessation. Provide incentives for employees who participate in cessation programs and achieve successful outcomes.

5.1.2 Innovative recommendation

Utilize technology-based interventions, such as mobile apps or virtual coaching, to deliver personalized cessation support to employees. These platforms can offer real-time tracking of progress, access to educational resources, and instant communication with cessation counselors.

5.2 Socio-economic empowerment

5.2.1 Concrete solution

Establish community-based economic empowerment programs that provide skills training, job placement assistance, and financial literacy education. By improving economic stability, individuals may be less likely to turn to smokeless tobacco as a coping mechanism.

5.2.2 Innovative recommendation

Explore microfinance initiatives or community-driven entrepreneurship opportunities tailored to vulnerable populations. These initiatives can foster economic independence and reduce the reliance on smokeless tobacco.

5.3 Culturally tailored interventions

5.3.1 Concrete solution

Engage community leaders and cultural influencers in the development and delivery of anti-tobacco campaigns. Leverage culturally relevant messaging, events, and media channels to increase awareness about the harms of smokeless tobacco.

5.3.2 Innovative recommendation

Implement peer-led interventions within culturally distinct communities. Trained community members can serve as mentors and advocates, offering support and guidance to those seeking to quit smokeless tobacco.

5.4 Policy advocacy and regulatory innovation

5.4.1 Concrete solution

Advocate for comprehensive policies that restrict the marketing, sale, and distribution of smokeless tobacco products. Support initiatives that raise taxes on tobacco products to reduce affordability and discourage use.

5.4.2 Innovative recommendation

Explore emerging technologies, such as blockchain or digital verification systems, to track and regulate the supply chain of tobacco products. This could enhance the enforcement of existing regulations and deter illicit trade.

5.5 Integrating mental health support

5.5.1 Concrete solution

Integrate mental health services within tobacco cessation programs. Recognize and address the underlying psychological factors that may contribute to smokeless tobacco use, such as stress or anxiety.

5.5.2 Innovative recommendation

Implement virtual reality (VR) or augmented reality (AR) therapies as adjuncts to traditional counseling. These immersive experiences can provide innovative tools for managing cravings and stressors associated with quitting tobacco.

By incorporating these concrete solutions and innovative recommendations, public health efforts can move beyond generic interventions and address the root causes of smokeless tobacco use. These strategies take a holistic approach, considering

socio-economic, cultural, and psychological factors, ultimately leading to more effective and sustainable outcomes in reducing smokeless tobacco-related health disparities.

6. Conclusion

In conclusion, this chapter provides a comprehensive overview of the mechanisms contributing to health inequities related to smokeless tobacco use. By dissecting the socio-economic and cultural dimensions, as well as evaluating the impact of public health policies, we have gained insights into the intricate web of factors driving these disparities. By addressing these mechanisms, policymakers and public health practitioners can design targeted strategies to reduce smokeless tobacco-related health inequities and improve overall population health [3].

In the pursuit of understanding the multifaceted landscape of smokeless tobacco, this exploration delved into key dimensions that unravel its mechanisms and implications. Through examining socio-economic factors, gender dynamics, public health policies, cultural influences, and cessation efforts, a comprehensive view emerges of the intricate interplay between smokeless tobacco use and health disparities [18].

As socio-economic factors intersect with smokeless tobacco use, it becomes evident that vulnerable populations face a disproportionate burden of health inequities. The convergence of low income, limited access to healthcare, and societal norms often magnifies the challenges faced by these communities. Addressing health disparities requires a multifaceted approach that encompasses policies targeting affordability, accessibility, and awareness [25].

Gender dynamics add another layer to the complex narrative of smokeless tobacco use. Societal perceptions of masculinity and femininity influence initiation patterns and continuation behaviors, contributing to disparities in prevalence and health outcomes. Efforts to mitigate these disparities necessitate tailored interventions that address the distinct drivers of tobacco use within different gender identities [28].

Public health policies and interventions emerge as critical tools in dismantling the influence of smokeless tobacco. By regulating product availability and curbing advertising influence, these measures create a more conducive environment for individuals to make informed choices. Cessation programs and awareness campaigns synergistically empower individuals to quit tobacco use and encourage communities to prioritize their well-being [31].

In conclusion, navigating the realm of smokeless tobacco use requires a comprehensive understanding of its mechanisms and implications across socio-economic, gender, and cultural contexts. By weaving together evidence-based policies, culturally sensitive interventions, and informed awareness campaigns, public health endeavors can work towards a future free from the grasp of smokeless tobacco. This holistic approach not only empowers individuals but also fosters communities that champion healthier lives and equitable health outcomes.

Conflict of interest

The authors declare no conflict of interest.

Author details

Esmaeil Fattahi
Department of Health Education and Promotion, School of Health, Guilan University of Medical Sciences, Rasht, Iran

*Address all correspondence to: esmaeil.fattahi1@gmail.com

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Chapter 5

Perspective Chapter: Health Inequalities in Zambia – A Comprehensive Exploration

Mupakile Chrispin

Abstract

Zambia like any other developing country is faced with a lot of health inequalities that includes disease burden, poor housing and infrastructure, poor sanitation, water supply challenges, poverty and nutrition deficiencies. In 2019, the Ministry of Health Zambia reported to have made significant steps towards improving the health of the population based on the principle of Universal Health Coverage using an integrated people-centred approach. Through these steps, the National Health Insurance Scheme was introduced which is still in effect and its positive outcome has been noted by the population even though it had its negative sides such as not providing some essential services especially those related to accidents.

Keywords: Covid-19, health, Zambia, inequalities, mental health, unemployment

1. Introduction

According to the 2022–2026 National Health Strategic Plan issued by the Ministry of Health, Zambia faces a number of diseases such as maternal, child and adolescent health problems; communicable diseases (Malaria, HIV/AIDS, Sexually Transmitted Infections (STIs), Tuberculosis (TB), Covid-19, among others, and a growing burden of non-communicable diseases (NCDs). Even though there has been progress in selected health indicators, particularly for maternal and child health, this progress has been inadequate and below the targets [1].

As the world faces the cascading and interlinked global crises and conflicts, the aspirations set out in the 2030 Agenda for Sustainable Development are in jeopardy. The Ukraine-Russia war has also contributed to the health inequalities in Zambia through food crisis, fertiliser and oil price increments [2]. These factors have heavily affected the country and this is evidenced by the increase of essential commodities, borrowing by the government to cushion the national treasury, inadequate availability of medicines and essential medical supplies as well as failing to manage the agriculture and mining industry.

2. The health inequalities in Zambia

2.1 The health system

Zambia is a signatory to many conventions or treaties and on health, it is a signatory to the abuja declaration on HIV and AIDS, T.B and other Infectious Diseases which set a target for all member states to allocate at least 15% of its national budget to health to ensure proper management of the health sector. In the 2022–2023 National Budget, Zambia was below the target and only managed to allocate 10.4% out of the target required to meet the target. Even though there was a slight increment of 2.4% from the 2022 national budget which the government allocated 8% from the total National Budget. This is the reason why there is inadequate essential medicine and other medical supply [3].

Health is wealth. The country which struggles with its health system has no guarantee of being a wealthy nation. According to the 2023 national budget address presented to parliament by finance minister Hon. Minister Situmbeko Musokotwane, the budget indicated that the government had committed towards improving the health of the Zambian population by recruiting health personnel, infrastructure development and provision of drugs and medical supply [4].

In 2023, the government managed to recruit more than 11,000 health personnel and placed them in different health facilities across the country. While this progress was made, the health sector experienced shortages of medicines in health facilities across the country and many patients were issued with prescriptions to go and buy and only those under National Health Insurance Scheme (NHIMA) had the privilege of certain types of medication and services [5].

According to the report of the Committee on Health, Community Development and Social Services for the First Session of the 13th National Assembly of Zambia, the committee confirmed the shortages of medicines in most public health facilities. The report also outlined some of the contributing factors to the shortage of pharmaceutical products such as the dependency on importation of products and delayed payments by government which resulted in the government accumulating debt owed to players in the pharmaceutical sector for the provision of various goods and services [6, 7].

The committee was saddened to learn that the government was importing intravenous fluids (IVF/Drips) despite having a fully-fledged local manufacturing company producing these fluids. This later impacted the patients who bore the cost of medicines and medical supplies from private Pharmacies. There was a need for the government to prioritise the local manufacturers and speed up the payment procedures so as to encourage local manufacturers to produce more and since the same money government pays is used to acquire raw materials for the manufacture of goods needed in the health sector. Government will also need to reduce the tax of all the products that the private local manufacturers may need for the production of essential goods such as medicines and medical supplies. In that way, the local producers will be encouraged to produce more and this will lead to more employment as more manpower will be required to meet the demand.

3. Transport system

In Zambia, to travel from one town or district, you either use the bus or your own private vehicle and only few people use local aircraft to travel from one province to

the other. Road transport is the only reliable and faster way of travelling. With the increase in the prices of fuel, that means transportation has become a challenge. Transport challenges is a negative signal indicating that commodities like food will be difficult to be transported from one place to the other and in 2023, Zambia observed the increase of mealie meal prices which most Zambians depend on a daily basis.

4. Cost of leaving

The cost of living has been observed to have been rising year in year out. This has been observed through the increase in prices of essential commodities like fuel and maize meal. According to the Jesuit Centre for Theological Reflection 2023 May, the cost of living for a family of five as measured by the Jesuit centre for Theological Reflection (JCTR) Basic Needs and Nutrition Basket (BNNB) for the month of July stood at K9301.18 compared to June which stood at K9239.45 which shows an increase of K61.73. This has a huge impact on the livelihood of the people across the country. Most people with families do not earn even K9000 or more; the majority of the people earn less, meaning they resort to getting loans to ensure that they reach the amount of money needed to provide the necessary home essential goods or reduce the amount of meals per day which later on affects people's health [8].

When people do not have enough meals or are burdened with financial challenges, they lose focus at work. Imagine a theatre nurse without proper meals, not enough concentration will be given to the patient. Imagine a Pharmacist who cannot take care of the family because of financial issues when he actually is tempted to sell medical supplies to support the family, he/she will resort to stealing to cover the financial gap. These same challenges that people go through are the ones that facilitate wrong acts. If enough money is given to employees that meet their needs, the temptation of stealing may neither be here nor there but because of the circumstance, the opportunity of stealing becomes a relief to some people and when they are caught is another tragedy to talk about.

The increase on the prices of mealie meal has led some families to reduce on the normal 3 meals by adjusting to either one or 2 meals per day just to sustain the little mealie meal available in the house.

This is contrary to the United Nations (UN) sustainable development goals (SDGs) No. 3 'Health and Well-being' which demands from governments to ensure their people have healthy lives and promote well-being. It is clear that when people do not have enough available food, poverty kicks in and later on affects their mental health and well-being. The increase of essential commodities has raised anxiety among the Zambian people though the current government has blamed it on the previous regime to have made reckless decisions that has contributed to the suffering of the people [2].

According to the 2022 report by World Food Program (WFP) in February last year 2022, prices of staple food commodities such as maize grain and maize meal rose sharply, especially in the Northern province as the lean season peaked. While national maize stocks were well above-average, commodity prices remained high and above-average levels. The cost of living measured by the Basic Needs and Nutrition Basket (BNNB) continued on an upward trend for a third consecutive month, with significant increases being noted in the prices of meat and animal protein foods or products. Although cumulative rainfall received countrywide was in the normal

range, temporal distribution was a major concern; most of the rains were witnessed around January, resulting in the worst flash floods in the last decade, which destroyed livelihoods especially in Southern province [9].

According to the Jesuit Centre for Theological Reflection (JCTR), the Basic Needs and Nutrition Basket (BNNB) for a family of five living in Lusaka stood at K9305.38 in February, marking a K256.13 (nearly 3%) increase compared to the January basket that stood at K9049.25. This upward trend has been observed since November 2021, implying reduced household purchasing power. Increases in the cost of the basket were mostly on account of increases in prices of animal and plant protein foods or their products. Macroeconomic conditions in February, the annual rate of inflation continued its downward trend for the seventh month in a row, falling to 14.2% from 15.1% in January. Non-food inflation fell from 12.7% in January to 11.8% in February. The annual food inflation, on the other hand, increased slightly, rising to 16.9% from 16.0% the previous month. Price changes in plant and animal protein foods were largely attributed to this trend. In the same month, the local currency, the Zambian Kwacha, depreciated slightly against the US dollar, with the exchange rate increasing by 4% [8].

5. Political will

The decisions made by the politicians in power have the higher chances of affecting the health and well-being of the people. The equal distribution of resources especially on developmental agenda such as construction of health care facilities, provision of medicines and provision of safe water and sanitation all depend on the present political will. When these are not fairly distributed, it causes a number of the population to lack the necessary requirements for the health of the community and the nation. A normal family is supposed to have 3 meals in a day but currently it seems impossible as the increase in the cost of living has been attributed to the increase of commodities which a number of people cannot afford.

6. Sanitation water quality and supply

Sanitation and water supply are very important to every country. It is one of the symbols of a well managing governance system. These important services are as important as food and if overlooked, may bring catastrophic events. Zambia historically has been facing challenges with Sanitation and water quality supply in almost many parts of the country including its capital city Lusaka [10].

On October 6, 2017, a cholera outbreak was declared in Zambia after laboratory confirmation of vibrio cholerae O1 from stool specimens from two patients who suffered from acute water diarrhoea. The Ministry of Health worked with different organisations including World Health Organization (WHO), CDC, UNICEF, OXFAM and many other international and local organisations including the defence forces to ensure the outbreak was contained but it later spread to all 10 provinces of the country [11].

On 15th March 2019, it was reported that a 9 year old girl was brought to Rural Health Centre presenting with acute watery diarrhoea and vomiting in Nsumbu district, Northern province. More cases were recorded and this was attributed to the contamination of drinking water [11]. It is satisfying to see to it that the government

of the republic of Zambia working with cooperating partners plan to continue the rehabilitation of old and dilapidated water supply and sanitation infrastructure as well as embark on new projects in both rural and urban areas [12].

Now looking at the experience the country has had over the years concerning cholera. Do these events need to continue even when all the factors leading to these outbreaks are known? Definitely not. There is a need to be more proactive than ever before especially before the rainy season to ensure that all the sanitation facilities are well built.

According to the European Centre for Disease Prevention and Control, since 21 June 2023 and as of 20 August 2023, 99,463 new cholera cases were recorded worldwide clearly indicating that globally the cholera challenge still exists. The countries identified to have more cases include Bangladesh, Afghanistan, DR Congo, Haiti and Ethiopia. Even though Zambia is not mentioned in this report, it still has chances of recording higher cases in the future provided that the preventive measures are relaxed [13].

Many people who live in rural areas have difficulties accessing good quality water and sanitation services. Most programs and decisions are made from the capital city Lusaka including approval of budgets which makes it even difficult and delay certain interventions to improve these services. More better facilities like water treatment plants are found in the capital city while in rural areas people draw water either from the wells or streams, rivers or lakes Most of the people living in islands in Zambia have difficulties in managing their human waste and mostly others they resort to dumping in the water though natural purification may occur but contamination do happen.

Other contamination has been observed like the Nsumbu cases which occurred after floods during the rainy season where runoffs were contributing factors after the pitlands were submerged with water thereby carrying all the human waste around into the water sources and contaminating the water. There is still hope for improvement on water and sanitation as the government keeps on track the good budget score on international best practices in its allocation of resources towards the water and sanitation and social protection sectors [3].

Another important factor that contributes to these hygiene related diseases are the distances from where the water sources are and the households. In some areas, some water sources can even be a kilometre and so people may only visit the water source once and young people even at the age of 12 may be forced to start carrying loads of containers of water thereby affecting their health. According to World Vision Zambia, access to clean water is unequal.

In Zambia, 90% of households in urban areas have access to safe water compared to only 53% of households in rural areas. Urban areas have about 70% access to sanitation compared to those in rural areas who have only 25% access. These poor water supply and sanitation services especially in rural areas are the main contributing factors to a high burden of water-borne diseases that Zambia experiences almost every year (**Figure 1**) [14].

To prevent children and mothers from lifting heavy loads of water containers, there was a need for more investments to ensure that equal water and sanitation programs are done so as to ensure every household is provided with clean water and sanitation services closer to their homes. In that way many diseases including health effects on the musculo-skeletal system will be reduced especially in young girls and boys [14].

In 2022, the government committed to construct 1350 boreholes and 8 solar powered small water schemes in all 10 provinces which are ongoing. Further government

Figure 1.
Water supply and sanitation challenges. Photo by WorldVisionZambia.

also committed to construct and rehabilitate more boreholes in different parts of the country especially in rural areas such as western province where Sanitation and Hygiene (WASH) Project in refugee settlements and host communities in Nchelenge, Kaoma and Lusaka districts with support from the German Government, through the United Nations International Children's Emergency Fund (UNICEF). This involves the construction of over 300 boreholes and sixteen solar powered medium piped water schemes, which are expected to benefit around 75,000 people and 16,000 people, respectively. Once these projects are done, they will have a huge impact and benefit the community with clean water provision services [15].

7. Mental health

Mental health worldwide is accompanied by stigma and discrimination. Most of the people experiencing mental health issues either struggle to solve the issues by themselves or commit suicide. The first time I saw someone who committed suicide was in 2000 were my mother's young brother committed suicide in the uncompleted house where we were supposed to shift to, a house that belonged to my grandparents but unfortunately no one occupied it after the suicide. Since then, pictures of him hanging by the rooftop comes in the moment I hear of suicide. Well, by then I was only 7 years and I am 30 years now and still traumatised about my uncle's death. Now imagine those reports that are received where women are abused by their husbands and step children being abused by step-mothers, how do you expect them to cope with their daily lives. More harm is done on their mental health than to their body.

According to the Gender-Based violence assessment in Zambia 2022, despite the progressive provisions on gender and GBV in international, regional and national legislation, gender inequalities continue to be significant in Zambia. The 2021 data showed that 4115 cases were reported of GBV against girls, including 2238 of cases of child development and in 2023, the Zambia police reported 10,797 cases of GBV country-wide [16].

Imagine how those girls are abused or defiled, how traumatised they become, how much those women who are beaten and mistreated in their homes. Most women in these toxic homes live in fear and they have no freedom and cannot make any decisions for themselves. It is almost the same as modern day slavery. GBV should have been made a criminal offence to prevent those who intend to infringe other people's rights to freedom. This is the reason why most of the women have resorted to drinking alcohol especially after divorce to prevent them from thinking about the abuse they went through in their previous marriages.

The most renowned and famous place where people with mental health issues are treated is at Chainama hospital. This is the largest and referral facility where all the individuals who have mental health issues end up whenever families fail to manage them though almost every 10 provinces, there individuals in the streets with mental health issues who move around picking food in dumping areas or refuse pits. According to the Borgen project, mental health practices and research are very limited. However, there have been more government and NGO efforts that aim at making awareness programs for mental health care [17]. The most prevalent disorders include schizophrenia, brain infections, alcoholism and psychotic episodes. Imagine a developing country with so many mental health issues only having one facility in Lusaka to address all the mental health issues with only 3 local psychiatrists for a population of 12 million.

8. Disease burden

Since the time Zambia recorded cases of Covid-19 in 2020, the country faced a lot of financial challenges as more money was allocated to the health sector to fight the disease. Even though International communities like the World Health organisation (WHO), The United Nations International Children's Emergency Fund (UNICEF), United Agency for International Development (USAID), United kingdom Agency for International Development and many more local companies like Lafarge now Chilanga Cement, Trade Kings and many more also contributed to the fight against the fight of Covid-19.

Every country faces a disease burden and Zambia is not an exception. The common diseases in Zambia include Covid-19, Tuberculosis, HIV/AIDS, Malaria, diabetes, cancer, heart conditions and other infectious diseases [1]. The major disease that crippled the economy was Covid-19 since 2020 when the first cases were reported in March. Since then, the government through the ministry of health struggled to fight against the disease which claimed many lives and affected all the provinces in the area [18]. The same Covid-19 disease exposed a lot of gaps that the ministry of health needed to address to improve the health system. As the world struggled to fight against Covid-19, many parts of the world went into shutdown which led to suspension of transportation of some essential commodities that the country needed and this disadvantaged Zambia since most of the medicines and essential medical supplies are imported.

Luckily developed countries came to aid and essential commodities like vaccines were donated together with funds to use during the pandemic. According to the

World Bank Group, policy Research paper 9571, a research on Covid-19, Poverty and Social Safety Net response in Zambia, the impacts of Covid-19 such as lockdowns and travel restrictions resulted in unprecedented health and economic crisis. This came at a time when the country was facing serious macroeconomic crisis because of rising inflation, a high fiscal deficit, a depreciating kwacha and pressing external debt which the country even defaulted to pay and luckily, there has been some relief through the new government through his excellency Mr. Hakainde Hichilema who managed to restructure the debt with the lenders which gives the country more time to plan on how to pay the external debt [18].

Most companies in the country were closed as employees were getting infected on a daily basis and other lost jobs thereby affecting their normal lively wood. This clearly shows that during this period unemployment increased. Many employees from private institutions complained of having difficulties buying essential commodities like food in their homes because they were not paid when their companies were closed due to the pandemic. This affected their mental health as they got worried on how they could feed their families.

One of the good part that was observed during the pandemic was that even though the ministry of health had no capacity to manage the pandemic on its own, other ministries and cooperating partners came on board and the pandemic was managed in a multi-sectoral approach and this made it easy as resources came from different sources. Patients used to receive donations such as food and beddings from different cooperating partners and on some occasions, staff in isolation centres were given food and some presents as appreciation for the sacrifice shown during the pandemic.

In 2023, the minister of health Hon. Sylvia Masebo when attending 76 World Health assembly called on world leaders in health through the world health organisation to give attention to the public health issues of concern like cholera, which continues to affect countries like Zambia and the Southern African region [19]. These diseases claim lives every year and when neglected, they lead to catastrophic events such as outbreaks which are observed almost every year in some parts of Zambia.

Since the time Covid-19 unmasked the gaps that the ministry was facing, a lot of improvements has been observed where government has invested more in construction of more medical facilities since 2020 and medical supply facilities like in 2023 groundbreaking for the construction of an Oxygen Generation Plant in Kitwe Teaching Hospital. With the new administration in the ministry of health, people's expectation is to see more improvement in the health sector, especially quality health care.

Therefore, there was a need to have more projects to be done locally including manufacture of medicines, vaccines and other essential products so as to reduce on external dependency and funding. When such industrial activities are available in most parts of the country, it leads to more employment thereby reducing the unemployment as well as making youths more productive. Many youths are involved in drug abuse and excessive alcohol abuse making them problematic and unproductive in the community. Others resort to stealing so as to sponsor their drinking activities. And when more jobs are available, even for the uneducated, theft is reduced, and the community is safe and productive.

9. Unemployment of the youth

I am more concentrated on the employment of the youth because I am a youth and what affects youths affects me. The majority among the Zambian population are

the youth and many of them are unemployed. On the 18th August 2023, a Zambian youth by the name Moses Sichione attempted to commit suicide after he was left on the army recruitment [20]. Moses climbed a network tower and threatened to throw himself down but he was later convinced and he came down from the tower. This is shown by the photo by **Figure 2**.

This was a clear mental health issues that many youths in the country who are committing suicide are going through. Many youths have graduated from Colleges and University but there are no available jobs available for everyone to grab on. At least in 2023 government recruited more than 11,000 health workers and additional 3000 health workers to be recruited, others recruited included people in defence, police, teachers as well as other government institutions and parastatals [5]. Even though those efforts were made, there is still unemployment that needs to be addressed. Some health personnel who graduated cannot even intern or find direct jobs because they have to undergo an additional licence exam which disadvantages them an opportunity to join the workforce only until they undergo the exam while other professions grab it easily [21]. There was a need to look into the licence exam issues to ensure they are either integrated with the final normal exam so that when people graduate immediately they have opportunities to work but in this case, graduates have to wait. On 20th September, the Health Professions Council of Zambia (HPCZ) nullified the licensure exams due

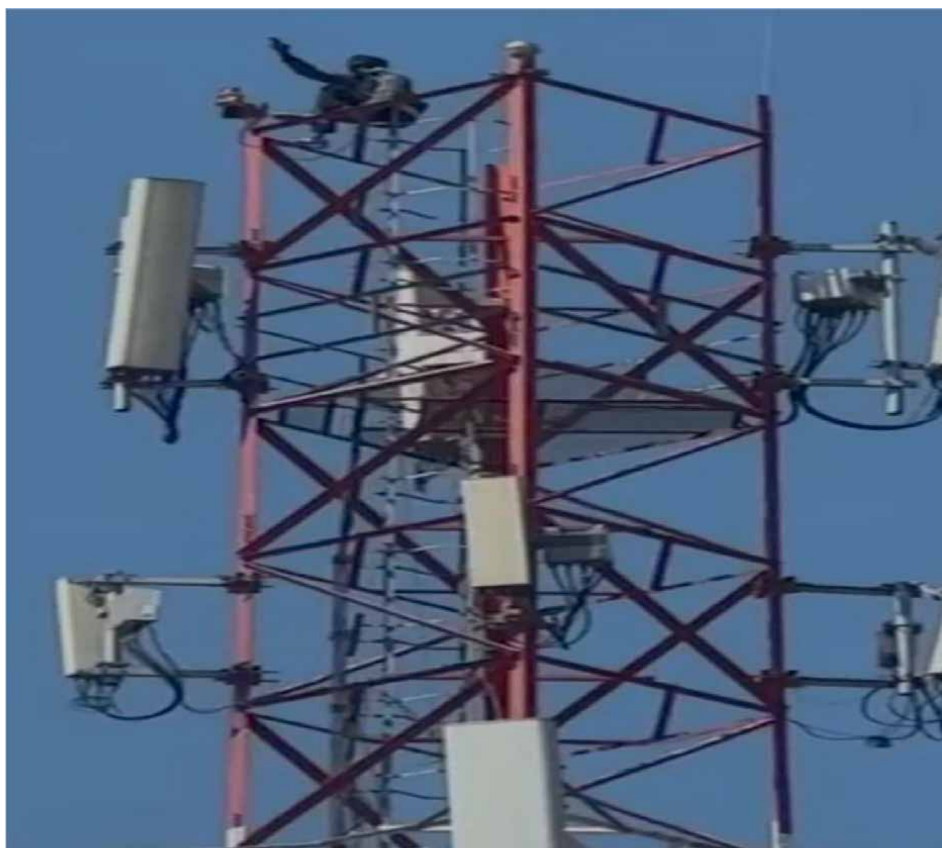

Figure 2.
Suicide attempt due to unemployment.

to malpractice and also suspending 9 of its staff members [22]. These decisions and events will not only disadvantage the youth who after completing school needs jobs but also affect their mental health as their hope of finding employment is delayed. This is the reason why government needs to find a way to change this system of competence assessment to either allow the HPCZ and other health examination board to make on comprehensive exams that will include all the inputs from difference stakeholders such as HPCZ and other University or to create an examination board that prepares examination papers that satisfies the HPCZ standards. In that way, it will allow students to be ready for employment upon graduation. As things stand, that method of assessment is a clear way of stealing employment opportunities for the youth especially those in the health sector. Remember, students are ready to work after graduation, not after writing licensure exams.

10. Conclusion

It is a fact that many parts of the world face a lot of challenges in ensuring equal opportunities are given to people regardless of social status, race, age and health status. Even in most developing countries, health inequalities do exist. Therefore, it is a huge task given to governing bodies to ensure distribution of resources among the population and prioritise the weakest, most vulnerable and those at higher risk. The government of the republic of Zambia has a huge task to ensure that at least invest more in the health sector so as to improve health and prolong life. When the nation is healthy, it is wealthy. This may not come easy but with strong leadership and political will, the sky's the limit. Hippocrates once said, *"Healing is a matter of time, but it is sometimes also a matter of opportunity."* When the opportunities are not given equally, those who do not have the chance for health opportunities suffer the most. I hope for the future where we all share resources equally with discrimination and that future is coming.

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Author details

Mupakile Chrispin
Department of Environmental Health, Ministry of Health, Lusaka, Zambia

*Address all correspondence to: mupakilechrispin@gmail.com

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Chapter 6

Perspective Chapter: Addressing Global Health Inequalities – A Public Health Perspective

Esra Daharlı

Abstract

The concept of public health covers all services offered to protect and improve the health of individuals and society and to provide the best services in the field of treatment/rehabilitation. In this way, all situations that are common in society, frequently lead to death, create a burden on the health economy, and in short, affect the health welfare of the society and are considered as the subject of public health. All steps to be taken to protect and improve the health of individuals, societies, and countries are evaluated within the framework of public health. Although the systematics and organization of health services vary from country to country, they are basically classified as preventive, therapeutic, and rehabilitative services. The provision of health services should be accessible, sustainable, and inclusive of all humanity. Otherwise, if there is no balanced policy in service delivery, the desired goals will not be achieved. In order to bring a health principle based on the principle of equality to certain standards throughout the world, basic targets are determined and countries organize studies to achieve these targets. The aim is to provide healthcare services equally to everyone and more to those in need. Health services should be urgently provided by all countries in the world, especially in regions where health needs are felt intensely, such as ongoing wars and mass deaths in many parts of the world today. Failure to understand and persistence of inequalities in health care, it will first affect individuals and societies, and this effect will spread all over the world.

Keywords: public health, health inequality, health awareness, sustainable development goals, maternal and infant deaths

1. Introduction

Health, which is one of the fundamental human rights and freedoms, has maintained its importance throughout history. This importance has led to changes in the definition of health over time [1]. In ancient times, health was defined as the absence of illness, but according to the World Health Organization (WHO), the definition of health has become more comprehensive. In its current form, health is defined not only as the absence of disease and disability but also as a state of complete physical,

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mental, and social well-being [2]. According to this definition, the preservation and improvement of the health of individuals and society require collaboration in multiple fields and a multidisciplinary approach. As the definition of health has changed, there have been changes in health policies around the world. The aim of the changes is to produce more equal and applicable policies and to increase the health level of individuals and society. While in the past years, more years of death or life expectancy were taken into consideration instead of healthy life [3], the concepts of social well-being, quality life, and healthy aging have become topics discussed in terms of equal health service provision in recent years [4]. In order to make evaluations about health issues more understandable, it has been felt necessary to use different concepts in addition to the definition of health. One of these concepts is quality-adjusted life year (QALY), which takes into account the opinions of individuals regarding the quality of life, and the other is disability adjusted life years (DALY), which represents the years lost due to disability [5].

2. Initiatives for health equity

For countries to pursue a common path in terms of health protection and improvement, the Ottawa Charter was established during a meeting held in Geneva in 1986 [1]. The promotion and encouragement of health encompass the entire process of individuals making informed decisions about their own health, increasing and enhancing their control over it [2]. This process necessitates making social, economic, and environmental conditions conducive to health in addition to actions aimed at increasing individuals' health skills and capacity. The concepts introduced in the Ottawa Charter have been updated in the Jakarta declaration, which now encompasses all countries worldwide. According to the Jakarta declaration, the five priorities for health promotion are as follows: promoting social responsibility for health, increasing investments in health development, expanding partnerships for health promotion and development, enhancing community capacity and empowering individuals, and ensuring infrastructure for health promotion and development [2]. The decisions of the Jakarta declaration were taken to cover all the country's populations, that is, all humanity. The desired goals can be achieved when these decisions are implemented without allowing any inequality between countries and people. These concepts, which are expected to be planned for the entire population, have necessitated the importance and priorities of public health to be known.

According to public health principles, actions aimed at improving, protecting, and enhancing the current health status of individuals, and the community should be implemented within a multidisciplinary approach. In this context, public health encompasses all individual and environmental conditions that are common, frequently fatal, and pose a threat to the overall health of the community [3]. In the context of public health, along with environmental, political, and social regulations, the dedicated participation of individuals is of great importance in addressing crucial and prioritized issues. To achieve this, the necessary conditions can be considered as the right political approaches, a health-supportive environment, a suitable social context, and individuals with a high level of health literacy.

When collaborative efforts are made with stakeholder institutions in the field of public health, desired goals can be achieved. This necessitates countries to adopt a multidisciplinary approach both in terms of health and from social and economic perspectives. Inequality in terms of responsibilities among institutions included in

the health delivery plan can hinder the goals of public health. Similarly, the unequal provision of services to the entire community can lead to adverse situations in public health. All of these approaches should be considered as a threat to humanity with different consequences from small communities to the global scale.

The concept of inequality, which is expected to lead to negative outcomes, is of particular importance in public health and needs to be defined. Health inequality is the occurrence of preventable and unacceptable deteriorations in the health of individuals/societies due to various reasons. According to the World Health Organization (WHO), the key determinants of health inequality are income, education, occupation, social class, and gender [4]. Healthcare service disparities and social inequalities should be evaluated as a whole, and outcomes resulting from uncontrollable factors, such as age and gender, should be described as "differences" in health rather than "inequalities" [5, 6]. These definitions are of great importance in determining service delivery. For example, differences arising from the characteristics of the female gender also change the health services provided for them. The principle of "equality" should be adopted when providing the health conditions necessary for a healthy birth to all female genders, and there should be "difference" in terms of the services offered to the male gender in terms of the type of service.

Concepts of difference and inequality can be affected by factors such as demographic structures, historical structures, and development levels of countries. Health-related expectations consist of combinations of all these factors. Underdeveloped countries cannot act independently in the field of health as in every field. Countries whose resources were once exploited by other countries have still not achieved their development and demographic transformation today. These countries are in the first phase of demographic transformation and life expectancy at birth is short and infant mortality rates are high. In these countries, health-related expectations are mostly about childhood services and measures to prolong life. In developed countries, the last phase of demographic transformation is experienced and life expectancy at birth is 80 years and above. In such societies, there is a greater need for health services for old age or healthy aging.

Dahlgren and Whitehead's influential health determinants on health inequalities are depicted in a rainbow model [7]. According to this model, the factors influencing health are diverse, encompassing individual lifestyle choices, community influences, living and working conditions, and broader social circumstances.

Studies on the determinants of health can vary around different and common components. In essence, these components should be classified to formulate health delivery policies accurately. Some studies classify them as "social determinants and healthcare services," while others categorize them as "modifiable and non-modifiable factors" [6].

In the field of public health, when evaluating health inequalities, the first step is to embrace the idea that health is a fundamental right for everyone, and individuals have equal rights to access healthcare services with more services provided to those in need. With this understanding, the components of an effective healthcare system include finance, organization, management, and policy.

Finance is one of the fundamental components of the healthcare system. Different countries provide healthcare services with various financing models. The proportion of a country's income allocated to healthcare or the total amount of money spent on healthcare is closely related to health indicators. It is important to note that free primary healthcare services should cover the entire population. For example, when essential primary healthcare services, such as immunization services, are not

provided to the entire population, the desired level of effectiveness is not achieved, leading to increased healthcare costs. In areas where vaccination is incomplete or vaccine refusal is high, preventable diseases, such as measles, may see an increase in prevalence, especially among high-risk groups.

The organization of healthcare services and the management model derived from it, when tailored to the needs of communities, will yield meaningful results in terms of public health. This can be illustrated with an example from Turkey's healthcare history. In the early 1900s, a vertical organization model was adopted for healthcare management, and dispensaries were established to combat common and deadly diseases. In the early 2000s, a horizontal organization model was embraced, and approaches suitable for the demographic structure and prevalent diseases were adopted. Starting in 2005, screening programs covering the entire population were initiated for diseases with a high prevalence and for which treatment is possible when detected. Additionally, all individuals under the age of 18 began to be evaluated under general health insurance. Innovations in the field of health have shown themselves with interesting results in the country. For example, with the new vaccines added to the vaccination calendar, there has been a dramatic decrease in some diseases (**Figure 1**) [8].

When the evaluation and provision of services are extended to the entire population, health indicators show positive changes. Providing equal and more services to individuals and the community in the field of public health raises the overall level of health. Could a service that was not spread throughout the society still produce the same results?

After achieving equality in healthcare through the components of the healthcare system, equality should also be applied to the social determinants of health. Social determinants of health should be evaluated across a wide spectrum of factors affecting health. It should be remembered that even the most effective healthcare system will face failure in health indicators if an appropriate social environment is not provided. At this stage, the first step in achieving equal and just healthcare for the public should be to understand the community in all its dimensions. While understanding the community, factors, such as needs, behaviors, social norms, and cultural structures, should be analyzed, and concrete criteria, such as health literacy, should be utilized. Otherwise, services provided without a thorough understanding of communities will not be effective. For example, the use of products containing

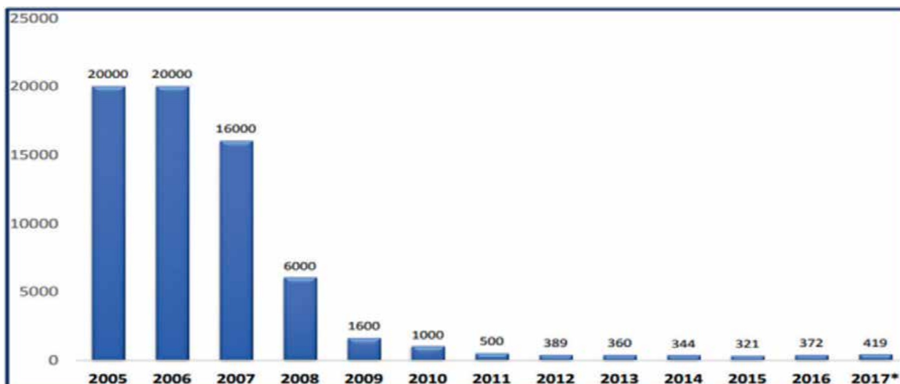


Figure 1.
Number of reported mumps cases (2005–2017) [8].

pork derivatives in medical treatments and vaccines is against religious beliefs in Muslim communities, and such products would not be preferred, making it difficult to achieve effective results in vaccination programs. To avoid such situations, international organizations or nongovernmental organizations can be used to determine needs. In order to prevent the disruption of vaccination services in Muslim-majority countries, the Organization of Islamic Cooperation issued an international fatwa. It has paved the way for vaccination when necessary for health, even if it contains pork additives [9]. Perhaps the question we should not be asking, especially for civilians killed or denied healthcare in war zones. "How can internationally recognized bodies be better used to advocate or protect fundamental health rights?"

Among the social determinants of health, income level, education level, individual behavioral traits, geographic conditions, workplace factors, employment status, environmental health, and political approaches are considered fundamental. These are the headings that communities and countries should consider when implementing the principle of health equality. Taking these factors into account, the United Nations established the "Sustainable Development Goals" in 2015, aiming to achieve them by 2030 [10]. All of these goals contain concepts that may affect human health. When all targets are implemented equally and in an integrated manner, concrete steps can be taken toward human health. Fighting hunger and poverty is one of the basic needs of health, and it should be provided more to everyone who needs it equally. The indispensable nature of protecting and improving health can be achieved by providing qualified education to all humanity. In addition, in order to prevent inequality in health, policymakers must be equipped with quality education. Clean and drinkable water is the basic building block of health and development. Access to clean water for all humanity, without exception, is one of the fundamental human rights. Sustainable, clean energy, and other sustainable development goals aim to provide a clean infrastructure and environment to protect human health. Presenting all these goals within the framework of the principle of equality will ensure success in health. Among these goals, the third goal, which specifically focuses on health, and its sub-steps are discussed below. The third goal among these is the "good health and well-being goal," consisting of nine main targets and four sub-targets [11].

The first target in the field of health is to reduce the global maternal mortality ratio to less than 70 per 100,000 live births. It is noteworthy that the first health target is identified as a special group in terms of gender and age. From a public health perspective, the significance of maternal mortality as an important indicator among health indicators highlights the importance of the issue. To achieve success in this regard, countries should prioritize premarital screenings, family counseling, and contraception services. Subsequently, services related to planning and maintaining a healthy pregnancy, such as pregnancy monitoring and checkups, as well as screenings for fetal anomalies, should be provided [11]. To ensure a healthy pregnancy concludes with a healthy childbirth, it is necessary to provide suitable conditions (such as all pregnant women giving birth with the assistance of a healthcare professional and providing lodging services for those residing in areas with difficult access to healthcare facilities during the period close to childbirth) [12]. The postpartum period, which includes the 40 days following childbirth and should be controlled irrespective of the mother's risky condition, requires regular health checkups for the mother. Maternal deaths can be direct, indirect, or accidental. To provide services related to maternal mortality without allowing health inequality, the existing pregnancy conditions should be established for all pregnant women worldwide. Conditions that directly lead to maternal deaths should be determined country-wise, and policies should be developed

to address these causes. The most common direct cause of maternal death is known as "hemorrhage." To prevent deaths due to hemorrhage, it is necessary to provide services with trained healthcare professionals who use appropriate techniques during antenatal, childbirth, and postpartum periods. Another common cause is "eclampsia/preeclampsia." For this cause, blood pressure monitoring during pregnancy, dietary measures to control salt intake, and increasing the health literacy of expectant mothers for effective implementation would be appropriate approaches. Actions should be planned for the existence of other causes that may vary from country to country. Efforts should be made to provide the necessary food and services to communities and countries where pregnant women are at risk due to inadequate nutrition. The inequality in terms of maternal mortality between countries is strikingly presented as the maternal mortality rates of the countries in 2019 are shown (**Figure 2**) [13].

Ensuring that mothers, who are one of the most important groups in terms of public health, have equal opportunities worldwide is crucial for the healthy and quality lives of future generations.

In the second target of the Global Goals "good health and well-being" goal, it is stated that by 2030, reduce the neonatal mortality rate to at least as low as 12 per 1000 live births, and under-5 mortality rate to at least as low as 25 per 1000 live births in all countries. Children are the most vulnerable and affected group when it comes to health inequalities worldwide. When equal healthcare is provided, mothers and children are the groups that benefit the most. Therefore, one of the most important indicators among a country's health indicators is the infant mortality rate. The infant mortality rate indicates how many of 1000 live-born babies die within a year. Since childbirth can occur anywhere in the world, the infant mortality rate is one of the most crucial indicators in assessing health inequality. When countries do not provide equal and inclusive healthcare services to the entire population, there will be disparities in the distribution of maternal and infant deaths. It would be appropriate to make assessments by conducting relevant surveys to evaluate the provision of equal services to the entire country. Other health indicators considered alongside the infant mortality rate include perinatal mortality rate, neonatal mortality rate, and under-5 child mortality rate. According to the United Nations, the global average infant mortality

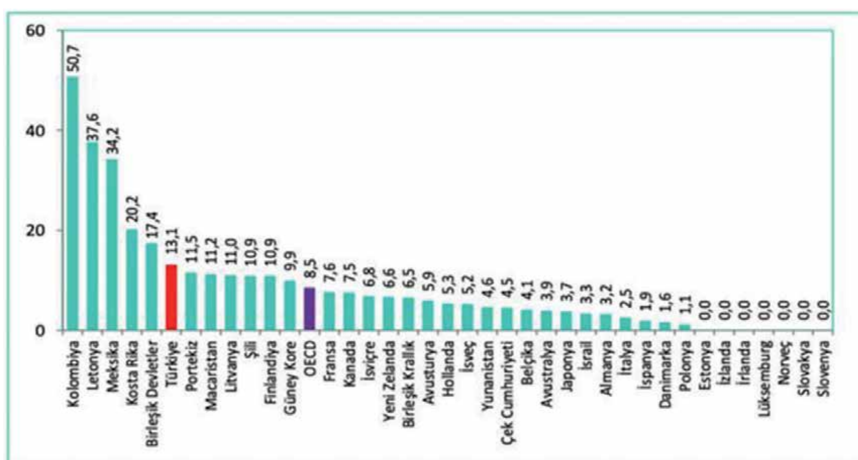


Figure 2.
Maternal mortality rates by country, 2019 [13].

rate is 49.4, and the under-5 child mortality rate is 73.7. While the World Health Organization (WHO) counts every baby showing signs of life at birth as a live birth, some countries apply their own standards [14].

As the level of development in countries increases, a decrease in under-5 child mortality rates is observed. It is evident that infant deaths are related to the opportunities in healthcare service delivery. Therefore, a significant portion of the consequences related to health inequality concern infants and children. Studies on this topic are also mentioned in UNICEF reports. According to the report, maternal deaths in sub-Saharan Africa are 50 times higher than the global average for women, and infants in the same region are 10 times more likely to die within the first month following birth compared to high-income countries [15]. To address health inequalities related to this issue, it is essential to focus on groups at risk, identify the global support needs of affected countries, and organize collaborative assistance. Approaches aimed at addressing the causes of deaths should also be adopted.

Another crucial issue regarding health inequalities is the fight against infectious diseases, as specified in Goal 3 of good health and well-being. High rates of deaths due to infectious diseases are still observed worldwide, especially in low-income countries. Ending the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases and combating hepatitis, water-borne diseases, and other infectious diseases are part of the Sustainable Development Goals by 2030. Infectious diseases, one of the most significant public health concerns, are affected much more by disparities in healthcare service delivery.

There are three fundamental methods for preventing infectious diseases. The first is to eliminate the pathogen at its source, the second is to take measures against the mode of transmission, and the third is to protect or prepare susceptible individuals. The combined application of these methods will lead to success in the fight against infectious diseases. Measures aimed at eliminating the source of infectious diseases are often related to environmental health issues. Healthy cities, adequate water and food sanitation, healthy housing conditions, personal hygiene education, and conditions are essential for preventing transmission. Ensuring access to clean and safe food and water is a common human need and a fundamental right for all humanity. The deadly consequences of health inequalities in this area continue to be alarming in today's world.

Another crucial method of prevention concerning infectious diseases is the development of protective measures against the mode of transmission and teaching individuals these measures through appropriate health education. For airborne diseases, it is essential to provide individuals with the necessary health knowledge and protective equipment for prevention. To prevent diseases transmitted through the fecal-oral route, disinfection of water and food and facilitation of access to clean and safe food and water are necessary. Food sanitation and proper cold chain practices should be provided to individuals in the food industry through health education, and regular health checkups should be conducted for workers in this sector. For sexually transmitted diseases, individuals should be informed, and equal, accessible, and free family planning services should be offered.

One of the most critical steps in preventing infectious diseases is the delivery of vaccination services. Especially for diseases preventable by vaccines, equal opportunities should be provided to all countries. Throughout world history, humanity has only achieved victory against a single virus, smallpox, thanks to vaccination services. Despite advances in technology and countless microorganisms, the fact that only one virus has been eradicated highlights the inadequate and unequal provision

of immunization services. Studies show that in societies with low income and inadequate social structure, the possibility of contracting the virus is higher in the presence of an infectious disease [16]. The most recent examples on the subject can be given from the COVID-19 period. While the disease burden has been reported to be higher in blacks, Latin Americans, immigrants, and Native Americans compared to whites in the USA, it has been reported that deaths due to COVID-19 are higher in people of Asian origin, blacks, and ethnic minority groups compared to whites in the UK [17]. For these reasons, the provision of vaccination services, especially for underdeveloped countries, should be free and cover all individuals.

When it comes to health priorities, particularly primary healthcare services, successful results can be achieved when they are applied equally and sustainably in all countries and communities.

Rehabilitation services are indeed of great importance in public health. These services are essential for disabled individuals and the elderly population, and their availability and scope can vary depending on the demographic structure of countries [18]. The increasing elderly population in developed countries has also affected healthcare service priorities [19, 20]. Desired outcomes can be achieved when healthy aging and treatment and rehabilitation services during the elderly period are applied equally to all individuals. While elderly control programs are more effectively implemented in developed countries worldwide, infrastructure efforts related to this issue are insufficient in less developed countries. Establishing a common infrastructure for providing suitable services for the elderly in all countries around the world will be an important step in addressing the inequality related to this matter.

Rehabilitation services for disabled individuals also vary depending on the level of development of countries. Inequality is not only limited to rehabilitation services alone but is also observed in areas such as healthy cities, disabled-friendly architectural structures, and public services [21, 22].

3. Conclusion

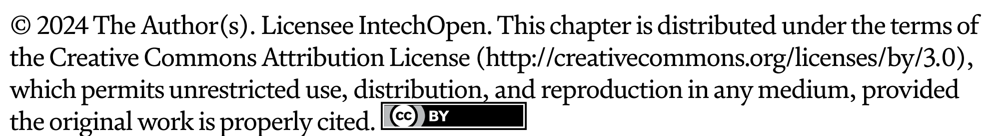
In conclusion, healthcare inequality is observed worldwide in all matters concerning public health. When countries formulate their health policies, they should plan in a way that eliminates all these inequalities. When making these international-level plans, the current situation of less developed countries must be taken into account. Measures that will eliminate inequalities for the benefit of individuals and all global communities should be urgently implemented.

We must know that no country will be able to reach the desired level of health unless all people receive equal health care. Equality is equality when it is applied always, everywhere, and toward everyone.

Author details

Esra Daharlı
Yakutiye Health Department, Erzurum, Turkey

*Address all correspondence to: e.c.daharli2012@gmail.com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Chapter 7

Perspective Chapter: Climate Change and Health Inequities

Shaneeta Johnson, Kimberly D. Williams, Brianna Clark, Earl Stewart Jr, Clarissa Peyton and Cynthia Johnson

Abstract

Climate change poses an imminent danger to health and humanity. Climate change via the drivers of rising temperatures, increasing natural disasters, rising sea levels, and air pollution pose significant challenges for the healthcare system and negatively impact patient health. These health risks include increased temperature-related morbidity and mortality, air-pollution-related health effects, and frailty due to respiratory and cardiovascular impacts from heat and weather events. Increased adverse birth outcomes have also been associated with climate change. Urbanization, exposure to increased heat levels, and exposure to increased natural disasters and extreme weather events also lead to higher levels of injury and mortality, increased health system trauma burden, and increased demand on the healthcare system's capacity. While all populations are impacted by climate change, vulnerable populations are disproportionately at risk. The impact on global health will be tremendous unless significant action is taken to reduce carbon emissions and curtail climate change.

Keywords: environmental justice, climate change, health equity, social determinants of health, political determinants of health, intersectionality, climate vulnerability

1. Introduction

Climate change has been described as a fundamental threat to human health [1]. It has a far-reaching impact and has been identified as a global threat to humanity in the 21st century. The health of the planet plays a role in sustaining human health. Dr. Margaret Chan, Director General, World Health Organization, stated, "A ruined planet cannot sustain human lives in good health [2]."

Climate change poses an imminent danger to humanity, and the discussion on its impact on population health outcomes can no longer be postponed. The World Health Organization (WHO) estimates that climate change will cause an additional 250,000 deaths per year from malnutrition, malaria, diarrhea, and heat stress alone [1]. Additionally, the direct damage costs to health are projected to be between US$2–4 billion annually by 2030 [1].

All populations and communities are affected by climate change, but vulnerable populations are disproportionately at risk [3]. In a 2018 report, the WHO stated that "climate change is the greatest threat to global health in the 21st century" and that "vulnerable populations, including children, pregnant women, and the elderly, are most at risk" [4]. This increased risk is compounded by the integration of structural racism into the built environment within the United States, which exacerbates existing inequities in the social, political, and ecological determinants of health [5, 6].

The health industry significantly contributes to the global carbon footprint, accounting for nearly 5% of greenhouse gas emissions [7]. The US health sector contributes substantially to the climate crisis, responsible for 8.5% of US greenhouse gas emissions [7]. This impact of healthcare on the climate crisis has prompted leading healthcare organizations globally to address the impact of the healthcare sector on climate change and climate change's impact on the health of the global population [8, 9].

While several well-known examples exist in US history of the disparate and unequal valuation of specific communities, there are also examples related to the impact of climate change on marginalized and vulnerable populations [10]. Redlining and other racist practices have disproportionately increased heat exposure, heat islands, air pollution, asthma, premature birth, and other health sequelae for communities of color and other marginalized populations [10–12]. The increased impact of natural disasters on communities of color, such as in the aftermath of Hurricane Katrina in New Orleans and Hurricane Maria in Puerto Rico has been reported [11]. Such examples further reinforce the critical roles of equitable policies in combating racism and environmental and social injustices.

1.1 Climate vulnerability

Climate vulnerability explains the sliding scale of impact individuals and communities have during climate health crises based on the level of privilege society has provided them [13]. The climate health crisis impacts all persons; however, some communities are impacted more immediately and severely than others. Individuals seen as being at the top of the racial-ethnic caste are generally allocated privileges of access and believability when voicing concerns for their safety [14]. This sliding scale of believability and privilege translates into less vulnerable or privileged populations having larger public health budgets and financial resources in general to educate and prevent catastrophic outcomes. These resources directly translate into community capacity and intragroup efficacy in these groups with intersectional privilege.

1.2 Socioeconomic status

Socioeconomic status refers to the income level a family or individual has access to in relation to the cost of living and their family size. Having financial freedom and being at a higher socioeconomic status allows individuals the freedom to proactively plan for climate change challenges and relocate to locations that have more resilience and capacity to combat climate change. For example, a study completed in Southern Nevada found that communities with lower incomes live in areas with a lower cost of living. In some cases, exposure to mold and pest infestations exacerbate asthma. Exposure to Radon and asbestos can increase the risk of lung cancer. These communities that have close proximity to pulmonary aggravating factors may also have less access to medical care and less financial investment in public health strategies. Often, persons and families of lower socioeconomic status feel less empowered to

DOI: http://dx.doi.org/10.5772/intechopen.1004280

report concerns or self-advocate due to the power differential created between the owners, those financially profiting from the land use, and themselves, the renters. Persons with low socioeconomic status often do not have a lack of awareness of the environment and climate change. Still, they are hyper-aware of the retaliation present when speaking out about the state of their living environment, such as increasing rent prices and nonrenewal of leases without an alternative living situation, if they voice their concerns [15].

One example of the socioeconomic status and power dynamic struggle is the impact of oil and gas companies on rural communities. Often, oil and gas extraction occurs in lower-income communities. These communities can be exposed to poor water quality, fracking earthquakes, and unpleasant smells [16]. These factors make the surrounding community less likely to house wealthy persons with social capital. However, the oil and gas industry can provide a source of immediate income for those living in proximity to the extractive process. The steep financial gradient between the oil and gas industry and people cohabiting in the same space with the industry can make a tempting scenario for community members to accept the immediate benefit of affordable living costs for the perceived delayed risk of adverse health outcomes.

1.3 Intersectionality

The ability of an individual or community to occupy more than one identity is described as intersectionality [17]. Often, intersectionality is used to describe various marginalized communities that one identifies with. Understanding these multiple intersections can provide a more comprehensive understanding of the social, political, and ecological determinants of health's impact on community and individual health. Viewing the impact of climate change through the lens of intersectionality helps the climate clinician better understand who is impacted the most and to what degree by climate change. Hurricane Katrina, which first struck on August 29, 2005, on the United States Gulf Coast, negatively impacted lower-income Black communities. The inadequate emergency response system and severity of the hurricane, category 5, resulted in significant structural damage, delayed access to emergency services, and significant loss of life [18]. As the catastrophic event made headline news, some religious organizations blamed LGBTQIA+ populations for causing the event, and adequate shelter considerations were not provided for transgender and gender non-conforming individuals. Inadequate evacuation plans and accessibility made it challenging for persons with disabilities to evacuate from the area [19]. The lack of planning caused limited access to medications and medical devices that were medically necessary for some individuals living in the impacted area.

When viewed in silos, each marginalized population faced unique challenges in combating the challenges of climate change and the fallout from Hurricane Katrina. In reality, many of those impacted were not siloed into one marginalized identity but lived in the intersection of multiple marginalized identities. Understanding the intersections of marginalized populations helps the climate clinician understand climate vulnerability. Often, populations and individuals who live within the intersectionality of multiple marginalized identities lack the access and resources to quickly adapt to a climate change event and prepare for impending events. The lack of a robust response by these communities lies not in a lack of desire or understanding of the implications of climate change in the community but in the health inequities that exist and have a catastrophic impact during climate change events.

Lack of planning can also leave vulnerable populations, such as infants, without access to safe nutrition. Communities that lack adequate lactation and breastfeeding plans can leave infants under 6 months of age vulnerable to nonpotable water and infections more common in formula feeds when appropriate planning for vulnerable populations is not considered [20]. Research is needed to elucidate the impact of intersectionality on marginalized communities fully. An example of a toolkit to incorporate intersectional gender perspective into implementation research projects is the Tropical Disease Research (TDR) Implementation Research Toolkit [21]. The TDR is co-sponsored by the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), the World Bank, and the World Health Organization [22].

2. Environmental justice

Environmental Justice has been described by Dr. Robert Bullard, considered the "Father of Environmental Justice," as "the principle that all people and communities have a right to equal protection and equal enforcement of environmental laws and regulations" [23]. Environmental justice refers to the fact that there is a disproportionate impact and burden of environmental risks, including climate change and air pollution, on vulnerable and frontline populations such as low socio-economic households and communities of color. The intersectionality of these marginalized groups may serve to worsen their disproportionate burden of climate change and its impact. The American Public Health Association describes environmental racism as any environmental policy, practice, or directive that disproportionately affects or disadvantages individuals, groups, or communities based on race or color [24].

Historical policies such as redlining in the United States have harmed Black Indigenous and People of Color (BIPOC) communities. Redlining policies codified segregation and unequal distribution of funds to different neighborhoods across a community [25]. Additionally, redlining policies restricted BIPOC families from living in certain neighborhoods and accessing resources to build capital in their community, such as home loans. Today, the impact of redlining allows for hazardous chemicals, unfavorable plant processing operations, waste disposal, and limited green spaces to occur near BIPOC communities. In a practical sense, this means that aside from overt racial discrimination, these marginalized communities are suffering from a lack of climate change resilience due to policies that often predate their existence. That is, the policies created when their grandparents were attempting to buy homes and build communities in a post-World War II era are still driving health outcomes for the community's inhabitants today.

A study by Hsu et al. found that the average person of color in the United States lives in a census tract with higher surface heat than non-Hispanic whites in all but 6 of the 175 largest urbanized areas in the continental United States [26]. This was also demonstrated for people living in households below the poverty line, compared to those at more than two times the poverty line.

Heat islands are urban areas with higher temperatures compared to surrounding areas. They are also associated with a lack of green spaces. Higher percentages of Black and Hispanic people reside in these heat islands in the US South, Southwest, and West and are projected to experience more extreme heat.

The construction of the modern United States highway system is another example of environmental racism. A majority of these highways were constructed through

frontline communities of color and low-income communities, which lead to increased exposure to traffic and air pollution and disruption and destruction of these neighborhoods [27]. A study of transportation-related fine particulate matter air pollution in the Northeast and Mid-Atlantic found that communities of color breathe 66% more of it from vehicles than white residents [28].

Air pollution exposure also demonstrates an unequal and disproportionate impact on frontline communities. Factories are more likely to be placed in poor and underserved communities. These vulnerable communities are more likely to live near polluting power plants and hazardous facilities. They are also more likely to experience cumulative adverse health effects from exposure to pollutants. Additionally, studies demonstrate an increased impact of air pollution on maternal mortality in women of color.

2.1 Historical context of environmental injustices

Environmental injustice within Black and Brown communities have been demonstrated over 40 years of research which shows that these communities experience the worst environmental pollution and degradation [29, 30]. Over this time, these same communities continue to experience the greatest impact of "climate-change fueled risks like hurricanes, flooding, vector-borne illness, and wildfires" [30]. Although the start of the environmental justice movement needs to be clarified, the first documented research on environmental injustice was captured by Dr. Bullard in the 1970s [30]. When residents of a Black middle-class neighborhood in Houston, Texas, learned that the state planned to permit a solid-waste facility in their community, they determined that further investigation was needed [5]. Dr. Bullard found that over 80 percent of the city's waste—was indeed situated in Black neighborhoods, while only 25 percent of Houston's population were Black [30]. Local groups nationwide have similarly complained about inequitable land uses for decades [5].

"In the 1980s the environmental justice movement developed into a national social and racial call to action that inspired communities nationwide to seek social justice and environmental protection" [31]. Per reports, in 1982, a small, predominantly Black community in Warren County, North Carolina was identified as the host location for a hazardous waste landfill to accept PCB-contaminated soil that resulted from illegal dumping of toxic waste along roadways [29]. The state of North Carolina reportedly considered several potential sites to host the landfill and ultimately settled on the small Black community [29]. Although the Warren County protest was not successful in preventing the approval of the disposal facility, it is considered to have fostered a national start to the environmental justice movement [29]. The Toxic Waste and Race study in 1987 found that race was the most significant factor regarding the siting of toxic waste facilities with nearly 3 of every 5 African-Americans or Hispanic Americans residing in proximity to a hazardous waste site [29].

3. Health equity and health impacts of climate change

Climate change via the vectors of rising temperatures, extreme weather, increasing CO2 levels, and rising CO2 levels has a significant and wide-ranging impact on human health (**Figure 1**). Many health effects of climate change disproportionately impact frontline and vulnerable communities.

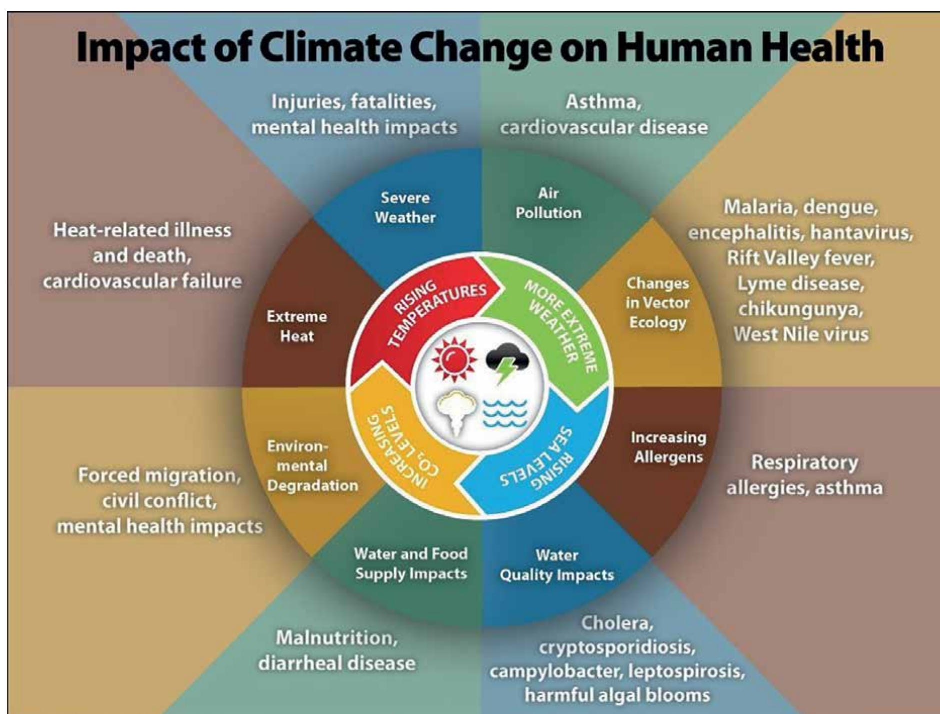

Figure 1.
Impact of climate change on human health (CDC). https://www.cdc.gov/climateandhealth/effects/default.htm [32].

3.1 Climate change exposures

3.1.1 Heat

The IPCC's sixth assessment report, published in 2021, found that human activities have caused approximately 1.1 degrees Celsius of warming from 1850 to 1900 due to greenhouse gas emissions [33]. Increasing global warming is projected to increase the number and intensity of heat extremes. Exposure to extreme heat is a significant health hazard. Those most susceptible to the health impacts of extreme heat exposure include babies and children, older adults, and people with co-existing health conditions. Heat exposure increases the risk of mortality from cardiovascular and cerebrovascular disease, with heat-related deaths in people older than 65 years of age reaching a record high in 2019 with an estimated 345,000 deaths [34].

3.1.2 Air pollution

The National Institute of Environmental Health Sciences (NIEHS) reports that air pollution accounts for 1 in 8 deaths worldwide, while data from the World Health Organization (WHO) shows that almost all of the global population (99%) breathes air with pollution levels that exceed the WHO guideline limits, with low and middle-income countries suffering from the highest exposure [35, 36]. Climate-related extreme weather events, such as worsening wildfires, also increase air pollution levels. Heat also increases ground-level ozone, a harmful air pollutant known as smog.

Ground-level ozone occurs when air pollutants such as volatile organic compounds and nitrogen oxides mix with heat and sunlight.

Those most vulnerable to the health effects of air pollution are typically those exposed to the highest levels. In the United States, this includes low-income communities and communities of color, which are more likely to be located near polluting facilities and highways. Additionally, children and older adults, as well as those with underlying health conditions such as asthma, are at an increased risk [37]. Globally, the risk is highest for those in low- and middle-income countries, with the highest mortality rates attributed to air pollution in East and South Asia and sub-Saharan Africa [38].

3.1.3 Extreme weather

The impact of natural disasters on healthcare access and healthcare is significant. This includes increased adverse birth outcomes, higher trauma burdens, mental health impacts, infrastructure damage, and burdening of the healthcare systems [39]. Mitigating these impacts through significant policy changes and evaluating the social and political determinants of health that have contributed to these inequities is paramount.

There are a significant number of natural disasters each year. In 2019, there were 396 disasters worldwide globally. These disasters were responsible for more than 11,000 deaths and affected the health of more than 95 million people [40]. The cost is significant, costing the economy billions of dollars. The most common natural disasters encountered are floods and storms, accounting for approximately 68% of the worldwide impact [40].

Extreme weather events, rainfall, wildfires, droughts, and hurricanes associated with climate change may lead to human population displacement, increased trauma burden, and increased health system burden [37] Additionally, increased fires and flooding associated with climate change can affect access to electricity supply and destroy roads and clinics, leading to the loss of needed infrastructure for delivering healthcare to vulnerable populations.

The most vulnerable patients are affected most significantly by disasters and extreme weather events, such as children, pregnant women, elderly individuals, those with limited resources, and those with chronic illnesses and allergies. Mitigating these impacts requires significant changes in policy and evaluation of the social and political determinants of health that have contributed to these inequities [41].

Often, these populations are also the most under-resourced populations who may not have the resources required for disaster mitigation strategies such as relocation or other preparation strategies. Natural disasters may also serve to worsen health disparities, as seen recently in the impact of Hurricane Katrina. Communities of color and under-resourced communities were most affected by the impact of the storm in Louisiana. The intersection of risk from extreme weather and climate events, physical hazards, the extent of exposure, the vulnerability of individuals and communities, and the capacity to prepare to manage and recover from extreme events is the central theme when viewing this through a health equity lens [40]. The placement of infrastructure and the migration of people into vulnerable regions in combination with climatological or meteorological events account for the impact of natural disasters [40].

The effects of natural disasters on health have a wide range, including heat exhaustion, traumatic injuries, respiratory illnesses due to mold from floods, and impact on perioperative care. Extreme weather events affect perioperative care by increasing the frailty of the patient. Loss of access to healthcare systems by the destruction of roads and infrastructure impacts access to medications and potentially

lifesaving healthcare. Additionally, there are increased adverse birth outcomes, higher trauma burdens, and damage and burdening of the surgical infrastructure caused by disasters and extreme weather events. Extreme weather has been associated with increased injuries, fatalities, heat-related illness, death, and cardiovascular failure. Water quality impacts include increased bacteria within water sources, decreased access to potable water, and increased vector-borne diseases related to stagnant or poor-quality water sources. Emergency evacuations also pose an extra health risk to children, older adults, disabled patients, and those who are under-resourced. Exposure to extreme weather has been demonstrated to result in injury, death, and displacement. Weather events impact power and phone lines, cause damage or destruction of homes and reduce the availability of safe food and water. They may also damage roads and bridges, impede access to medical care, and separate patients from their medications [37].

Severe weather events also have significant mental health impacts [42]. Exposure to disasters is correlated with increased stress and mental health consequences, including increased suicidal thoughts, depression, and post-traumatic stress disorder [43–45]. Cianconi, Betro, and Janiri noted the introduction of new terms such as ecoanxiety, ecopsychology, and ecological grief and that the phenomena may be transmissible to later generations. Pregnant women and postpartum women have an increased risk for severe stress and other adverse mental health outcomes associated with weather-related disasters associated with climate change. Additionally, severe maternal stress can increase the risk of adverse outcomes such as pre-term birth [46].

3.2 Global impact of climate change on worsening health inequities

Climate change, however, has a global impact and contributes to global health inequities. Record temperatures have been seen globally. In 2020, it was estimated that there were 3.1 billion more person-days of heatwave exposure in persons 65 years and older [34]. Additionally, there were an estimated 626 million more person-days of heatwave exposure in children younger than 1 year [34]. The most affected populations are the socially disadvantaged, elderly, and youth populations. Populations in countries with low and medium levels of the UN-defined human development index show the highest increase in heat vulnerability in the past 30 years. Those risks were worsened by the lower availability of cooling mechanisms and green space [34].

Rising average temperatures and altered rainfall patterns also worsen food and water insecurities, affecting underserved populations globally. In any month in 2020, it was estimated that up to 19% of the global land surface was affected by extreme drought. This impacted the yield potential of major crops and worsens the risk of food insecurity. Additionally, malnutrition risks rise, significantly impacting the population's health [34]. Climate change impacts food insecurity and plays a role in decreasing maternal and infant health. Increased heat and extended drought lead to crop failures and unstable crop yields, further contributing to malnutrition, low birth-weight infants, increased disease burden, and decreased maternal energy [47].

3.3 Health impacts of climate change

The existing inequities and vulnerabilities of specific populations expose these populations to disproportionate risks (**Table 1**). Health impacts by climate change vectors include:

Health Impact	Climate Change Vector/Exposure Pathway	Inequities/Vulnerable populations
Heat-related illness (heat stroke, heat exhaustion, etc.)	Heat	Elderly, children, lower socio-economic populations, farm workers, student athletes
Cardiac Diseases (myocardial infarction, stroke, atherosclerotic plaque disease etc.)	Heat Air Pollution	Elderly, children
Kidney Disease	Heat	Agricultural workers, End-stage renal disease
Mental Health (Depression, Anxiety, Violence, PTSD, Suicide)	Heat Extreme Weather	Underlying mental health conditions, pregnant women, children, migrants, refugees, elderly, low-socioeconomic populations, first responders
Allergies and Respiratory Health (Asthma, Lung Cancer, etc.)	Air Pollution Heat	Low socioeconomic populations, proximity to highways and factories, underlying respiratory illnesses (e.g., COPD, Asthma)
Pregnancy and Infant Risks (Preterm labor, low-birth weight, etc.)	Air Pollution Heat Extreme Weather Vector Disease Transmission	Living near highways and/or factories, low-income communities, communities of color, poor access to care
Infectious Disease (increased disease transmission, increased water-borne infectious diseases)	Heat Extreme Weather (Flooding, Drought)	Low-socioeconomic populations, coastal communities
Food and Water Insecurity	Heat	Women, rural communities, low-income global communities
Disruptions to care (Decreased access to care, disruption in access to care and medications, power disruption etc.)	Natural disasters (Wildfires, hurricanes, flooding)	Elderly, chronically ill, lower socio-economic populations, poor access to care populations

Table 1.
Health impacts via climate change and inequities and vulnerable populations.

3.3.1 Heat-related illness

Heat-related illnesses cover a wide range of health consequences, from dehydration to heat stroke. Heat stroke, one of the most hazardous health conditions, occurs if the body temperature rises to about 104°F (40°C) [48]. Heat stroke is characterized by central nervous system dysfunction (damage to the brain), as well as multiorgan failure, including damage to the heart, kidneys, and muscles. Heat stroke is most likely to impact the elderly, whose ability to adjust physiologically to heat stress is diminished. Young children are also at high risk due to multiple factors, including their high ratio of surface area to mass (which leads to an increased heat-absorption rate) and their lower sweating rate (used to dissipate heat).

3.3.2 Cardiac disease

Both heat exposure and air pollution pose a risk to cardiovascular health [49]. Thermal stress and air pollution cause acute and chronic physiologic changes within

the circulatory system, increasing inflammation and cardiovascular demand [50]. The stress on the cardiovascular system increases blood pressure, impairs clotting responses, and predisposes vulnerable individuals to atherosclerotic plaque rupture, which can result in a heart attack or stroke [39].

3.3.3 Kidney disease

Extreme heat exposure increases the risk of developing kidney stones and kidney injury [51]. Chronic kidney injuries are increasingly occurring in agricultural workers in low- and middle-income countries, likely associated with occupational heat stress exposure. In addition, heat can exacerbate underlying medical conditions, with a recent study showing that for those who already have end-stage renal disease, extreme heat exposure increases the risk of same-day hospital admission and mortality [52].

3.3.4 Mental health

The mental health impacts of heat exposure include increased depression and anxiety, violence, and post-traumatic stress disorder after climate-fueled natural disasters [53]. There is a higher rate of suicide associated with extreme heat, with one study finding that during periods of 1°C increase over the average monthly temperatures, suicide rates increased by 0.7% in the United States and by 2.1% in Mexico [54]. Elevated temperatures have also been shown to increase rates of interpersonal and intergroup violence, which can result in increased trauma both to oneself and to others [55]. In addition, heat exposure can negatively impact cognitive function and sleep quality [56, 57].

The most vulnerable include people with underlying mental health conditions, women who are pregnant (especially postpartum women), children, migrants and refugees, those of low socioeconomic status, and the elderly [44]. In addition, first responders to climate-related natural disasters also experience significantly higher rates of adverse psychological effects [58].

3.3.5 Allergies and respiratory health

Air pollution is a well-studied risk to respiratory health [59]. Those with underlying health conditions, such as chronic obstructive pulmonary disease and asthma, are most at risk, as well as those populations who are exposed to levels higher than recommended by the WHO. Air pollutants, from particulate matter to ozone, cause both acute inflammation and chronic lung changes, with health consequences of worsening asthma exacerbations, lung remodeling, and increased risk of lung cancer.

In addition, warming temperatures, changing precipitation patterns, and higher atmospheric carbon dioxide levels impact allergic respiratory diseases and asthma [60]. Climate change alters pollen allergies by affecting where plants and trees are able to grow, how long their season of growth is, and how much pollen there is in the atmosphere. In North America, the environmental allergy season is approximately 20% longer than 30 years ago, with about 21% more pollen in the air [61].

3.3.6 Infectious diseases

Warmer temperatures and changing precipitation patterns have widespread consequences on the spread and transmissibility of different types of infectious diseases,

most notably vector-transmitted diseases [62]. For example, climate impacts can alter the geographical range for diseases such as malaria and dengue while contributing to an expanded range for certain vector-borne diseases, such as Zika virus [63]. Changes in sea surface temperature and salinity due to climate change have increased the suitability of conditions for Vibrio bacteria in certain regions, which can cause gastroenteritis, life-threatening cholera, and sepsis [31]. In addition, climate-related disasters, such as increased flooding and worsening drought, also increase the risk of water-borne infectious diseases such as cryptosporidium [64].

3.3.7 Pregnancy risks

Pregnant women are considered one of the most vulnerable populations to the impacts of global warming and air pollution, with risks both to the mother and to the infant [65]. An extensive systematic review published in 2020 showed that pregnant women exposed to elevated levels of ozone or fine particulate matter had an increased risk of preterm birth in 79% of studies and low birth weight babies in 86% of studies [66]. These risks were highest in minority groups, especially black mothers. In addition, women living in neighborhoods near polluting facilities and highways, most commonly found in low-income areas and communities of color, are at higher risk due to the higher level of air pollutants [24].

3.3.8 Food and water security

Food insecurity is increasing globally, affecting two billion people in 2019 [34]. Climate change threatens to exacerbate this global crisis, with rising temperatures shortening the time for crops to reach maturity, leading to reduced seed yield potential and further straining food systems worldwide. Reductions in time to maturity are observed in many staple crops, including maize, winter wheat, soybean, and rice. Worldwide, women play a key role in food security, and these climate-related changes pose an increased risk, especially for rural women and those in low-income global communities.

3.3.9 Disruptions to care

Climate change contributes to an increased frequency and intensity of many types of natural disasters, from wildfires to hurricanes to flooding. These intensified natural disasters pose a risk to healthcare delivery by disrupting access to medical care for those in need and potentially disrupting the healthcare facility's infrastructure [67]. In addition, in the wake of a climate disaster, healthcare facilities globally are vulnerable to disruptions in power and service, with needs from electricity to waste disposal to access to food service delivery at risk [68].

4. Localized case studies and mental health impacts

4.1 Hurricane Sandy

On October 29th 2012, New York and New Jersey were slammed with a superstorm that had been brewing and inflicting damage on various coastal areas for the past few days, Hurricane Sandy. The two states were confronted with high winds with upwards

of 80 mph and a barrage of rainfall and flooding, reaching heights of over 13 feet [69]. At Bellevue Hospital in New York following the storm, the hospital evacuated high-risk patients, however, it attempted to keep running on a generator before it became clear after roughly a day, that the damage to essential resources, such as water tanks, was more extensive than initially realized [70]. There was no choice but to evacuate the remaining patients to various available hospitals in better conditions nearby. Therefore, a total of 500 patients needed to be transferred from the hospital [71].

Flooding and power outages presented a set of unique issues for psychiatric patients in the aftermath of Hurricane Sandy at Bellevue and for several psychiatrists working in hospitals or the communities in the greater affected regions of New York and New Jersey. For example, psychiatry residents were recruited to assist by serving as couriers of food, medicine, and fuel up several flights of stairs and by moving discharged patients out of Bellevue. Outside of New York, Dr. Charles Ciolino, a psychiatrist and chair of the New Jersey Psychiatric Association's Disaster Preparedness Committee, described the effects on psychiatric patients. This included an increase and exacerbation of anxiety disorders and addiction relapse, and the advent of problems such as coping with storm-related physical injuries, and difficulty obtaining psychotropic medications due to pharmacies also lacking power and experiencing flooding [72]. Not only were patients with pre-existing mental health disorders and those with psychotropic medicational needs adversely impacted, but other vulnerable populations saw an increase in adverse mental health impacts. A study evaluating any correlations between power outages and mental health issues during Sandy found that power outages positively correlated to mental health issues such as mood disorders, substance abuse, psychosis, and suicide. Notably, the rates of incidence were higher in lower-wealth counties such as Bronx, Kings, and New York, counties which comparably to Manhattan, experienced a longer blackout period. For example, Queens County had a 1.5-fold increase in mental health emergency department visits for every blackout increase of 1 percent, with Bronx County having a nearly 8-fold increase. Furthermore, researchers concluded that Bronx County, known for having high populations of African-American, Hispanic, and low-wealth communities, experienced a shorter blackout period than Nassau County, with a majority European-American population, but had higher adverse mental health incidences [73].

4.2 Hurricane Katrina

Hurricane Sandy is often compared to Hurricane Katrina, a hurricane that caused similar if not worse destruction and adverse impacts. Occurring a few years prior, this superstorm is known for the immediate and long-term devastating effects it had on coastal Louisiana/Mississippi regions, such as New Orleans. Like Sandy, the high winds and heavy rains brought by Hurricane Katrina caused widespread flooding, power outages, property damage, physical injuries, and death. Several people noted a disturbingly lackluster response by the federal government, including the then-mayor, Ray Nagin, who was convinced the poor response was due to racism and classism [74], considering 67% of the population of New Orleans was Black and of low socioeconomic status [75]. Therefore, some lacked the financial resources to evacuate. As a result, several citizens who were present during the storm experienced traumatic situations, such as Nia Burnett, a Black woman who was a young girl when she experienced Katrina. She recalled herself and her family attempting to take shelter at a nearby hospital, only to see corpses in bags lining the walls and the smell of dead bodies. Over a decade later, Burnett was diagnosed with post-traumatic stress disorder [76].

One risk factor for developing PTSD and other stress-related psychological disorders in the aftermath of a natural disaster is the existence of significant stressors or experiences with a previous traumatic event. Therefore, findings of studies show that ethnic minorities experience higher rates of PTSD: African Americans with rates higher than European Americans, and Hispanic/Latino Americans with the highest rates of PTSD [77]. This finding together with the previous is likely demonstrated by the daily and often compounded chronic stressors ethnic/cultural minorities and those of low economic status may experience such as racial discrimination, prejudice, family caretaking, and job strain [78].

4.3 Farmworkers and wildfires

In late Spring of 2023 in Canada, the first wildfire of the season started what would be unprecedented and have widespread effects with hundreds of fires; many reaching "megafires" status due to increasing to sizes of 39 square miles [79]. The negative health effects of wildfire smoke are known including respiratory, cardiovascular, and even neuro-cognitive, in addition to indirect mental health impacts. Unsurprisingly, those most at-risk are ethnic minorities and those of low socioeconomic status [80]. In particular, one group is farmworkers. This group of outdoor workers is often comprised of those who are ethnic minorities, of low socioeconomic status, and additionally have difficulties of limited educational proficiency [81]. Therefore, when the Canadian wildfires began to rage, farmworkers were one of the most intersectionality at-risk groups to be negatively impacted.

The mental health of farmworkers in general has been well documented, with research and advocacy addressing and evaluating the harmful conditions the vast majority of farmworkers are forced to work in. One example is exposure to pesticides. In a survey, participants who worked near Lake Apopka in 2006, reported experiencing "sadness a lot" at 38%, "nervousness for no apparent reason" at 42%, and "uncontrollable anger" at 37% [82]. Therefore, the social disadvantages and poor working conditions with the added impact of wildfires and the subsequent smoke, together with the trauma of experiencing wildfires, can lead to the development of mood disorders, such as major depressive disorder and generalized anxiety disorder, or stress-related disorders such as post-traumatic stress disorder.

5. Government and healthcare policy

Climate change is a global phenomenon that has far-reaching implications for public health. With the goal of achieving environmental justice, almost a decade later, President Bill Clinton signed the Environmental Justice Executive Order in 1994. This effort to focus Federal attention on the environmental and human health effects in low-wealth and minority communities aimed to achieve environmental justice.

The US Department of Health and Human Services (HHS) has identified climate change as a significant threat to human health, particularly for vulnerable populations [83]. The HHS Office of Climate Change and Health Equity (OCCHE) has been established to address the health impacts of climate change and promote health equity [83].

To address the health impacts of climate change, healthcare policies must prioritize health equity and ensure that vulnerable populations have access to the resources they need to adapt to the changing climate. The OCCHE has developed a referral guide summarizing resources that can address patients' social determinants of

health and mitigate health harms related to climate change [84]. The guide provides information on how to identify patients who may be at risk for climate-related health impacts and how to connect them with resources that can help [84].

In addition, the HHS has developed a Climate and Health Literacy Initiative to promote climate and health literacy among healthcare professionals and the public [83]. The initiative aims to increase awareness of the health impacts of climate change and provide healthcare professionals with the tools they need to address these impacts [83].

The Inflation Reduction Act (2022) invests billions of US dollars in climate solutions and environmental justice and is the most substantial US climate health policy to date. It is intended to build on the Bipartisan Infrastructure Law and the Justice 40 Initiative which aims to invest 40 percent of the overall benefits of climate and clean energy investments to disadvantaged communities such as low-income communities, communities of color and Tribal and Indigenous communities [84, 85]. The Act aims to reduce pollution, improve clean transit, make clean energy more affordable and accessible, and strengthen resilience to climate change via climate and environmental Justice block grants, funding for monitoring, investments at public schools in disadvantaged communities, addressing diesel emission, creating neighborhood access and equity grants, cleaning up ports, increasing solar project development, creating a clean energy and sustainability accelerator and improving the climate resilience of affordable housing. This bill is a significant step forward for US climate action and is the largest investment to address global warming in US history.

The Justice40 initiative directs federal agencies to deliver 40 percent of the climate, clean energy, affordable and sustainable housing, clean water and additional investments to disadvantaged communities. The investment represents billions of US dollars in annual investments from hundreds of federal programs being utilized to maximize the benefits to disadvantaged communities and includes programs funded or created in the President's Bipartisan Infrastructure Law. There are 13 programs at HHS covered under the Justice40 initiative including programs under the National Institutes of Health, Centers for Disease Control and the Administration for Children and Families [86, 87].

6. Healthcare systems and intersection with climate change

The healthcare industry is responsible for significant greenhouse gas emissions, which contribute to climate change. According to the American Association of Medical Colleges, the global healthcare industry is responsible for two gigatons of carbon dioxide yearly, or 4.4% of worldwide net emissions [88]. In the United States, the healthcare system is responsible for 8.5% of total greenhouse gas emissions [89]. Additionally, the indirect public health harms from greenhouse gas and additional pollutant emissions from the healthcare sector were estimated to result in the loss of 388,000 disability-adjusted life-years and provide similar health harms as that of medical errors [7].

Globally, the US healthcare emissions are the highest per capita, representing 27% of the global healthcare climate footprint [86]. The majority of healthcare emissions are indirect, or Scope 3 emissions mainly represented by the supply chain, including food, pharmaceuticals, supplies, and devices [7].

Hospitals have the highest energy intensity of all publicly funded buildings and emit 2.5 times more greenhouse gases than commercial buildings [90]. Therefore, switching to renewable energy can have a significant impact. Hospitals can also reduce their carbon footprint by improving energy efficiency, reducing waste, and using environmentally friendly products [91].

7. Interventions and initiatives for adaptation and mitigation

Climate change is real, affects the entire global community, and disproportionately impacts those considered vulnerable populations [92]. Structural changes to mitigate its effects should be aimed at understanding this basic acknowledgment toward ensuring environmental sustainability. This is where understanding climate change and furthering health equity intersect. There is no full realization of the impacts of climate change on communities without incorporating the need for equitable solutions to decrease the impacts of air pollution, fossil fuel emissions, lack of sustainable agriculture, increased flooding, inadequate plumbing and waste management, severe weather events, and heat-related illness as examples on Black Indigenous People of Color (BIPOC) and other disparately impacted groups. Everyone is at risk of the impacts of climate change, but communities of people who often experience the brunt of it lack resources to respond to it and protect themselves from it. Climate change is not a political issue. It is a substantive issue and, ergo, takes real solutions.

7.1 Adaptation and mitigation measures

Adaptation is the response to climate change that is already taking place. Mitigation is the active process of decreasing and eventually stopping the amount of greenhouse gases already in the atmosphere that cause global warming and are linked to further carbonization of the environment [93]. Adaptable and mitigating measures take place at the individual and community levels to lessen climate change and its effects, and there are actions that individual neighborhoods, households, and municipalities can take. Examples of climate adaptation include planting trees (e.g., arborization) to create cooler homes and neighborhoods, decreasing the risk of fire hazards by clearing brush, and purchasing insurance to be prepared for damage from and to rebuild after natural disasters [94]. With these efforts, priority should be focused on the most vulnerable communities, with estimated costs projected to be $300 billion by 2030 to help developing countries become more adaptable to climate change. Climate mitigation includes identifying more renewable energy sources and relying less on greenhouse gas emissions and their sources, including power plants, factories, cars, and even farms. Halting deforestation and achieving proper land use will help reach the goal of global climate neutrality by 2050, per the European Environmental Agency [95].

7.2 Advocacy and academic initiatives in the health profession

Those committed to climate advocacy are needed to both influence action and educate the general public about the implications of climate change on the global community, but missing in much of the published discourse is an increased need for physicians of color to minister to the climate change education needs of vulnerable populations, especially BIPOC communities. Physicians of color and their relationships with their patients represent an essential utility in educating those at most significant risk of the effects of climate change and the lack of environmental sustainability on health. Organizations such as the Medical Society Consortium on Climate and Health (MSCCH) and its Climate and Health Equity Fellowship (CHEF) provide intensive training for physicians of color from disparate specialties and lead the way in these efforts. Additional affiliate organizations, such as state-specific clinician advocacy groups to promote climate change education and awareness are also involved in these efforts, as the trust that patients have in their physicians is of utmost importance to ensure the

viability of such initiatives. Broadening physician understanding of how climate impacts health while providing physicians with the expertise to be advocates for policy change to lessen the impacts of climate change on health is necessary. Structural changes in medical practices and healthcare delivery systems are also crucial to increasing patient education on climate change and its impacts on health [96]. Involving physicians in meetings with legislators who make policy that impacts populations and altering medical curricula by oversight bodies such as the Accreditation Council on Graduate Medical Education and the Liaison Committee on Medical Education to improve education of medical students and physicians in training, as is being done at institutions like George Washington University's School of Medicine, are crucial to the education of a generation of clinicians who will have, further cultivate, and maintain the expertise to help populations of patients learn more about how to protect themselves from climate change [97]. Medical curricular improvements must include, toward the achievement of health equity, an understanding of how climate change overlaps with the social determinants of health, disability studies, and structural racism [98].

8. Call to action

The passage of landmark legislation such as the Inflation Reduction Act (IRA) of 2022 and the Infrastructure and Investment in Jobs Act (IIJA) of 2021 happened in the United States under the Biden administration because of an important recognition that we are living in a world where larger, wealthier countries are emitting greenhouse gases more than smaller, less industrialized nations and action is necessary to change this [85, 86]. As can be understood, climate change is a multifactorial woe and, therefore, will require a multifactorial, multi-faceted approach to stopping it. Each of us has a crucial role in decarbonizing our environment and improving our lives by ensuring the sustainability and longevity of our planet. Together, we can achieve the goal of keeping the planet's warming to less than 2 degrees Celsius [99].

As an example, power plants can switch to renewable energy options in producing cars and, in so doing, produce more and eventually only electric vehicles. Individuals, families, and businesses can purchase electric vehicles as their only mode of transportation. State and local governments can purchase those electric vehicles in the form of school busses to transport students to school. Physicians can be trained to educate patients at the point of care about how such a process lessens air pollution, reduces greenhouse gas emissions, and diminishes the burden of new-onset asthma development, increased mental illness caused by severe weather events, and heat-related illness. Legislators at the local, state, and national levels can write and pass legislation to provide tax credits to households, individuals, and businesses who purchase those electric vehicles and support physicians via reimbursement measures through health insurance who educate their patients consummately on the impacts of climate change.

This is just one example of how to employ the interdependence of all facets of society to help transform current practices and policies toward the end of stopping climate change. This example also demonstrates that though there are multiple players involved in the fight to end climate change, the individual community needs are at the center of combating climate change and its effects, and the voice of the individual community must be honored, prioritized, and respected in order for any framework to be successful [100]. We all have a role, and each role is important. Become an advocate. Join a group devoted to speaking out and effecting policy against climate change. Run for office with climate change action as a significant component of your

platform. Become more educated on the ravages of climate change on the global community and especially vulnerable populations. Learn how you can sustainably green your environment, home, and business. Realize that climate change is real, as that is where this entire process starts. Your voice matters in the global fight to save all lives and protect our planet for future generations.

9. Conclusion

Climate change and environmental justice have a significant impact on health and healthcare. The intricate interplay between climate change, environmental justice, and healthcare constitutes a multifaceted challenge reverberating across global landscapes. The vectors of climate change via exposure pathways impact the health of all populations. However, historical, political, environmental, structural, and social factors interact so that all populations are not equally affected and disproportionately burdened. The healthcare sector must employ initiatives to mitigate and adapt to counteract the impact of climate change.

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Author details

Shaneeta Johnson[1*], Kimberly D. Williams[2], Brianna Clark[3], Earl Stewart Jr[4], Clarissa Peyton[2] and Cynthia Johnson[5]

1 Morehouse School of Medicine, Atlanta, GA, USA

2 George Mason University, Fairfax, VA, USA

3 IBCLC Sunflower Lactation and Health Education LLC, Houston, Texas, USA

4 Wellstar Health System, Atlanta, Georgia, USA

5 Independent Researcher, Nassau, Bahamas

*Address all correspondence to: smjohnsonmd@aol.com

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Health Inequality - A Comprehensive Exploration is an insightful and significant work delving into the complex realm of health disparities and their multifaceted impact on society. This book skillfully bridges the gap between theoretical understanding and practical realities, presenting a holistic view of health inequality from various global perspectives. It navigates through the foundational concepts of health equity, shedding light on the intricate mechanisms that perpetuate disparities in health outcomes. The exploration extends to diverse dimensions of health inequality, including the influences of environmental factors like climate change and specific health issues such as tobacco use. The content is curated to appeal to a wide range of readers, from public health professionals and policymakers to scholars and students interested in health equity. Its multidisciplinary approach offers a unique amalgamation of perspectives, from public health to environmental sciences, making it an invaluable resource for anyone seeking to understand the complexities of health inequality in today's world. The comprehensive coverage of the book, coupled with its engaging narrative, ensures that readers not only grasp the theoretical aspects of health inequality but also understand the real-world implications. *Health Inequality - A Comprehensive Exploration* stands out as an essential read for those looking to deepen their understanding of this critical issue and its broader societal impact, positioning itself as a key resource in the ongoing conversation about achieving health equity globally.

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