

We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,100

Open access books available

149,000

International authors and editors

185M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



Chapter

Impact of Poverty on Health

Ahmad Alqassim and Maged El-Setouhy

Abstract

Poverty is not merely the absence of money but the absence of resources to get the necessities of life. Poverty and health are always in a reciprocal relationship. This relation came to light in 1948 when the WHO defined health as complete physical, mental and social wellbeing. In 1987, the Alma-Ata declaration opened the discussion on health inequity. This opened the door for thousands of projects, proposals, and publications on this relation. Although the relationship between poverty and infectious diseases was clear, there was inequity in funding. The Global Fund invests US\$ 4 billion annually for AIDS, tuberculosis, and Malaria, while other diseases lack funds. That is why they were considered neglected tropical diseases. However, the relationship between health and poverty is not limited to infectious diseases but includes noninfectious problems like malnutrition and injuries. In this chapter, we will assess the association between poverty as a predictor and health as an outcome.

Keywords: poverty, infectious diseases, malnutrition, developing countries, public health

1. Introduction

There are several definitions of poverty as a concept based on the context of the topic in which it is placed. During the World Summit on Social Development in Copenhagen in 1995, 117 countries adopted two concepts for poverty absolute and overall [1]. An ambitious global plan was proposed to eliminate absolute poverty and reduce overall poverty. Absolute poverty was defined as “a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education, and information. It depends not only on income but also on access to services.” On the other hand, overall poverty is a “lack of income and productive resources to ensure sustainable livelihoods; hunger and malnutrition; ill health; limited or lack of access to education and other basic services; increased morbidity and mortality from illness; homelessness and inadequate housing; unsafe environments and social discrimination and exclusion. It is also characterized by a lack of participation in decision-making and civil, social, and cultural life. It occurs in all countries: as mass poverty in many developing countries, pockets of poverty amid wealth in developed countries, loss of livelihoods as a result of economic recession, sudden poverty as a result of disaster or conflict, the poverty of low-wage workers, and the utter lack of people who fall outside family support systems, social institutions and safety nets.”

Every country has its concept of poverty. However, the world bank defined poverty as “Poverty is a pronounced deprivation in well-being.” [2].

Traditional poverty is a lack of essential resources for basic needs such as hygienic food, water, clothing, and shelter. However, access to health care, education, and transportation might also be included as indicators of poverty in the modern world. In general, Poverty is a state in which a community or person lacks the Necessary needs for minimal standard living in that place.

2. Global poverty lines

Each country has its own definition of poverty. The poverty line is substantially lower in poorer countries than richer ones [3]. This means that if we were to only depend on national poverty criteria for a global measure of poverty, the outcome would be a measuring framework in which a person’s place of residence would decide whether or not they were poor. Setting global poverty lines based on national definitions and applying them globally is one solution to this issue. The global Poverty Line was determined in this manner by the United Nations. The global poverty line must be frequently adjusted to account for changes in worldwide price disparities. The new global poverty line was updated to \$2.15 starting in the fall of 2022 [4]. Therefore, it is considered extreme poverty for someone to make less than \$2.15 daily.

3. Poverty facts

More than 689 million people rely on less than \$1.9 per day, while 250 million are under the global poverty line [5]. Two-thirds of the world’s poor people are children and young, while women predominate in most areas [6]. Sub-Saharan Africa sees an increase in the concentration of extreme poverty, and about a little over 40% of the local population makes less than \$1.90 each day [7]. Between 2015 and 2018, the Middle East and North Africa experienced a nearly doubling of the extreme poverty rate, from 3.8 to 7.2%, primarily due to the political conflicts in the area [8]. Between 2015 and 2018, the Middle East and North Africa experienced a nearly doubling of the extreme poverty rate, from 3.8 to 7.2%, primarily due to the political conflicts in the area [9]. Around 67% of the world’s poor people are predicted to live in unstable regions by 2030 [9]. In extreme poverty, 70% of adults over 15 either have no formal or minimal education. Around 1.3 billion people reside in 107 developing nations and experience poverty [10].

4. Poverty and health

Globally, poverty and poor health are deeply associated [11]. Disparities in politics, society, and the economy are the underlying causes of poor health among millions worldwide. Poverty is both a cause and a consequence of poor health [12]. Infectious and neglected tropical diseases affect millions of the world’s poorest and most vulnerable individuals annually [13]. Poverty is a crucial contributor to poor health and a barrier to receiving necessary medical care [14]. Financial restrictions prevent poor people from acquiring the necessities for optimal health, such as enough quantity of high-quality food and medical care. However, the relationship is also

linked to other aspects of poverty, such as a lack of knowledge about the best ways to promote health or a lack of a voice to ensure that social services are effective for them. Because they lack the knowledge, resources, or access to healthcare that would enable them to prevent and treat disease, marginalized groups and vulnerable individuals frequently suffer the most. Indigenous communities and other marginalized groups may have severe health repercussions due to reduced health care use due to cultural and social barriers, which maintain their extreme poverty levels [15]. Robust health systems protect populations from the potentially disastrous effects of out-of-pocket health care costs and enhance the entire population's health status, especially the poor, who are more likely to experience poor health and limited access to healthcare [16]. In general, the poor are disproportionately more likely to have bad health [17].

5. Ending poverty's current challenges

Globally, the number of people suffering from extreme poverty, poor people living on less than \$1.90 a day, decreased from 36% in 1990 to only 10% in 2015 [12]. For nearly 25 years, the number of poor people living on less than \$1.90 a day has been steadily declining [18]. Unfortunately, this gradual improvement was halted in 2020 by the effects of the COVID-19 pandemic [19]. The COVID-19 pandemic has swept back decades of progress in the fight against poverty. According to the World Bank, the COVID-19 pandemic pushed between 143 and 163 million people in 2021 into extreme poverty [20]. Some countries have been affected more than others. We find that countries in South Asia and Sub-Saharan Africa have suffered from new waves of high extreme poverty rates, more than previously reported [21]. These large numbers of these "new poor" will be in addition to the already 1.3 billion poor people living in extreme poverty and experiencing exacerbated life difficulties in light of the COVID-19 pandemic [22]. Poverty rates are alarmingly high, especially in developing countries that are the most vulnerable to economic risks since the onset of the COVID-19 pandemic [23]. These devastating effects on developing countries are not just due to health crises but also because of the pandemic's impact as a devastating social and economic crisis for the foreseeable future [24]. According to the United Nations Development Program, income losses are expected to exceed \$220 billion in developing countries [12]. The world's population without access to social protection is expected to reach an estimated 5% of people [25]. All this will lead to the repercussions of these losses affecting education, human rights, basic food security, and global nutrition. There is a light at the end of the tunnel due to the beginning of the recovery phase from the pandemic starting in 2022 [26]. This might contribute to returning to the right track in achieving the sustainable development goals in many countries where poverty rates have risen to record numbers [12]. These record numbers caused mistrust of these countries in the current global sustainable development plans. The need has become urgent and intense to start taking actual steps by the developed countries to reduce poverty rates by opening economic cooperation and transferring sufficient expertise to improve the economic environment for these countries.

6. Diseases related to poverty

As described above, poverty and ill health are mutually related as each affects the other. Infectious diseases are mostly related to poverty, so we will only consider them

in this chapter. Aiming to integrate health with the plans to eradicate poverty, the World Health Organization developed the International Poverty and Health network in 1997. This network of people and organizations from business, health, governmental and non-governmental organizations worked on developing policies to improve the health of the poor populations worldwide [27].

Three years later, with the support of the Group of eight (G8) (Group of eight, namely the United States of America, Canada, The United Kingdom, France, Germany, Japan, Italy, and Russia), the global fund was declared to cover three diseases that appear as unstoppable in different countries. The Global Fund invests US\$ 4 billion annually for AIDS, Tuberculosis, and Malaria, while many other diseases lack funds for eradication or elimination.

That is why they were called neglected tropical diseases, mainly prevalent in the tropical and subtropical regions of Africa, Asia, and the Americas. However, they included a group of infectious diseases that are highly prevalent in these developing countries. These three events and declarations defined the diseases concerning poverty. But unfortunately, the first three Malaria, Tuberculosis, and HIV/AIDS were lucky to get the global fund, while others were neglected as defined.

To make it easy, we divided poverty-related diseases into two main groups those covered by the Global Fund and those considered neglected tropical diseases.

6.1 Diseases covered by the global fund

Replace the entirety of this text with the main body of your chapter. The body is where the author explains experiments, presents and interprets data of one's research. Authors are free to decide how the main body will be structured. However, you are required to have at least one heading. Please ensure that either British or American English is used consistently in your chapter.

6.1.1 HIV/AIDS

After the death of the first known case of HIV/AIDS in Kinshasa (Belonging to Congo nowadays) in Africa in 1959, the disease spread to many other countries in the world as a global blood-borne and sexually transmitted disease pandemic (**Figures 1 and 2**) (**Table 1**) [28]. The estimated number of globally infected people now is around 38 million [29]. The virus attacks the immune system with different manifestations of the disease ranging from the carrier state with no manifestations to severe immune-depression states and death. No standard curative treatment is known for the disease [30–33]. That is why the patients' early diagnosis, symptomatic treatment, and care help them to live longer. However, primary prevention is considered the cornerstone in preventing the spread of the disease [34–36].

This would describe the much higher prevalence of deaths from HIV/AIDS in developing countries compared to developed countries and even the higher deaths in the developed countries among poor people who have limited access to health care facilities [37–42]. This fact is evident in maps 1 and 2 quoted from the WHO website 2017, especially compared to the extreme poverty presented earlier (**Figure 3**), where Africa carries the primary disease burden and deaths from the disease [43].

That is why the global health sector strategies (GHSSs) focus on HIV, viral hepatitis, and sexually transmitted infections for 2022–2030. The GHSSs guide

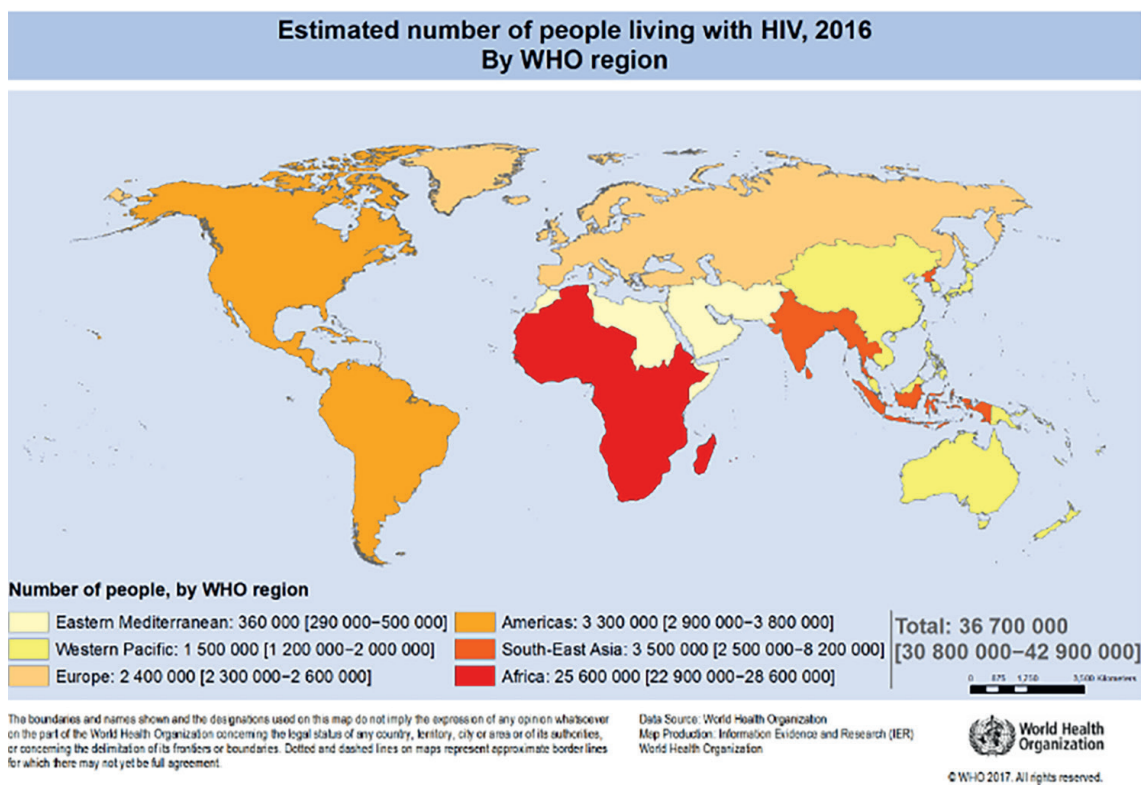


Figure 1.
 The global estimated number of people living with HIV, 2016. Source: WHO/UNAIDS/UNICEF©.

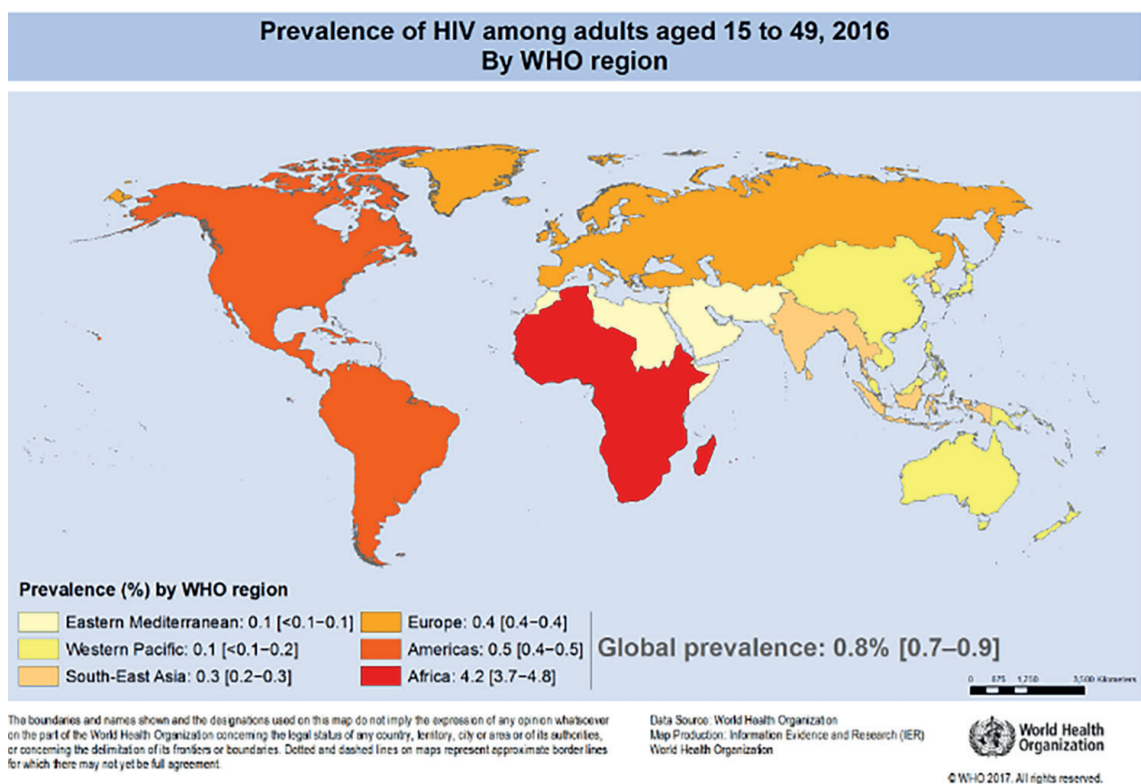


Figure 2.
 The global prevalence of HIV among adults aged 15 to 49, 2016. Source: WHO/UNAIDS/UNICEF©.

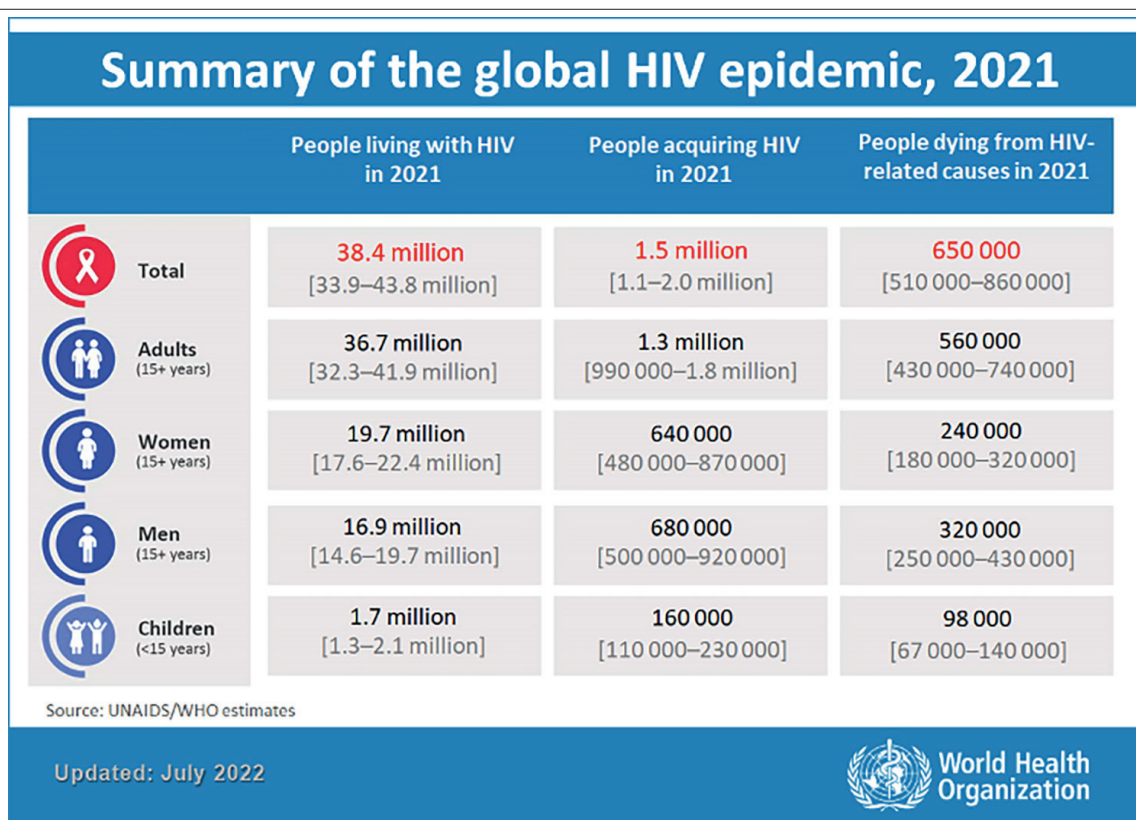


Table 1.
The global burden of the HIV epidemic, 2021. Source: WHO©.

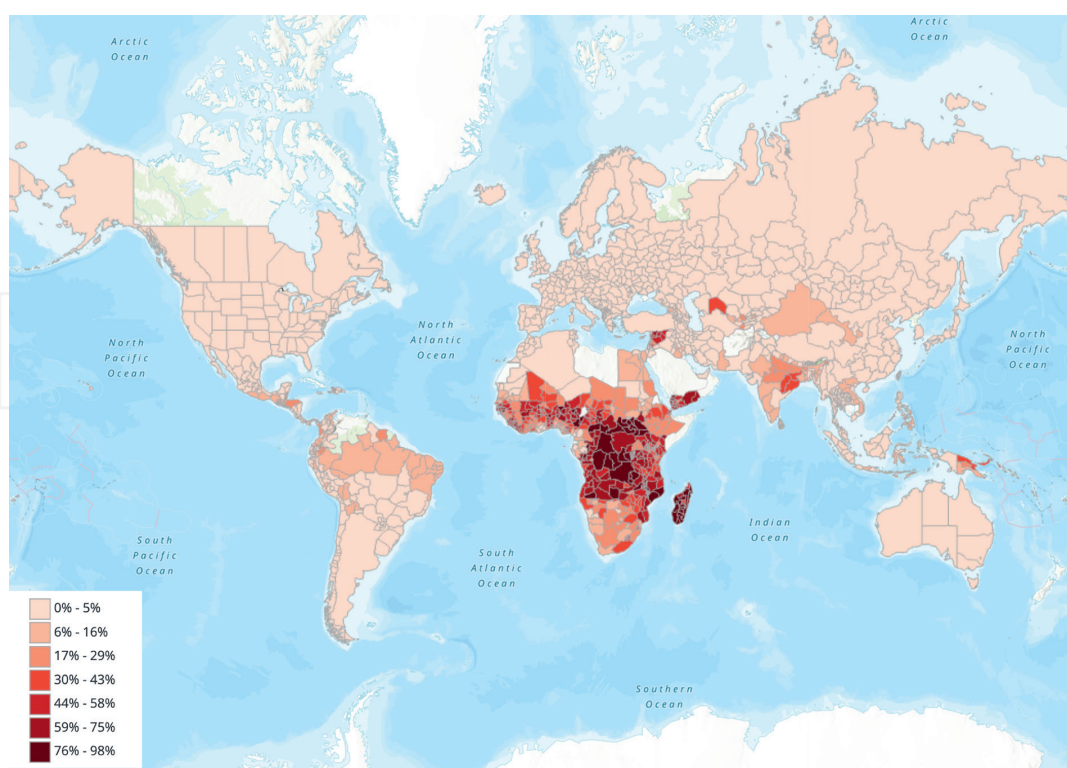


Figure 3.
Poverty proportion at \$1.90 a day, 2018. Source: World Bank©, Poverty Global Practice, and Development Economics Division. Data are based on household survey data obtained from different government statistical agencies and the World Bank country departments.

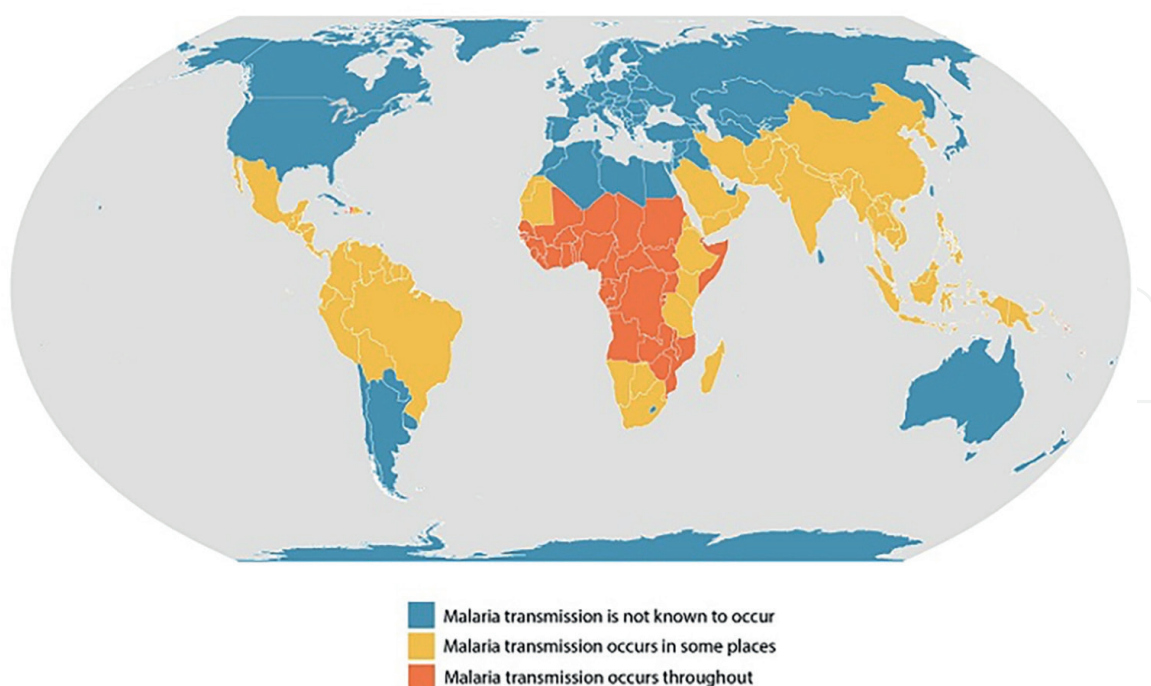


Figure 4.
The global endemic locations for malaria worldwide, 2020. Source: Global Health, Division of Parasitic Diseases and Malaria, CDC©.

the health sector in implementing strategically focused responses to end AIDS, viral hepatitis B and C, and sexually transmitted infections by 2030. This would be achieved through the synergistic work of different health sectors with the Primary Health Care (PHC) [44].

6.1.2 Malaria

Malaria is a vector-borne parasitic disease transmitted by anopheline mosquitos [45, 46]. The disease is caused mainly by four kinds of malaria parasites that can affect man. They are called Plasmodium (P) falciparum, P. vivax, P. oval, and P. malariae [47]. The estimated number of Malaria cases in 2020 was 241 million in 85 endemic countries. The global Malaria map (**Figure 4**) is nearly the same as the poverty map presented earlier. Malaria is mainly prevalent in poor countries [48]. Most Malaria cases (around 95%) are present in Africa [49]. Although most developed countries eliminated the disease, developing countries did not [50, 51].

The World Health Organization (WHO) launched the first Global Malaria Eradication Program (GMEP) in 1955 [52]. The program targeted The Americas, Europe, and Asia through spraying DDT and the use of chloroquine [53, 54]. However, most African countries were excluded due to logistical difficulties at that time (most of them were occupied by European countries) [55, 56]. However, in 1969 the WHO suspended this program after developing resistance to the treatment and the insecticides [57]. Malaria re-emerged in Europe in the 1990s, and the WHO launched the Roll Back Malaria program in 1998 using insecticides that impregnated bed nets and new cheap drugs [52, 58–60]. In 1987 Mosquirix vaccine was created against P. falciparum malaria and hepatitis B after great efforts and funds. The vaccine is now available in Europe for children aged 6 weeks to 17 months, but not yet for poor African children, although Africa carried all the burden of the vaccine's clinical

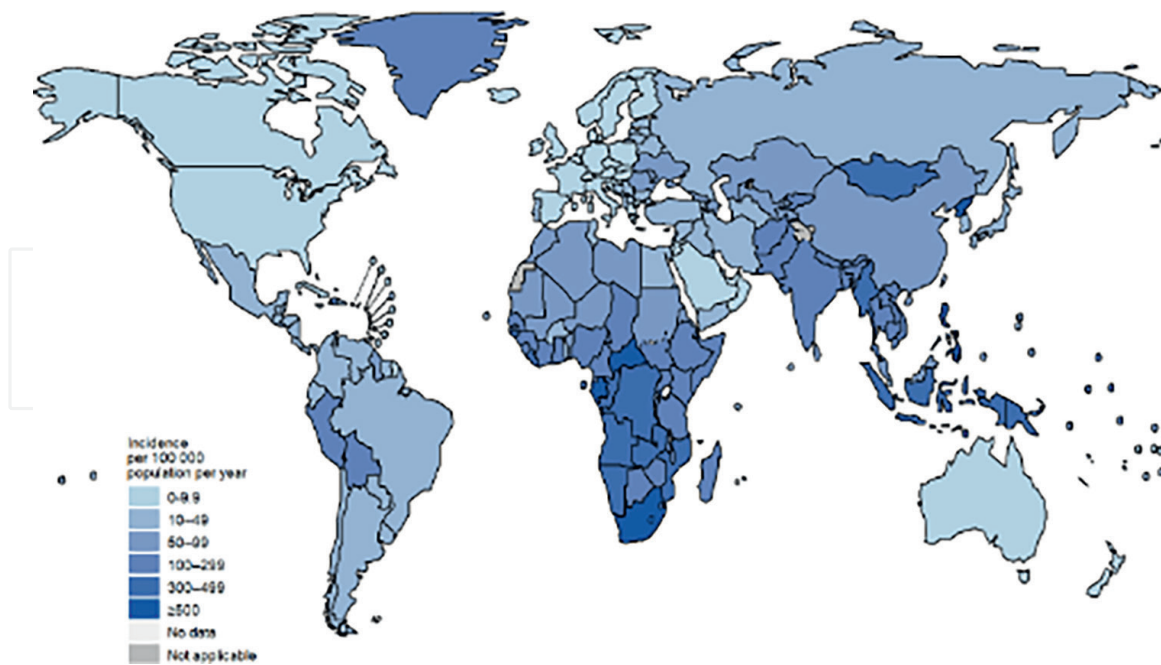


Figure 5.
The global estimated TB incidence rates, 2020. Source: Global Tuberculosis Report 2021, WHO©.

trials [61–63]. Although malaria is eradicated in the US and most of the European countries, it is still highly prevalent in the poor countries of Africa [52].

6.1.3 Tuberculosis

Tuberculosis (TB) is one of the oldest diseases caused by tubercle bacilli. It is a disease in poor people and countries. It is highly prevalent in developing countries, as shown in the map compared with the poverty map [64–67]. Despite all efforts to eradicate tuberculosis (TB), it remains a threat to global health (**Figure 5**). In the early 1920s, the BCG vaccine against tuberculosis was available. However, no universal global vaccination program has been adopted, and still, tuberculosis is responsible for millions of deaths [68]. Different lines of treatment were developed to eliminate the disease, as drug resistance developed for some medications used to treat the disease [69, 70]. However, Directly Observed Therapy (DOT) is still effective in many areas but in poor areas where direct observation of the therapy is impossible [71–73]. The concurrent infection with HIV in poor areas was a decisive factor hindering the disease treatment [74]. Poverty with overcrowding, inadequate housing, poor ventilation, and famines were all contributing factors to the disease's continued among poor populations.

6.2 Neglected tropical diseases related to poverty

Neglected tropical diseases (NTDs) are affecting more than 1 billion people. They are mainly diseases of poor populations in the tropical and subtropical areas [75, 76]. They are group of 20 diseases as mentioned down:

- Buruli ulcer
- Chagas disease

- Dengue and chikungunya
- Dracunculiasis
- Echinococcosis
- Foodborne trematodiasis
- Human African trypanosomiasis
- Leishmaniasis
- Leprosy
- Lymphatic filariasis
- Rabies
- Mycetoma, chromoblastomycosis and other deep mycoses
- Onchocerciasis
- Scabies and other ectoparasitoses
- Schistosomiasis
- Soil-transmitted helminthiasis
- Snakebite envenoming
- Taeniasis and cysticercosis
- Trachoma
- Yaws

The NTDs are mainly diseases in developing countries, as shown in the maps of some of the NTDs down if compared to the map of poverty shown earlier in the chapter (**Figure 6**) [77–84]. However, due to a lack of funding, the WHO published a 2021 booklet as a road to end the NTDs by 2030 by integrating their prevention and control (**Figure 7**) [76].

As described above and with comparing the maps of the diseases described it is obvious that fighting poverty should be considered in preventing these diseases (**Figure 8**). Whatever we would do to prevent these diseases they will continue affecting poor people till poverty is controlled (**Figure 9**).

7. Conclusion

Poverty is the economic condition in which the individual lacks sufficient income to obtain the minimum levels of food, clothing, health care, education, and all the

Distribution of human African trypanosomiasis (*T.b.gambiense*), worldwide, 2021

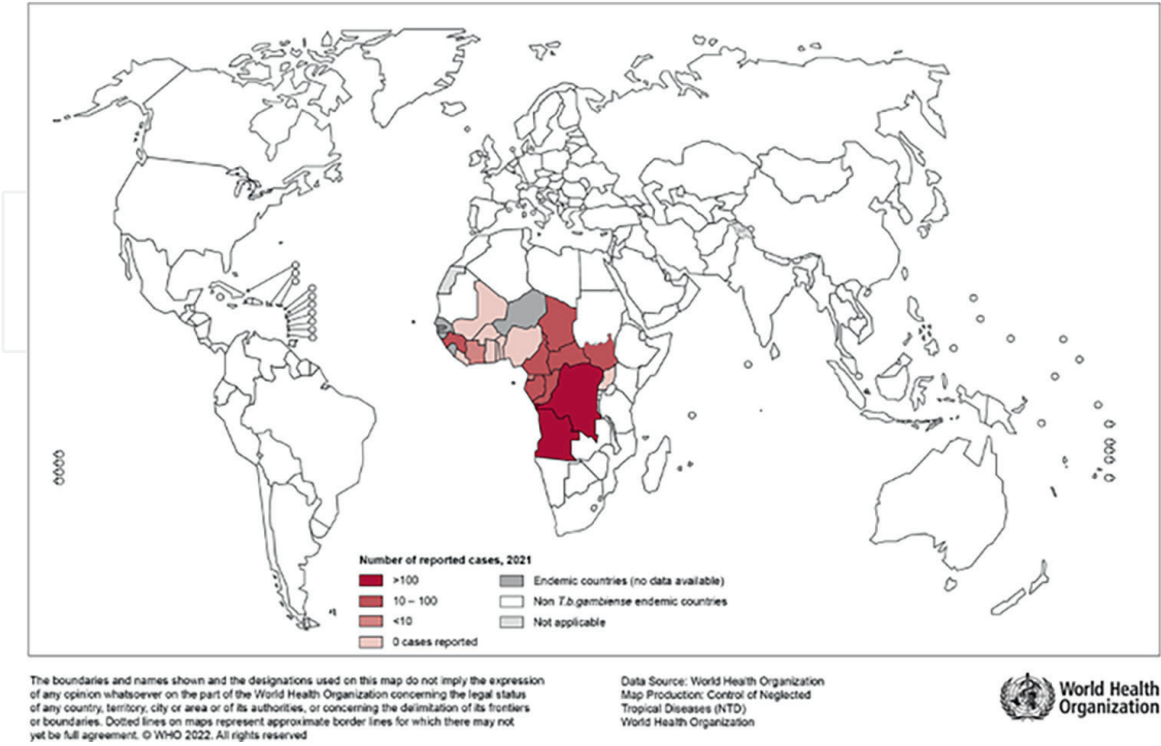


Figure 6.
The global distribution of human African trypanosomiasis, 2021. Source: WHO©.

Endemicity of *Taenia solium*, 2022

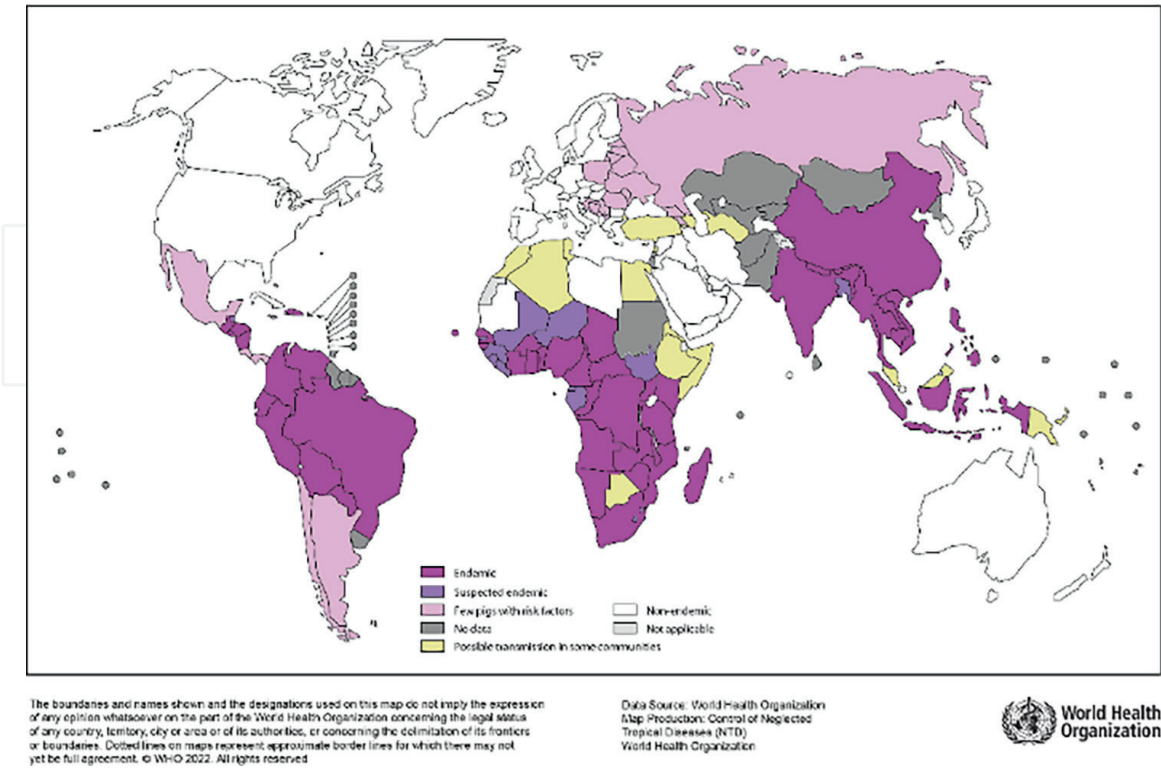


Figure 7.
The global endemic locations for *Taenia solium*, 2022. Source: WHO©.

Distribution of onchocerciasis and status of preventive chemotherapy in endemic countries, 2019

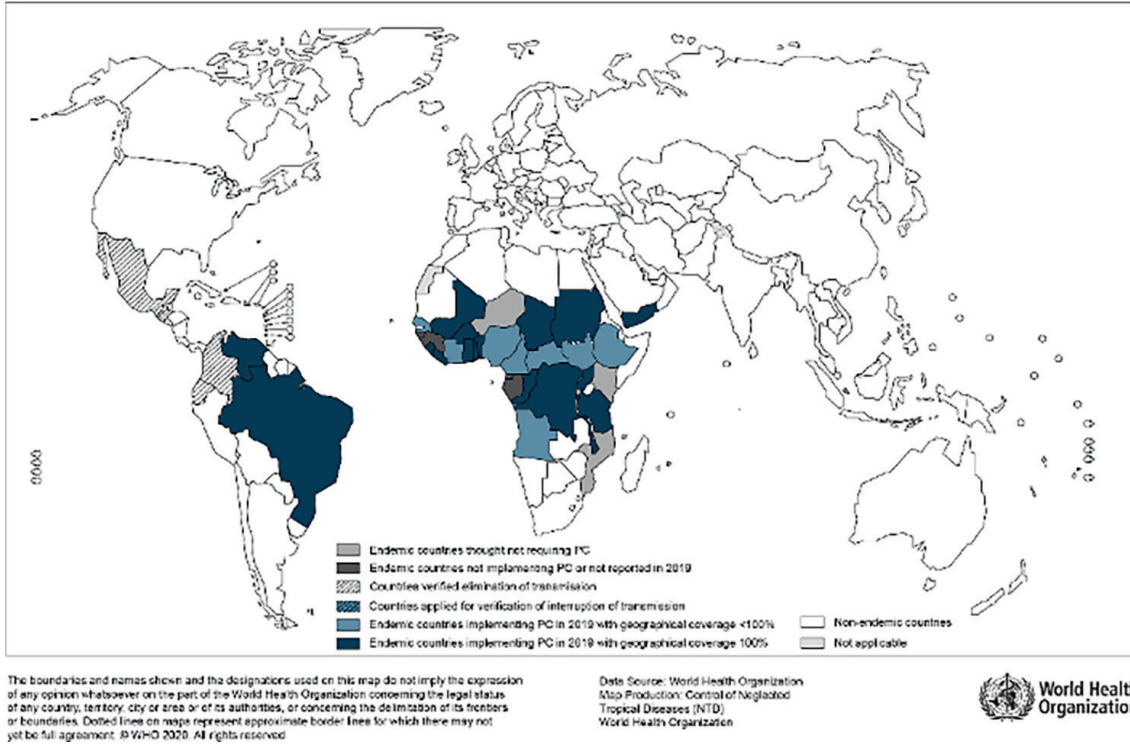


Figure 8.
 The global endemic locations for onchocerciasis and the status of its preventive chemotherapy, 2019. Source: WHO©.

Distribution of lymphatic filariasis and status of preventive chemotherapy (PC) in endemic countries, 2016

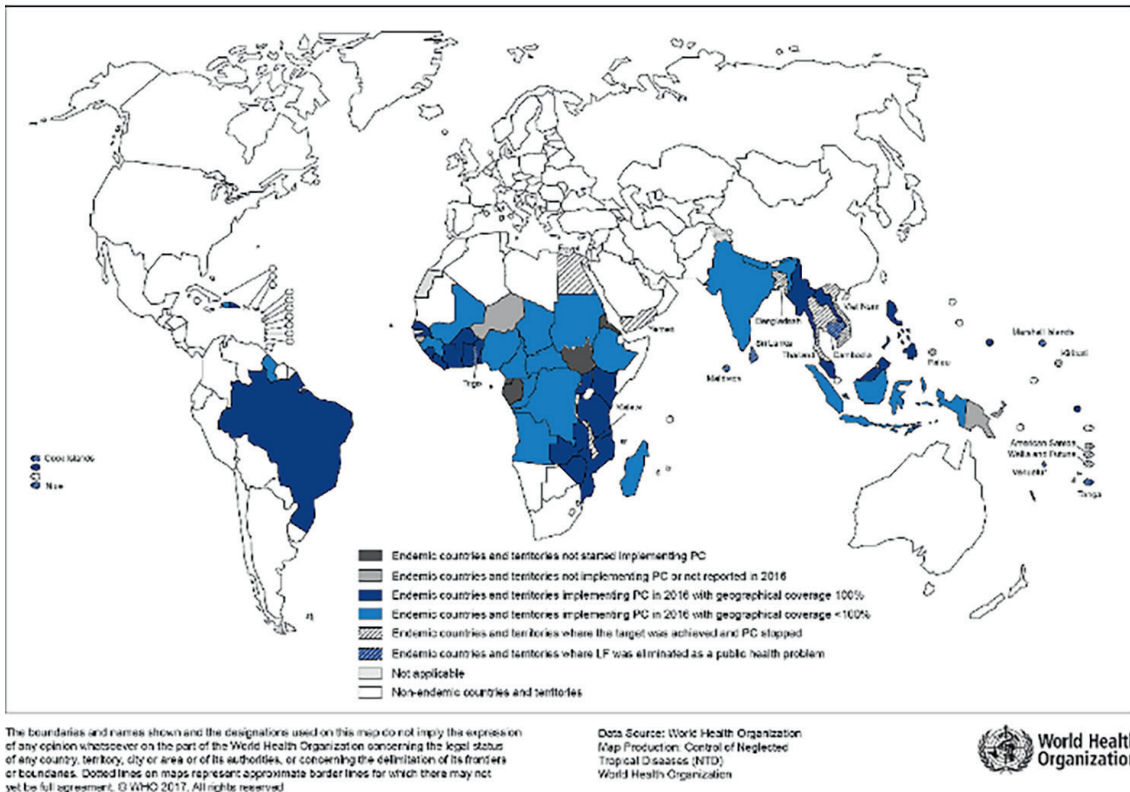


Figure 9.
 The global endemic locations for lymphatic filariasis and the status of its preventive chemotherapy, 2016. Source: WHO©.

needs necessary to secure a decent standard of life. The phenomenon of poverty in all countries of the world is considered an intractable problem. However, in developing countries, the significant increase in poverty rates is the problem. In addition, the COVID-19 pandemic has dramatically affected the increase in poverty rates, especially in developing countries.

Poverty affects health significantly in several directions. Malnutrition is when the poor suffer from the lack of food, and it may not be healthy if available. They also suffer from malnutrition, which makes children starve to death. The inability to access health care, as the poor can not afford the health care expenses or buy the medications they need, is a considerable obstacle. Poverty is associated with a higher risk of diseases, epidemics, and early deaths. The relationship between poverty with health remains a deep-rooted relationship, no matter how researchers differ in determining who affects the other. Therefore, developed countries must increase the rates of economic cooperation and support the development of developing countries.

Acknowledgements

We would like to extend our sincere thanks to international and local organizations such as the United Nations, World Bank, and CDC for making valuable data and information available to researchers and supporting developing countries' development process.

Conflict of interest


The authors declare no conflict of interest.

Author details

Ahmad Alqassim* and Maged El-Setouhy
Faculty of Medicine, Family and Community Medicine Department, Jazan University,
Jazan, Saudi Arabia

*Address all correspondence to: ahmadalqassim1407@gmail.com

IntechOpen

© 2022 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 

References

- [1] United Nations. The Copenhagen Declaration and Programme of Action: World Summit for Social Development 6-12 March 1995. New York: United Nations Department of Publications; 1995
- [2] World Bank. World Development Report 2000/2001: Attacking Poverty. Washington, DC: World Bank; 2000
- [3] Jolliffe D, Prydz EB. Estimating international poverty lines from comparable national thresholds. *The Journal of Economic Inequality*. 2016;**14**(2):185-198
- [4] De F, Fu H, Sánchez-Pàramo C. An Adjustment to Global Poverty Lines. The World Bank Group; 2022. Available from: <https://blogs.worldbank.org/voices/adjustment-global-poverty-lines>
- [5] Kagimu I. Sustainable rural poverty alleviation programs: A case study of Uganda [Doctoral thesis]. 2022;**1**(1):1-48
- [6] Olinto P, Beegle K, Sobrado C, Uematsu H. The state of the poor: Where are the poor, where is extreme poverty harder to end, and what is the current profile of the world's poor. *Economic premise*. 2013;**125**(2):1-8
- [7] Schoch M, Lakner C. The Number of Poor People Continues to Rise in Sub-Saharan Africa, Despite a Slow Decline in the Poverty Rate. The World Bank Group; 2020. Available from: <https://blogs.worldbank.org/opendata/number-poor-people-continues-rise-sub-saharan-africa-despite-slow-decline-poverty-rate>
- [8] Castaneda Aguilar RA, Cojocarú A, Howton ELA, Lakner C, Nguyen MC, Schoch M, et al. Poverty and Shared Prosperity 2020: Reversals of Fortune. The World Bank Group; 2020. Available from: <https://www.worldbank.org/en/publication/poverty-and-shared-prosperity-2020>
- [9] World Bank. Monitoring Global Poverty. Poverty and Shared Prosperity 2020: Reversals of Fortune: The World Bank Group; 2020. p. 27-80. Available from: https://elibrary.worldbank.org/doi/abs/10.1596/978-1-4648-1602-4_ch1
- [10] Alkire S, Dirksen J, Nogales R, Oldiges C. Multidimensional poverty and COVID-19 risk factors: A rapid overview of interlinked deprivations across 5.8 billion people. 2020
- [11] Chokshi DA. Income, poverty, and health inequality. *Journal of the American Medical Association*. 2018;**319**(13):1312-1313
- [12] UN. Sustainable Development Goals. Goal 1: End poverty in all its forms everywhere. United Nations: United Nations Publications; 2022. Available from: <https://www.un.org/sustainabledevelopment/poverty/>
- [13] Feasey N, Wansbrough-Jones M, Mabey DC, Solomon AW. Neglected tropical diseases. *British Medical Bulletin*. 2010;**93**(1):179-200
- [14] WHO. Poverty and Health. The World Bank Group; 2003. Available from: <https://www.worldbank.org/en/topic/health/brief/poverty-health>
- [15] United Nations. Mandated Areas: Health. United Nations: United Nations Publications; 2022. Available from: <https://www.un.org/development/desa/indigenouspeoples/mandated-areas1/health.html>
- [16] Sirag A, Mohamed NN. Out-of-pocket health expenditure and poverty: Evidence from a dynamic panel

threshold analysis. *Healthcare (Basel)*. 2021;**9**(5):1-20

[17] Gupta RP, de Wit ML, McKeown D. The impact of poverty on the current and future health status of children. *Paediatrics & Child Health*. 2007;**12**(8):667-672

[18] World Bank. Decline of Global Extreme Poverty Continues but Has Slowed: World Bank [press release]. Washington, D.C.: The World Bank Group; 2018

[19] Pereira M, Oliveira AM. Poverty and food insecurity may increase as the threat of COVID-19 spreads. *Public health nutrition*. 2020;**23**(17):3236-3240

[20] Lanker C, Yonzan N, Mahler G, Aguilar RAC, Wu H. Updated estimates of the impact of COVID-19 on global poverty: Looking back at 2020 and the outlook for 2021. 2021

[21] Aguilar RAC, Diaz-Bonilla C, Fujs T, Lakner C, Mahler DG, Nguyen MC, et al. September 2022 global poverty update from the World Bank: 2017 PPPs and new data for India. The World Bank Group; 2022. Available from: <https://blogs.worldbank.org/opendata/september-2022-global-poverty-update-world-bank-2017-ppps-and-new-data-india>

[22] United Nations. International Day for the Eradication of Poverty 2021. United Nations; 2021. Available from: <https://www.un.org/development/desa/socialperspectiveondevelopment/international-day-for-the-eradication-of-poverty-homepage/2021-2.html>

[23] Sánchez-Páramo C, Hill R, Mahler DG, Narayan A, Yonzan N. COVID-19 Leaves a Legacy of Rising Poverty and Widening Inequality. The World Bank Groups; 2021. Available from: <https://blogs.worldbank.org/developmenttalk/covid-19-leaves-legacy-rising-poverty-and-widening-inequality>

[24] OECD. The impact of the coronavirus (COVID-19) crisis on development finance. OECD Policy Responses to Coronavirus (COVID-19). 2020

[25] Spasova S, Bouget D, Ghailani D, Vanhercke B. Access to social protection for people working on non-standard contracts and as self-employed in Europe. A study of national policies Brussels: European Commission. 2017

[26] del Rio C, Malani PN. COVID-19 in 2022—The beginning of the end or the end of the beginning? *Journal of the American Medical Association*. 2022;**327**(24):2389-2390

[27] Haines A, Heath I, Smith R. Joining together to combat poverty. Everybody welcome and needed. *BMJ*. 2000;**320**(7226):1-2

[28] de Sousa JD, Muller V, Lemey P, Vandamme AM. High GUD incidence in the early 20 century created a particularly permissive time window for the origin and initial spread of epidemic HIV strains. *PLoS One*. 2010;**5**(4):e9936

[29] WHO. The Global Health Observatory: WHO; 2022 [updated July 2022; cited 2022 Sept. 10]. HIV data]. Available from: <https://www.who.int/data/gho/data/themes/hiv-aids#:~:text=Globally%2C%2038.4%20million%20%5B33.9%E2%80%9393,considerably%20between%20countries%20and%20regions>.

[30] Islam RK, Donnelly E, Islam KN. Circulating hydrogen sulfide (H₂S) and nitric oxide (NO) levels are significantly reduced in HIV patients concomitant with increased oxidative stress biomarkers. *Journal of Clinical Medicine*. 2021;**10**(19):1-13

[31] Ning S, Zeng C, Zeng C, Zhao Y. The TAR binding dynamics and its implication in Tat degradation

mechanism. *Biophysical Journal*. 2021;**120**(23):5158-5168

[32] Vanangamudi M, Nair PC, Engels SEM, Palaniappan S, Namasivayam V. Structural insights to human immunodeficiency virus (HIV-1) targets and their inhibition. *Advances in Experimental Medicine and Biology*. 2021;**1322**:63-95

[33] Weldemariam SA, Dagnew Z, Tafere Y, Bereka TM, Bitewa YB. Time to death among HIV-infected under-five children after initiation of anti-retroviral therapy and its predictors in Oromiya liyu zone, Amhara region, Ethiopia: A retrospective cohort study. *BMC Pediatrics*. 2022;**22**(1):5

[34] Mambanga P, Sirwali RN, Tshitangano T. Factors contributing to men's reluctance to seek HIV counselling and testing at primary health care facilities in vhembe district of South Africa. *African Journal of Primary Health Care & Family Medicine*. 2016;**8**(2):e1-e7

[35] Rietmeijer CA. Improving care for sexually transmitted infections. *Journal of the International AIDS Society*. 2019;**22**(Suppl 6):e25349

[36] Tshweneagae GT, Oss VM, Mgutshini T. Disclosure of HIV status to sexual partners by people living with HIV. *Curationis*. 2015;**38**(1)

[37] Attal BA, Al-Rowaishan KM, Akeel AA, AlAmmar FK. HIV stigma in the teaching hospitals in Sana'a, Yemen: A conflict and low-resource setting. *BMC Public Health*. 2021;**21**(1):1793

[38] Bousmah MA, Nishimwe ML, Kuaban C, Boyer S. Free access to antiretroviral treatment and protection against the risk of catastrophic health expenditure in people living with HIV: Evidence from Cameroon. *BMC Health Services Research*. 2021;**21**(1):313

[39] Gwako GN, Were F, Obimbo MM, Kinuthia J, Gachuno OW, Gichangi PB. Association between utilization and quality of antenatal care with stillbirths in four tertiary hospitals in a low-income urban setting. *Acta Obstetrica et Gynecologica Scandinavica*. 2021;**100**(4):676-683

[40] Onyango DO, van der Sande MAB, Musingila P, Kinywa E, Opollo V, Oyaró B, et al. High HIV prevalence among decedents received by two high-volume mortuaries in Kisumu, western Kenya, 2019. *PLoS One*. 2021;**16**(7):e0253516

[41] Pahwa S, Deeks S, Zou S, Tomitch N, Miller-Novak L, Caler E, et al. NIH Workshop on HIV-associated comorbidities, coinfections, and complications: Summary and recommendation for future research. *Journal of Acquired Immune Deficiency Syndromes*. 2021;**86**(1):11-18

[42] Yang X, Li X, Qiao S, Shen Z, Zhou Y. Socioeconomic disparity of immunologic outcome among people living with HIV in Guangxi, China. *AIDS Care*. 2021;**33**(3):347-351

[43] Parker E, Judge MA, Macete E, Nhampossa T, Dorward J, Langa DC, et al. HIV infection in Eastern and Southern Africa: Highest burden, largest challenges, greatest potential. *Southern African Journal of HIV Medicine*. 2021;**22**(1):1237

[44] World Health Organization. Global Health Sector Strategies on, Respectively, HIV, Viral Hepatitis and Sexually Transmitted Infections for the Period 2022-2030. World Health Organization; 2022. p. 134. Available from: <https://www.who.int/publications/i/item/9789240053779>

[45] Institute of Medicine. Committee for the Study on Malaria Prevention

and Control. Carpenter CC, Pearson GW, Mitchell VS, Oaks Jr SC. Malaria: obstacles and opportunities. US: National Academies Press; 1991. Available from: <https://nap.nationalacademies.org/catalog/1812/malaria-obstacles-and-opportunities>

[46] Al-Adhroey AH, Nor ZM, Al-Mekhlafi HM, Mahmud R. Opportunities and obstacles to the elimination of malaria from Peninsular Malaysia: Knowledge, attitudes and practices on malaria among aboriginal and rural communities. *Malaria Journal*. 2010;**9**:137

[47] Su XZ, Zhang C, Joy DA. Host-malaria parasite interactions and impacts on mutual evolution. *Frontiers in Cellular and Infection Microbiology*. 2020;**10**:587933

[48] WHO. The Global Health Observatory: WHO. 2020. Available from: <https://www.who.int/data/gho/data/themes/malaria#:~:text=According%20to%20the%20World%20Malaria,again%20to%2059%20in%202020>

[49] WHO. World Malaria Report 2018. Geneva: WHO; 2018

[50] Sharma S, Verma R, Yadav B, Kumar A, Rahi M, Sharma A. What India can learn from globally successful malaria elimination programmes. *BMJ Global Health*. 2022;**7**(6):1-10

[51] Global Burden of Disease Health Financing Collaborator N. Health sector spending and spending on HIV/AIDS, tuberculosis, and malaria, and development assistance for health: Progress towards Sustainable Development Goal 3. *Lancet*. 2020;**396**(10252):693-724

[52] Karema C, Wen S, Sidibe A, Smith JL, Gosling R, Hakizimana E, et al. History of malaria control in Rwanda: Implications for future elimination in Rwanda and

other malaria-endemic countries. *Malaria Journal*. 2020;**19**(1):356

[53] van den Berg H, da Silva Bezerra HS, Chanda E, Al-Eryani S, Nagpal BN, Gasimov E, et al. Management of insecticides for use in disease vector control: A global survey. *BMC Infectious Diseases*. 2021;**21**(1):468

[54] Wilson AL, Courtenay O, Kelly-Hope LA, Scott TW, Takken W, Torr SJ, et al. The importance of vector control for the control and elimination of vector-borne diseases. *PLoS Neglected Tropical Diseases*. 2020;**14**(1):e0007831

[55] Mills A, Lubell Y, Hanson K. Malaria eradication: The economic, financial and institutional challenge. *Malaria Journal*. 2008;**7**(Suppl 1):S11

[56] Smith NR, Trauer JM, Gambhir M, Richards JS, Maude RJ, Keith JM, et al. Agent-based models of malaria transmission: A systematic review. *Malaria Journal*. 2018;**17**(1):299

[57] Cohen JM, Smith DL, Cotter C, Ward A, Yamey G, Sabot OJ, et al. Malaria resurgence: A systematic review and assessment of its causes. *Malaria Journal*. 2012;**11**:122

[58] Biselli R, Nisini R, Lista F, Autore A, Lastilla M, De Lorenzo G, et al. A historical review of military medical strategies for fighting infectious diseases: From battlefields to global health. *Biomedicine*. 2022;**10**(8)

[59] Hii J, Hustedt J, Bangs MJ. Residual malaria transmission in select countries of asia-pacific region: Old wine in a new barrel. *The Journal of Infectious Diseases*. 2021;**223**(12 Suppl. 2):S111-SS42

[60] Ochomo E, Chahilu M, Cook J, Kinyari T, Bayoh NM, West P, et al. Insecticide-treated nets and protection

against insecticide-resistant malaria vectors in Western Kenya. *Emerging Infectious Diseases*. 2017;**23**(5):758-764

[61] Ho JK, Jeevan-Raj B, Netter HJ. Hepatitis B virus (HBV) Subviral particles as protective vaccines and vaccine platforms. *Viruses*. 2020;**12**(2)

[62] Laurens MB. RTS,S/AS01 vaccine (Mosquirix): An overview. *Human Vaccines & Immunotherapeutics*. 2020;**16**(3):480-489

[63] Arora N, L CA, Pannu AK. Towards eradication of malaria: Is the WHO's RTS,S/AS01 vaccination effective enough? *Risk Management in Healthcare Policy*. 2021;**14**:1033-1039

[64] Editorial. Tackling poverty in tuberculosis control. *Lancet*. 2005;**366**(9503):2063

[65] Oxlade O, Murray M. Tuberculosis and poverty: Why are the poor at greater risk in India? *PLoS One*. 2012;**7**(11):e47533

[66] Li Y, Ehiri J, Tang S, Li D, Bian Y, Lin H, et al. Factors associated with patient, and diagnostic delays in Chinese TB patients: A systematic review and meta-analysis. *BMC Medicine*. 2013;**11**:156

[67] Storla DG, Yimer S, Bjune GA. A systematic review of delay in the diagnosis and treatment of tuberculosis. *BMC Public Health*. 2008;**8**:15

[68] Luca S, Mihaescu T. History of BCG vaccine. *Maedica (Bucur)*. 2013;**8**(1):53-58

[69] Dartois VA, Rubin EJ. Anti-tuberculosis treatment strategies and drug development: Challenges and priorities. *Nature Reviews. Microbiology*. 2022;**20**(11):685-701. Available from:

<https://www.nature.com/articles/s41579-022-00731-y#citeas>

[70] Matteelli A, Rendon A, Tiberi S, Al-Abri S, Voniatis C, Carvalho ACC, et al. Tuberculosis elimination: Where are we now? *European Respiratory Review*. 2018;**27**(148):1-15

[71] Browne SH, Umlauf A, Tucker AJ, Low J, Moser K, Gonzalez Garcia J, et al. Wirelessly observed therapy compared to directly observed therapy to confirm and support tuberculosis treatment adherence: A randomized controlled trial. *PLoS Medicine*. 2019;**16**(10):e1002891

[72] Fiseha D, Demissie M. Assessment of directly observed therapy (dot) following tuberculosis regimen change in Addis Ababa, Ethiopia: A qualitative study. *BMC Infectious Diseases*. 2015;**15**:405

[73] Wright CM, Westerkamp L, Korver S, Dobler CC. Community-based directly observed therapy (DOT) versus clinic DOT for tuberculosis: A systematic review and meta-analysis of comparative effectiveness. *BMC Infectious Diseases*. 2015;**15**:210

[74] Garcia JI, Mambuque E, Nguenha D, Vilanculo F, Sacooc C, Sequera VG, et al. Mortality and risk of tuberculosis among people living with HIV in whom TB was initially ruled out. *Scientific Reports*. 2020;**10**(1):15442

[75] Klohe K, Amuasi J, Kaducu JM, Haavardsson I, Bogatyreva E, Onarheim KH, et al. The 2017 Oslo conference report on neglected tropical diseases and emerging/re-emerging infectious diseases - Focus on populations underserved. *Infectious Diseases of Poverty*. 2019;**8**(1):40

[76] WHO. Ending the Neglect to Attain the Sustainable Development Goals.

A Road Map for Neglected Tropical Diseases 2021-2030. WHO; 2020.
Available from: <https://www.who.int/publications/i/item/9789240010352>

[77] Montiel Ishino FA, Rowan C, Talham C, Villalobos K, Poudel D, Rajbhandari-Thapa J, et al. Household profiles of neglected tropical disease symptoms among children: A latent class analysis of built-environment features of Tanzanian households using the demographic and health survey. *Journal of Global Health*. 2022;**12**:04067

[78] Ochola EA, Karanja DMS, Elliott SJ. Local tips, global impact: Community-driven measures as avenues of promoting inclusion in the control of neglected tropical diseases: A case study in Kenya. *Infectious Diseases of Poverty*. 2022;**11**(1):88

[79] Pennance T, Ame SM, Amour AK, Suleiman KR, Muhsin MA, Kabole F, et al. Transmission and diversity of *Schistosoma haematobium* and *S. bovis* and their freshwater intermediate snail hosts *Bulinus globosus* and *B. nasutus* in the Zanzibar Archipelago, United Republic of Tanzania. *PLoS Neglected Tropical Diseases*. 2022;**16**(7):e0010585

[80] Pradhan AU, Uwishema O, Wellington J, Nisingizwe P, Thambi VD, Onyeaka CVP, et al. Challenges of addressing neglected tropical diseases amidst the COVID-19 pandemic in Africa: A case of Chagas disease. *Annals of Medicine and Surgery*. 2022;**81**:104414

[81] Schmidt CA, Cromwell EA, Hill E, Donkers KM, Schipp MF, Johnson KB, et al. The prevalence of onchocerciasis in Africa and Yemen, 2000-2018: A geospatial analysis. *BMC Medicine*. 2022;**20**(1):293

[82] Tambo E, Al-Nazawi AM. Combating the global spread of poverty-related

Monkeypox outbreaks and beyond. *Infectious Diseases of Poverty*. 2022;**11**(1):80

[83] Ugai K, Koffi DY, Kouadio K, Yao A, Yotsu RR. Nutritional status and wound healing in patients with *Mycobacterium ulcerans* disease (Buruli ulcer): A pilot study from rural Cote d'Ivoire. *European Journal of Dermatology*. 2022;**32**(2):227-236

[84] Weld ED, Waitt C, Barnes K, Garcia BF. Twice neglected? Neglected diseases in neglected populations. *British Journal of Clinical Pharmacology*. 2022;**88**(2):367-373