RESEARCH ARTICLE

Monetary value of disability-adjusted life years lost from all causes in Mauritius in 2019 [version 1; peer review: awaiting peer review]

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Abstract

Background: The Republic of Mauritius had a total of 422,567 disability-adjusted life years (DALYs) from all causes in 2019. This study aimed to estimate the monetary value of DALYs lost in 2019 from all causes in Mauritius and those projected to be lost in 2030; and to estimate the monetary value of DALYs savings in 2030 if Mauritius were to attain the national targets related to five targets of the United Nations Sustainable Development Goal 3 on good health and well-being.

Methods: The human capital approach was used to monetarily value DALYs lost from 157 causes in 2019. The monetary value of DALYs lost in 2019 from each cause was calculated from the product of net gross domestic product (GDP) per capita in Mauritius and the number of DALYs lost from a specific cause. The percentage reductions implied in the SDG3 targets were used to project the monetary values of DALYs expected in 2030. The potential savings equal the monetary value of DALYs lost in 2019 less the monetary value of DALYs expected in 2030.

Results: The DALYs lost in 2019 had a total monetary value of Int\$ 9.46 billion and a mean value of Int\$ 22,389 per DALY. Of this amount, 84.2% resulted from non-communicable diseases; 8.7% from communicable, maternal, neonatal, and nutritional diseases; and 7.1% from injuries. Full attainment of national targets related to the five SDG3 targets would avert DALYs losses to the value of Int\$ 2.4 billion.

Conclusions: Diseases and injuries cause a significant annual DALYs loss with substantive monetary value. Fully achieving the five SDG3 targets could save Mauritius nearly 8% of its total GDP in 2019. To achieve such savings, Mauritius needs to strengthen further the national health system, other systems that tackle the social determinants of health, and the national health research system.

Keywords

Mauritius, disability-adjusted life year, monetary value, sustainable development goal

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Introduction

The Republic of Mauritius is one of 16 Southern African Development Community (SADC) member states¹. It had an estimated population of 1.279 million people; gross domestic product (GDP) of International dollars (Int\$) 30.171 billion; and GDP per capita of Int\$ 23,818.571 in 2019². In 2017, the country had a high human development index (HDI) of 0.79, and the income inequality Gini coefficient was 35.8³.

Mauritius lost a total of 422,566.58 disability-adjusted life years (DALYs) from all causes in 2019⁴ compared to 132,813 DALYs in 1993⁵. Of the 2019 DALYs, 355,910.13 (84.2%) were from non-communicable diseases (NCDs); 36,780.42 (8.7%) from communicable, maternal, neonatal, and nutritional diseases (CMNNDs); and 29,876.03 (7.1%) from injuries (INJ). **Figure 1** portrays the DALYs from all causes by 23 age groups. People aged between 15 and 59 years bore 49.55% of the DALYs⁴.

Figure 2 depicts the share of DALYs by 22 disease categories in 2019. About 26.7% of the NCD DALYs resulted from diabetes and kidney diseases; 20.7% from cardiovascular diseases; 11% from neoplasms; 8.4% from musculoskeletal disorders; 6.3% from mental disorders; 5.7% from neurological disorders; 4.2% from chronic respiratory diseases; 3.9% from sense organ disease; 3.8% from digestive diseases; 2.2% from skin and subcutaneous diseases; 1.9% from substance use disorders; and 5.2% from other NCDs⁴. Nearly 47.4% of the NCD-related DALYs were attributed to diabetes and kidney diseases, and cardiovascular diseases.

Approximately 31.2% of the CMNND DALYs lost was caused by maternal and neonatal disorders; 20.6% by respiratory infections and tuberculosis (TB); 13.7% by neglected tropical diseases (NTDs); 12.8% by HIV/AIDS and sexually transmitted infections; 10% by nutritional deficiencies; 6.9% by enteric infections; and 3.8% by other infectious diseases⁴. Maternal and neonatal disorders, respiratory infections, and TB caused 52.8% of the CMNND DALYs.

Of the 29,876 DALYs from INJ, 33.8% were attributed to transport injuries; 39.9% to unintentional injuries; and 26.3% to self-harm and interpersonal violence⁴.

On 25 September 2015, the United Nations General Assembly (UNGA) adopted resolution A/RES/70/1, titled *Transforming our World: The 2030 Agenda for Sustainable Development*⁶, which contains 17 Sustainable

Source: Generated by authors using data from the Global Burden of Disease Collaborative Network [4]. Note: The Early neonatal = 0-6 days; late neonatal = 7-27 days; and post neonatal = 28-364 days [4].

Figure 1. Disability-adjusted life years (DALYs) from all causes by age groups in Mauritius in 2019

Source: Generated by authors using data from the Global Burden of Disease Collaborative Network [4].

Figure 2. The DALYs in Mauritius by disease categories in 2019

Development Goals (SDGs) and 169 targets. The SDG3 on ensuring healthy lives and promoting wellbeing for all at all ages has 13 targets. The following five of these SDG3 targets are intended for reducing the abovementioned disease burden⁶:

Target 3.1: By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births.

Target 3.2: By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births.

Target 3.3: By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.

Target 3.4: By 2030, reduce by one-third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and wellbeing.

Target 3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents' (p.14).

The current health expenditure per capita (CHEPC) in Mauritius was US\$ 600 in 2017⁷. It consisted of the domestic general government health expenditure of US\$ 257 per capita; domestic private health expenditure of US\$ 338 per capita (of which US\$ 293 was from out-of-pocket spending); and external health expenditure of US\$ 5 per capita. The Mauritius CHEPC was within the range of US\$ 297 (minimum) and US\$ 984 (maximum) per year of health systems investment recommended for attaining SDG3 among upper-middle-income economies⁸. The fact that out-of-pocket payments (OOPS) constitute 49% of CHEPC is a matter of concern because, according to the World Health Organization (WHO)⁹, when OOPS exceed 20% of total health expenditure, the incidence of financial catastrophe and impoverishment increases. Between 2012 and 2018, the population with households with health expenditures exceeding 25% of total household expenditure (or income) grew slightly from 1.79% to 1.8%^{10,11}.

The Mauritius domestic general government health expenditure is 10% of general government expenditure, which is below the African Heads of State and Government 2001 target of allocating at least 15% of the national budget to health development¹². Furthermore, in 2017, the Mauritius CHEPC of US\$ 600 (2% of GDP) was about seven-fold lower than the average of US\$ 4,003 (9% of average GDP per capita) for Organisation for Economic Co-operation and Development countries¹³. As a result, Mauritius has a universal health service coverage index (UHSCI) of 63 (on a scale of 0 to the target of 100), denoting a gap in essential health services coverage of 37¹⁴. The deficit in the UHSCI was attributed to suboptimal component scores of 69 in reproductive, maternal, newborn, and child health; 53 in infectious diseases; 52 in NCDs; and 80 in service capacity and access¹⁴.

Embracing the principles of a welfare state, Mauritius ensures the provision of free healthcare at the point of use in all public facilities. Steady economic growth over the last decade has enabled the national economy to sustain social protection systems, including health^{10,15}. To attain SDG3, Mauritius needs to sustainably increase its investments in the national health system and other systems that address the social determinants of health¹⁶. The health sector will have to keep on competing for scarce budgetary allocations with economic sectors. Thus, the health and health-related sectors ought to mount sustained evidence-based advocacy within the government and the private sector to sustain, grow, and efficiently utilize funding for health development to bridge the existing gap in access to essential health services.

People who control the national resources in the public and private sectors are not public health experts¹⁷, and thus, they might not fully understand the intricacies around the negative impact of disability and premature mortality (from various causes) on economic indicators, such as GDP. Therefore, health sector stakeholders will have to couch their advocacy messages in a language that those who control national resources can understand¹⁷⁻¹⁹.

Evidence from the economic burden of disease studies in both economically developed and developing countries continues to be used to advocate for increased investments in health development²⁰⁻³³. The WHO Regional Office for Africa (WHO/AFRO) report titled *A Heavy Burden: The Productivity Cost of Illness in Africa*, contains useful aggregated economic evidence for use in advocacy at global and regional forums³⁴. However, it is of limited usefulness to individual countries for two reasons: (a) it is not disaggregated by country and disease; and (b) the analysis is based on 2015 DALYs data. Mauritius policymakers require updated and contextualized economic evidence for use in making a case for increased investment in health development.

The specific objectives of this study are: (a) to estimate the monetary value of DALYs lost from all causes in Mauritius in 2019; (b) to estimate the monetary value of DALYs expected to be lost from all causes in Mauritius in 2030; and (c) to estimate the monetary value of DALYs savings in 2030 if Mauritius were to attain the SDG3 disease and injury-related targets of 3.1, 3.2, 3.3, 3.4, and 3.6.

Methods

The DALYs

The seminal application of DALYs to measure the global burden of disease was in 1993 in the World Bank report titled *World Development Report 1993: Investing in Health*, which ‘examined the interplay between human health, health policy, and economic development’ (p. iii)³⁵. However, it was only in 1994 that Professor CJL Murray developed and published in the *Bulletin of the World Health Organization* the conceptual basis for the DALYs³⁶. He defined DALY as the sum of potential years of life lost (PYLL) due to premature death and years lived with disability (YLD).

WHO³⁷ further explains that DALYs for a specific cause are calculated using the following formula:

$$DALY_{(c,s,a,t)} = PYLL_{(c,s,a,t)} + YLD_{(c,s,a,t)} \text{ for a specific disease or injury } c, \text{ age } a, \text{ sex } s, \text{ and year } t.$$

Even though debate has been ranging since 1996 about various real and perceived shortcomings of the DALYs³⁸⁻⁴¹, it has withstood the test of time and continues to be a useful metric in global health discourse⁴².

In this study, we calculate the monetary value of DALYs lost in Mauritius in 2019 from all 157 causes. The DALYs data are from the Institute for Health Metrics and Evaluation (IHME) global burden of disease (GBD) Study 2019 database⁴. Methodological details and sources of data used in the GBD study 2019 are from an article published by the GBD 2019 Diseases and Injuries Collaborators⁴³.

Estimating the monetary value of DALYs lost in Mauritius in 2019

This study replicates the human capital approach initially suggested by Weisbrod⁴⁴, and subsequently, adapted to financially value DALYs in Kenya among the elderly⁴⁵ and all age groups⁴⁶, the Arab Maghreb Union (AMU)⁴⁷, the Central African Economic and Monetary Community (CEMAC)⁴⁸, the East African Community (EAC)⁴⁹, Zambia⁵⁰, and the African region³⁴, to estimate the economic value of DALYs lost in 2019 in Mauritius. The development of health-related human capital begins at birth and ends at death; and thus, diseases have inter-and intra-generational negative impact on the process of human capital creation⁴³.

According to Weisbrod⁴⁴, ‘The present value of a man at any given age may be defined operationally as his discounted expected future earnings stream net of his consumption ...’ (p.427). GDP per capita is sometimes used as an indicator of an individual’s economic contribution per year. Any loss of DALYs erodes GDP through its components of consumption of household goods and services, investment (from savings), government spending (from taxes and service fees), and net exports (i.e. exports minus imports). The WHO⁵¹ clarifies that ‘GDP includes expenditure on health goods and services, so this component should be omitted and the focus of analysis be redirected towards establishing the present value of discounted aggregate flows of current and future consumption of non-health-related goods and services linked to disease’ (p.4). As further explained by the WHO⁵¹ and Chisholm *et al.*⁵², individuals do not derive utility (pleasure or happiness) from consumption of health goods and services, but from consumption of non-health consumption commodities (goods and services), leisure time, and health status. Thus, it has become common practice to use net GDP (i.e. GDP per capita minus health expenditure per person) in the valuation of DALYs^{34,45-50}.

The total monetary value of DALYs lost in Mauritius from 157 causes (TMOVD) is the sum of the monetary value of DALYs lost from each i^{th} disease or injury (MOVD _{i})⁴⁵⁻⁵⁰, denoted arithmetically as

$$TMOVD_{2019} = \sum_{i=1}^{\gamma=157} (MOVD_1 + MOVD_2 + MOVD_3 + \dots + MOVD_{\gamma}) \quad (1)$$

where $\sum_{i=1}^{\gamma=157}$ is the summation of monetary values of DALYs lost from the 1st to the 157th cause; MOVD₁ is the monetary value of DALYs lost from the 1st disease; MOVD₂ is the monetary value of DALYs lost from the 2nd disease; MOVD₃ is the monetary value of DALYs lost from the 3rd disease; and MOVD _{γ} is the monetary value of DALYs lost from the γ^{th} disease.

The monetary value of DALYs lost from each of the 157 diseases is equal to the number of DALYs lost from each disease (DALY _{$i = 1, \dots, \gamma$}) multiplied by Mauritius GDP per capita (GDPPC) minus CHEPC⁴⁵⁻⁵⁰, denoted algebraically as

$$MOVD_1 = \{DALY_1 \times (GDPPC - CHEPC)\} \quad (2)$$

$$MOVD_2 = \{DALY_2 \times (GDPPC - CHEPC)\} \quad (3)$$

$$MOVD_3 = \{DALY_3 \times (GDPPC - CHEPC)\} \quad (4)$$

$$MOVD_k = \{DALY_\gamma \times (GDPPC - CHEPC)\} \quad (5)$$

where $DALY_1$ is the number of DALYs lost from the 1st disease, $DALY_2$ is the number of DALYs lost from the 2nd disease, $DALY_3$ is the number of DALYs lost from the 3rd disease, and $DALY_\gamma$ is the number of DALYs lost from the γ^{th} disease. The DALYs acquired from the IHME GBD Study 2019 database are already discounted at 3%⁴³.

Estimating expected monetary value of DALYs lost in 2030

In this subsection, we adapt the formulae used in past studies in Africa^{34,45-50} to estimate the monetary value of DALYs losses in 2030, assuming the five disease-related SDG3 targets in Table 1 are fully accomplished in Mauritius⁵³⁻⁵⁹.

The reductions in the monetary value of DALYs lost from maternal disorders (SDG3 target 3.1), neonatal disorders (SDG3 target 3.2), HIV/AIDS (SDG 3 target 3.3a), TB (SDG3 target 3.3b), NTDs (SDG3 target 3.3c), viral hepatitis (SDG3 target 3.3d), NCD (SDG3 target 3.4), and transport injury (SDG3 target 3.6) are estimated using the form of equations below. For example, the equation used in estimating the SDG3 target 3.1 envisages a reduction in the monetary value of DALYs from maternal disorders (*MD*) as follows:

$$MOVD_{MD2030} = MOVD_{MD2019} - \left[MOVD_{MD2019} \times \left(\frac{MMR_{2019} - MMR_{T3.1}}{MMR_{2019}} \right) \right] \quad (6)$$

where: $MOVD_{MD2030}$ is the projected monetary value of DALYs lost from *MD* in 2030; $MOVD_{MD2019}$ is the monetary value of DALYs lost from *MD* in 2019; MMR_{2019} is the maternal mortality ratio in 2019; and $MMR_{T3.1}$ is the projected mortality ratio in 2030 supposing target 3.1 is fully realized. Since, $MOVD_{MD2019} = \text{Int\$ } 9,782,174$; $MMR_{2019} = 62$ per 100,000 live births; and $MMR_{T3.1} = 19.75806452$, the $MOVD_{MD2030}$ is estimated as follows:

$$MOVD_{MD2030} = \text{Int } 9,782,174 - \left[\text{Int } 9,782,174 \times \left(\frac{62 - 19.75806452}{62} \right) \right] = \text{Int } 3,117,368.$$

Calculate the potential monetary savings from DALYs lost averted

By subtracting the monetary value of DALYs lost in 2019 from the monetary value of DALYs lost in 2030 from the i^{th} disease (or injury), we obtain the potential savings in the monetary value of DALYs, assuming that the i^{th} SDG3 disease (or injury) target is fully accomplished⁴⁵⁻⁵⁰. For example, the projected savings in the monetary value of DALYs lost from NTDs is estimated as follows:

$$MOVD_{NTDs \text{ SAVING}} = (MOVD_{NTDs2019} - MOVD_{NTDs2030}) \quad (7)$$

$$MOVD_{NTDs \text{ SAVING}} = (\text{Int } 113,021,138 - \text{Int } 50,859,512) = \text{Int } 62,161,626.$$

where $MOVD_{NTDs \text{ SAVING}}$ is the probable saving in the monetary value of DALYs lost to NTDs by 2030; $MOVD_{NTDs2019}$ is the monetary value of DALYs lost to NTDs in 2019; and $MOVD_{NTDs2030}$ is the monetary value of DALYs anticipated to be lost from NTDs in 2030.

Data sources

The DALYs data for the 157 causes are from the IHME GBD study 2019 database⁴; the CHEPC data are from the WHO Global Health Expenditure Database⁷; and the 2019 per capita GDP data are from the IMF World Economic Outlook database². A summary of the data analysed can be found in the *Extended data*⁶⁰.

Data analysis

The analysis is conducted using Excel Software developed by Microsoft (New York)⁶¹. It is undertaken in seven steps.

Step 1: Construct economic model on Excel software

The economic model containing the equations is developed on an Excel spreadsheet.

Step 2: Collate DALYs data

Table 1. Health SDG3 targets and expected percentage reductions for Mauritius

Target	Description	Percentage reduction envisaged between 2020 and 2030
SDG 3.1	By 2030, reduce the global maternal mortality ratio (MMR) to less than 70 per 100,000 live births ⁶ . Mauritius in 2019 had an MMR of 62 per 100,000 live births, that is, SDG 3.1 was exceeded ⁵³ . The country set an MMR target of 35 per 100,000 live births by 2024 ⁵³ . The change between 2020 and 2024 equals $[(62 - 35)/62] = 0.435483870967742$. Assuming that the rate of decrease remains constant between 2025 and 2030, the MMR in 2030 equals 19.75806452 per 1,000 live births, that is, $[35 \times (35 \times 0.435483870967742)]$. Thus, the target reduction for Mauritius between 2020 and 2030 equals 68.13215401%, that is $[(62 - 19.758064516129)/62]$. The average annual rate of reduction (AARR) formula is from UNICEF ⁵⁴ . The Mauritius AARR between 2019 and 2030 equals 9.87396890591872, that is, $(((19.758064516129/62)^{(1/11)} - 1) * 100) * (-1)$.	68.13% (AARR = 9.87396890591872%)
SDG 3.2	By 2030, end preventable deaths of newborns, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births ⁶ . In 2019, the neonatal mortality rate for Mauritius was 10.3 per 1,000 live births ⁵³ . WHO/AFRO projected Mauritius to have a neonatal mortality of 6 per 1,000 live births by 2030 ⁵⁵ . Thus, the target reduction between 2020 and 2030 equals 41.75%, that is $(((10.3 - 6)/10.3) * 100)$. AARR = $(((6/10.3)^{(1/11)} - 1) * 100) * (-1) = 4.79387013350859\%$.	41.75% (AARR = 4.79387013350859%)
SDG 3.3	By 2030, end the epidemics of AIDS, TB, malaria, and NTDs and reduce hepatitis, water-borne diseases, and other communicable diseases ⁶ .	
	(a) Reduce global HIV-related deaths from 1,062,352 in 2015 to below 500,000 by 2020 ⁵⁶ , implying a rate of reduction of 52.9346205400846%, that is, $[(1062352 - 500000)/1062352]$. In 2019, there were 91.38 HIV deaths in Mauritius ⁴ . Assuming that the rate of reduction remains constant, the HIV deaths in 2030 for Mauritius equal 43.0083437504707, that is, $=(91.38 - (91.38 * 0.529346205400846))$. AARR = $(((43.0083437504707/91.38)^{(1/10)} - 1) * 100) * (-1) = 7.25934551582492\%$.	52.93% (AARR = 7.25934551582492%)
	(b) The number of TB deaths will be reduced by 90% from 2015 to 2030 ⁵⁷ , meaning a reduction rate of 0.06% per year, that is, 0.9/15 years. In 2019, there were 14.689 TB deaths in Mauritius ⁴ , projected to decrease to 4.99426 by 2030, that is, $14.689 - ((14.689 * (0.06 * 11 \text{ years})))$. AARR = 9.34178282078786% , that is, $(((4.99426/14.689)^{(1/11)} - 1) * 100) * (-1)$.	66% (AARR = 9.341782821%)
	(c) Mortality due to vector-borne diseases will be reduced globally by at least 75% from 2016 to 2030 ⁵⁸ , meaning a reduction rate of 5% per year, that is 0.75/15 years. In 2019, there were 5048.08 TB-related DALYs in Mauritius ⁴ ; projected to be 2271.636 DALYs in 2030, that is, $(5048.08 - (5048.08 * (0.05 * 11 \text{ years})))$. AARR = 7.00194515949536% , that is, $(((2271.636/5048.08)^{(1/11)} - 1) * 100) * (-1)$.	55% (AARR = 7.00194515949536%)
	(d) Globally reduce viral hepatitis B and C deaths from 1.4 million deaths in 2015 reduced to less than 500,000 by 2030 ⁵⁹ , meaning a rate of reduction of 64.28571429, that is, $[(1400000 - 500000)/1400000]$. Thus, the annual rate of reduction between 2016 and 2030 equals 4.28571428571429, that is, $64.28571429\%/15 \text{ years}$. In 2019, there were 91.69 hepatitis deaths in Mauritius ⁴ , meaning between 2016 and 2019, deaths reduced by 17.1428571428571, that is, $4.28571428571429\% \times 4 \text{ years}$. Thus, the reduction between 2020 and 2030 equals 47.14285714, that is, $64.28571429\% - 17.1428571428571\%$. The hepatitis deaths in 2030 equal 48.4647142857143, that is, $(91.69 - (91.69 * 0.471428571428571))$. AARR = 5.63137924952368% , that is, $(((48.4647142857143/91.69)^{(1/11)} - 1) * 100) * (-1)$.	47.14% (AARR = 5.63137924952368%)

Table 1. *Continued*

Target	Description	Percentage reduction envisaged between 2020 and 2030
SDG 3.4	By 2030, reduce premature mortality due to NCDs by one-third through prevention and treatment and promote mental health and well-being ⁶ , meaning a reduction rate of 2.22211323900836% per year, that is, 33.3316985851254/15. In 2019, there were 355910.13 NCD-related DALYs in Mauritius ⁴ ; which were projected to reduce to 268914.142705279 DALYs by 2030, that is, 355910.13 - (355910.13*0.24443245629092). AARR= (((268914.142705279/355910.13)^(1/11)-1)*100)*(-1)	24.44% (AARR = 2.51586648621783%)
SDG 3.6	By 2020, halve the number of global deaths and injuries from road traffic accidents ⁶ , meaning a rate of reduction of 10% per year, that is, 50%/5 years. In 2019, there were 9585.76 DALYs from transport injuries ⁴ . Assuming that Mauritius maintains momentum of 9.082% reduction per year between 2020 and 2030 (i.e. 11 years), transport injuries would lead to 9.58576000000176 DALYs by 2030, that is, 9585.76 - (9585.76 *0.999). AARR = (((9.58576/9585.76)^(1/11)-1)*100)*(-1).	99.9% (AARR = 46.6330076879369%)

The 2019 data on DALYs lost from 157 causes are extracted from the IHME GBD⁴ and saved in an Excel spreadsheet. The data are then sorted by the three broad categories of health conditions (i.e. NCDs, CMNND, and INJ). Then, the 157 causes are organized under the relevant broad category.

Step 3: Collate health expenditure data

The Mauritius 2017 CHEPC of Int\$ 1,278.01147461 was from the WHO Global Health Expenditure Database⁷. The latest expenditure data available are for 2017, and thus, it is necessary to project the CHEPC for 2019 (the baseline year of the analysis) in three sub-steps:

- Calculate CHEPC growth rate between 2016 and 2017 = ((CHEPC2017 - CHEPC2016)/CHEPC2016) = ((Int\$ 1,278.01147461 - Int\$ 1208.34094238)/Int\$ 1208.34094238) = 0.0576580084200196.
- Projection of CHEPC2018 = ((CHEPC2017 + (CHEPC2017 × 0.0576580084200196) = ((Int\$ 1,278.01147461 + (Int\$ 1,278.01147461 × 0.0576580084200196)) = Int\$ 1351.69907097395.
- Projection of CHEPC2019 = ((CHEPC2018 + (CHEPC2018 × 0.0576580084200196) = ((Int\$ 1351.69907097395 + (Int\$ 1351.69907097395 × 0.0576580084200196))) = Int\$ 1429.63534738949.

Step 3: Collate per capita GDP data

The Mauritius GDP per capita (GDPPC) of Int\$ 23,818.571 in 2019 is from the IMF World Economic Outlook Database².

Step 4: Calculate non-health per capita GDP

Non-health GDP per capita is estimated as the difference between GDP per capita and CHEPC. The non-health per capita GDP (NHGDPPC) = GDPPC - CHEPC = Int\$ 23,818.571 - Int\$ 1,429.63534738949 = Int\$ 22,388.9356526105.

Step 5: Estimate 2019 monetary value of DALYs lost from each cause

The monetary value of DALYs lost from a specific cause *i* equals the number of DALYs lost multiplied by non-health per capita GDP⁶¹. For example, the monetary value of DALYs from neonatal disorders ($MOVD_{ND}$) is estimated as follows:

$$MOVD_{ND} = \{DALY_{ND} \times NHGDPPC\} = 11,044.07 \times 22,388.9356526105 = 247,264,973.$$

Step 6: Project 2030 potential monetary value of DALYs lost from SDG3-related causes

We use an example of neonatal disorders to illustrate how the 2030 monetary value of DALYs lost from each of the SDG3 causes is projected:

$$MOVD_{ND2030} = MOVD_{ND2019} - \left[MOVD_{ND2019} \times \left(\frac{ND_{2019} - ND_{T3.2}}{ND_{2019}} \right) \right]$$

$$MOVD_{ND2030} = 247,264,973 - \left[247,264,973 \times \left(\frac{10.3 - 6}{10.3} \right) \right] = \text{Int } 144,037,848.$$

All the abbreviations are as defined earlier.

Step 7: Estimate the savings in the monetary value of DALYs

We obtain the potential savings in the monetary value of DALYs lost prevented, assuming that the i^{th} SDG3 (or national) disease target is fully realized, by subtracting the monetary value of DALYs lost in 2019 from the monetary value of DALYs projected to be lost in 2030 from the i^{th} disease. We demonstrate, using target SDG 3.2 on neonatal disorders, how savings for all the SDG3-related causes are estimated:

$$MOVD_{ND_SAVING} = (MOVD_{ND2019} \times MOVD_{ND2030}) = 247,264,973 - 144,037,848 = \text{Int } 103,227,124.$$

Results

The monetary value of the DALYs lost in Mauritius in 2019

All causes:

In 2019, Mauritius lost a total of 422,566.58 DALYs from all causes⁴ valued at Int\$ 9,460,815,967, and with a mean value of Int\$ 22,389 per DALY. About 84.2% resulted from NCD, 8.7% from CMNND, and 7.1% to INJ.

Figure 3 portrays the monetary value of DALYs accruing to all causes by age. People aged 14 years and lower sustained DALYs with a value of Int\$ 575,675,182 (6.1%); 15-59-year-olds bore DALYs valued at Int\$ 4,687,590,169 (49.5%); and those aged 60 years and above incurred DALYs valued at Int\$ 4,197,550,617 (44.4%).

Communicable, maternal, neonatal, and nutritional diseases

Figure 4 presents the monetary value of DALYs from CMNND. Out of the total monetary value of DALYs from CMNND of Int\$ 823.47 million, 31.2% ensued from maternal and neonatal disorders; 21.6% from respiratory infections and TB; 13.7% from NTDs; 12.8% from HIV/AIDS and sexually transmitted infections; 10% from nutritional deficiencies; 6.9% from enteric infections; and 3.8% from other infectious diseases. About Int\$ 642 million (78%) accrued to DALYs from neonatal disorders, lower respiratory infections, HIV/AIDS, schistosomiasis, and dietary iron deficiency. The detailed monetary value of DALYs per CMNND health condition is contained in the *Extended data*⁶².

Non-communicable diseases

Figure 5 shows the monetary value of the DALYs associated with NCDs. As alluded to in the first subsection, the NCDs combined caused a loss of 355,910.13 DALYs, with a total monetary value of about Int\$ 7.968 billion. Approximately, 26.7% of that monetary value was attributed to diabetes and kidney diseases; 20.7% to cardiovascular diseases; 11% to neoplasms/cancers; 8.5% to musculoskeletal disorders; 6.3% to mental disorders; 5.7% to neurological disorders; 4.1% to chronic respiratory diseases; 3.9% to sense organ diseases; 3.8% to digestive diseases; 2.2% to skin and subcutaneous diseases; 1.9% to substance use disorders; and 5.2% to other NCDs. Therefore, 58.4% of the total monetary value of DALYs from NCDs was attributed to diabetes and kidney diseases, cardiovascular diseases, and neoplasms (cancers). The monetary value of DALYs by each NCD is available in the *Extended data*⁶³.

Injuries

Figure 6 depicts the monetary value of DALYs from various forms of injuries in Mauritius. The 29,876 DALYs from injuries had a total monetary value of Int\$ 668.9 million. Out of the latter estimate, Int\$ 225.9 million (33.8%) accrued to transport injuries; Int\$ 266.7 million (39.9%) to unintentional injuries; and Int\$ 176.3 million (26.3%) to self-harm and interpersonal violence. About Int\$ 531.3 million (79.4%) of the total monetary value of DALYs associated with injuries emanated from road injuries (32.1%), self-harm (19.1%), falls (15.3%), interpersonal violence (7.2%), and drowning (5.7%). The monetary value of DALYs by each type of injury can be found in the *Extended data*⁶⁴.

Figure 3. Monetary value of DALYs from all causes by age group in Mauritius (Int\$ 2019)

The monetary value of DALYs in 2019 from five SDG3 related targets

Table 2 shows that the five SDG3-related health conditions analysed in this study resulted in 387,235 DALYs in 2019 with a value of Int\$ 8.67 billion, which is 91.6% of the national total monetary value from all causes. About 97.24% of the monetary value of SDG3-related DALYs was attributed to NCDs, neonatal disorders, and transport injuries.

Estimates of reductions in the monetary value of DALYs in Mauritius between 2020 and 2030 assuming the five SDG3-related targets are attained

Table 3 shows the monetary value of DALYs in 2019, the monetary value of DALYs lost in 2030, and the potential savings from DALY losses prevented assuming that the five disease-related SDG3 targets analysed in this study are attained.

Figure 4. Monetary value of DALYs from communicable, maternal, neonatal, and nutritional diseases in Mauritius (Int\$ 2019)

The DALYs lost from the five SDG3 health conditions (MDs, neonatal disorders, TB, HIV/AIDS, acute hepatitis, NTD, NCD and injuries) in 2019 were valued at Int\$ 8.67 billion. Assuming that the five SDG3 targets (3.1, 3.2, 3.3, 3.4, and 3.6) are fully achieved by 2030, there would still be DALYs losses of Int\$ 6.27 billion. Therefore, the reduction/savings in the monetary value of DALYs lost by 2030 would be Int\$ 2.4 billion.

Figure 5. Monetary value of DALYs from non-communicable diseases in Mauritius (Int\$ 2019)

Figure 6. Monetary value of DALYs lost from injuries in Mauritius (Int\$ 2019)

Table 2. Monetary value of DALYs in 2019 from five SDG3-related targets in Mauritius (2019 Int\$)

SDG3 Targets	DALYs in 2019	Monetary value of DALYs (Int\$)	Percent
SDG3.1: Maternal disorders	437	9,782,174	0.11
SDG3.2: Neonatal disorders	11,044	247,264,973	2.85
SDG3.3a: HIV/AIDS	4,510	100,971,413	1.16
SDG3.3b: Malaria	-	-	0.00
SDG3.3c: TB	609	13,625,906	0.16
SDG3.3d: Neglected tropical diseases	5,048	113,021,138	1.30
SDG3.3e: Acute hepatitis	92	2,052,842	0.02
SDG3.4: NCDs	355,910	7,968,448,999	91.91
SDG3.6: Transport injuries	9,586	214,614,964	2.48
Total for SDG3 health conditions	387,235	8,669,782,408	100.00
National all causes total	422,567	9,460,815,969	

Sources: *DALYs from the Global Burden of Disease Collaborative Network⁴ of the IHME database. **Authors' estimates.

Discussion

Key findings and comparison with similar studies

In 2019, Mauritius lost a total of 402,565 DALYs from all causes with a total monetary value of Int\$ 9.46 billion. About 84.2% of the latter was attributed to NCDs, 8.7% to CMNNDs, and 7.1% to INJ. By comparison, 67.3%, 21.9%, and 10.8% of the total monetary value of DALYs lost in the AMU emanated from NCDs, CMNNDs, and INJ, respectively⁴⁷. Approximately 61.3%, 28.4%, and 10.3% of the total monetary value of DALYs lost in the CEMAC was due to CMNNDs, NCDs, and INJ, respectively⁴⁸. In the EAC, approximately 58.2%, 30.3%, and 11.5% of the total monetary value of DALYs lost in 2015 was attributed to CMNNDs, NCDs, and INJ, respectively⁴⁹. In Kenya, about 56.6%, 35.9%, and 7.4% of the total monetary value of DALYs was ascribed to CMNND, NCDs, and INJ, respectively⁴⁶. In Zambia, 62.5%, 31.2%, and 6.3% was attributed to CMNNDs, NCDs, and INJ, respectively⁵⁰. Therefore, it is evident that the lion's share of the monetary value of DALYs lost in Mauritius was from NCDs, unlike in the AMU, CEMAC, EAC, Kenya, and Zambia, where CMNNDs dominated.

The diseases and injuries related to SDG 3 targets 3.1-3.4 and 3.6 caused DALY loss valued at Int\$ 8.67 billion, that is, 91.6% of the total monetary value of DALYs lost in Mauritius. We found that full attainment of the five targets would yield an estimated Int\$ 2.4 billion saving in monetary value of SDG-related DALYs lost by 2030. This saving is about 27.7% of SDG-related DALYs.

SDG Targets 3.1 and 3.2: Maternal and neonatal disorders

Attainment of the national targets related to SDG3 targets 3.1 and 3.2 by 2030 would avert DALYs with a monetary value of Int\$ 109.9 million. The projected savings could be achieved assuming full implementation of the national sexual and reproductive health policy⁶⁵, the health sector strategic plan 2020-2024⁵³, the sexual and reproductive health strategy and plan of action⁶⁶, and the white paper on health sector development and reform⁶⁷. The existing national legal framework in underpins the implementation of those policy and strategic documents⁶⁸.

The formulation and implementation of the national policy and strategies are buttressed by the SADC strategy for sexual and reproductive health rights⁶⁹; the SADC regional gender-based violence strategy and framework for action⁷⁰; the AU ministers of health commitments on universal health coverage⁷¹ and ending preventable maternal and child deaths in Africa⁷²; the AU Assembly decision on progress on maternal, newborn, and child health⁷³; and the AU Assembly declaration on addressing social determinants of health using health in all policies approach⁷⁴.

Mauritius' efforts to reduce child and maternal morbidity, disability, and deaths are informed and supported by various pertinent WHO Governing Bodies resolutions, for example, the Regional Committee for Africa strategic plan for immunization⁷⁵ and its resolution⁷⁶; the World Health Assembly (WHA) resolution on reduction of perinatal and neonatal mortality⁷⁷; the global vaccine action plan⁷⁸ and related WHA resolution⁷⁹; and the global strategy for women's, children's, and adolescents' health 2016-2030^{80,81} plus the associated WHA resolution⁸².

The UNGA resolutions on the rights of the child^{83,84} and preventable maternal mortality and morbidity and human rights⁸⁵ provide high-level political backing for full implementation of Mauritius' policies and strategies.

Table 3. Monetary value of DALYs by SDG3 health conditions in Mauritius (2019 Int\$)

Health conditions/ diseases	(A). Monetary value of DALYs in 2019	(B). Monetary value of DALYs in 2030 (Int\$)	(C). Reduction in monetary value of DALYs by 2030 (Int\$) [C=(A-B)]
SDG3.1: Maternal disorders	9,782,174	3,117,368	6,664,806
SDG3.2: Neonatal disorders	247,264,973	144,037,848	103,227,124
SDG3.3a: TB	13,625,906	4,632,808	8,993,098
SDG3.3b: HIV/AIDS	100,971,413	47,522,579	53,448,834
SDG3.3c: Malaria	-	-	-
SDG3.3d: Acute hepatitis	2,052,842	1,085,073	967,768
SDG3.3e: Neglected tropical diseases (NTDs)	113,021,138	50,859,512	62,161,626
(a). Schistosomiasis	99,720,319	44,874,144	54,846,176
(b). Cysticercosis	5,255,131	2,364,809	2,890,322
(c). Cystic echinococcosis	29,106	13,098	16,008
(d). Dengue	3,377,371	1,519,817	1,857,554
(e). Rabies	1,791	806	985
(f). Intestinal nematode infections	527,707	237,468	290,239
(g). Leprosy	15,672	7,053	8,620
(h). Other NTDs	4,094,041	1,842,318	2,251,722
SDG3.4: Noncommunicable diseases (NCDs)	7,968,448,999	6,020,701,437	1,947,747,562
(a). Neoplasms	877,208,126	662,789,989	214,418,137
(b). Cardiovascular diseases	1,646,611,288	1,244,126,046	402,485,242
(c). Chronic respiratory diseases	332,103,590	250,926,694	81,176,896
(d). Digestive diseases	302,965,062	228,910,568	74,054,494
(e). Neurological disorders	453,328,259	342,520,119	110,808,140
(f). Mental disorders	498,531,520	376,674,236	121,857,284
(g). Substance use disorders	152,027,142	114,866,774	37,160,368
(h). Diabetes and kidney diseases	2,128,328,045	1,608,095,593	520,232,452
(i). Skin and subcutaneous diseases	178,323,171	134,735,200	43,587,971
(j). Sense organ diseases	309,495,915	233,845,068	75,650,847
(k). Musculoskeletal disorders	674,076,000	509,309,947	164,766,052
(l). Other NCDs	415,450,881	313,901,202	101,549,679
SDG3.6: Road injuries	214,614,964	214,615	214,400,349
TOTAL (Int\$)	8,669,782,408	6,272,171,241	2,397,611,167

SDG Target 3.3: HIV/AIDS, TB, acute hepatitis, and neglected tropical diseases

The achievement of national targets for SDG target 3.3 by 2030 would avert DALYs with a monetary value of Int\$ 53.45 million from HIV/AIDS, Int\$ 9 million from TB, Int\$ 0.97 million from acute hepatitis, and Int\$ 62.2 million from NTDs.

Therefore, the full attainment of target 3.3 could enable Mauritius to save DALYs with a total monetary value of Int\$ 125.6 million. These savings are achievable if the following plans are made universally accessible to all people in need: communicable disease prevention and control services planned in chapter 7 of the Mauritius health sector strategy⁵³; the national HIV and AIDS policy⁸⁶; the national HIV action plan⁸⁷; and the national multi-sectoral HIV and AIDS strategic framework⁸⁸. The implementation of pertinent policies, strategies, and plans is augmented with the national legal framework⁶⁸.

Mauritius' battle against HIV/AIDS, TB, and hepatitis is also guided by the SADC strategy for HIV prevention, treatment, and care and sexual and reproductive health⁸⁹; the framework for the prevention and control of sexually transmitted infections⁹⁰; the strategic plan for the control of TB⁹¹; and the advocacy strategy on HIV/AIDS, TB, and sexually transmitted infections⁹².

Moreover, communicable disease control policies, strategies, and plans in Mauritius and the SADC are informed and reinforced by the WHO Governing Bodies documents and resolutions, including the end TB strategy⁵⁷; the global health sector strategy on HIV⁵⁶; the HIV/AIDS strategy for the African Region⁹³ and resolution AFR/RC62/R2⁹⁴; the global health sector strategy on viral hepatitis⁵⁹; the framework for action on prevention, care and treatment of viral hepatitis in the African region⁹⁵ and resolution AFR/RC64/R5⁹⁶; the global health sector strategy on sexually transmitted infections⁹⁷; NTDs⁹⁸; the regional strategy on NTDs in the WHO African Region⁹⁹ and its resolution AFR/RC63/R6¹⁰⁰; the global vector control response strategy⁵⁸ and its resolution WHA70.16¹⁰¹; the regional strategy for integrated disease surveillance and response¹⁰² and its draft resolution AFR/RC69/WP2/Rev1¹⁰³; and the health promotion strategy for the African region¹⁰⁴ and resolution AFR/RC62/R4¹⁰⁵.

The implementation of the aforementioned national policies and strategies on communicable diseases is bolstered by many relevant political decisions/declarations/resolutions of the AU¹⁰⁶⁻¹¹⁰ and the UNGA¹¹¹⁻¹¹⁵.

SDG Target 3.4: Non-communicable diseases

We estimate that Mauritius could avert DALYs worth Int\$ 1.95 billion if it successfully decreases the NCD burden by 24.4% between 2020 and 2030. Such savings can be realized if Mauritius were to make accessible, to everyone in need (i.e. with the capacity to benefit), the prevention and control health interventions and services planned in the health sector strategic plan⁵³; the national sport and physical activity policy¹¹⁶; the national cancer control programme action plan¹¹⁷; and the national action plan on tobacco control¹¹⁸. The implementation of NCD strategies and plans is supported by the set of national legislation^{68,119}; and the UNGA Political Declaration on the prevention and control of NCDs as well as the AU commitment on NCDs^{120,121}.

The Mauritius NCD strategies and plans were partially informed by various WHA and RC resolutions on global strategy for the prevention and control¹²² and its resolution WHA53.17¹²³; the global action plan for the prevention and control of NCD¹²⁴ and its endorsing resolution WHA66.10¹²⁵; the global action plan on the public health response to dementia¹²⁶ and related resolution WHA70(17)¹²⁷; the comprehensive mental health action plan¹²⁸ and its resolution WHA66.8¹²⁹; the WHO Framework Convention on Tobacco Control¹³⁰ and related resolution WHA53.16¹³¹; strategies to reduce the harmful use of alcohol resolution WHA61.4¹³²; cancer prevention and control resolution WHA70.2¹³³; the global action plan 2014-2019 on universal eye health¹³⁴ and its resolution WHA66.4¹³⁵; the global action plan on physical activity resolution WHA71.6¹³⁶; the NCD regional strategy for the African region¹³⁷ and its resolution AFR/RC50/R4¹³⁸; the Brazzaville declaration on NCD prevention and control in the African region¹³⁹ and its resolution¹⁴⁰; the strategic plan to reduce the double burden of malnutrition¹⁴¹ and its resolution AFR/RC69/WP1/Rev1¹⁴²; the regional oral health strategy¹⁴³ and the resolution AFR/RC66/R1¹⁴⁴; and the health promotion strategy for the African region¹⁰⁴ and its resolution AFR/RC62/R4¹⁰⁵.

The UNGA Declaration on NCDs¹⁴⁵, ageing^{146,147}, food¹⁴⁸, and nutrition¹⁴⁹ commits the Mauritius government to provide high-level political leadership and requisite resources to prevent and control NCDs.

SDG Target 3.6: Road injuries

Mauritius could avert DALYs with a monetary value of Int\$ 214.4 million if it were to successfully reduce road injuries by 99.9% between 2020 and 2030. With a view to realizing those potential savings, related to the attainment of SDG target 3.6, the government would need to fully implement its national road safety strategy 2016-2025, whose overarching objective is to achieve a 50% reduction in the number of non-fatal injuries and deaths by 2025¹⁵⁰. The strategy has 10 strategic fields of action, namely, improving safety standards of road infrastructure; reorganising control of roadworthy vehicles; strengthening of road traffic law and enforcement; re-engineering of the driving licensing scheme; improving medical testing of fitness to drive; provision of post-crash trauma care; starting a road safety academy; creating

a transport and road safety research and development programme; launching an effective education and communication strategy; and funding implementation of the road safety strategy¹⁵⁰. The institutions mandated by the Road Traffic Act to spearhead the implementation of the strategy are the National Transport Authority and National Road Safety Council¹⁵¹.

The development of Mauritius' national road safety strategy was informed by the AU road safety charter¹⁵², the AU road safety action plan 2011-2020¹⁵³, the WHO global plan for the decade of action for road safety¹⁵⁴, the WHO global 2018 status report on road safety¹⁵⁵, the 69th WHA resolution on the outcome of the second global high-level conference on road safety¹⁵⁶, and the status report on the implementation of the decade of action for road safety in the African region¹⁵⁷.

The UNGA resolutions A/RES/64/255¹⁵⁸, A/RES/66/260¹⁵⁹, A/RES/68/269¹⁶⁰, A/RES/70/260¹⁶¹, A/RES/72/271¹⁶², and A/RES/70/1⁶ provide high-level political support for full implementation of the Mauritian national road safety strategy 2016-2025 to at least halve the number of transport-related non-fatal injuries and human lives.

Limitations

This study has limitations related to the GDP calculations, the human capital approach, and the DALYs index.

Limitations in GDP calculations: The per capita GDP was used in this study as a numeraire for converting DALYs lost into their monetary equivalent. The current systems of national accounts measure GDP without considering unpaid household production (e.g. full-time homemakers' services in a household, including cooking, cleaning, childcare, and nursing ailing household members) and leisure; or the contribution of the elderly in reconciling differences among family members (social cohesion) and transmitting community values and indigenous knowledge to children and youth¹⁶³. The index also does not capture the adverse effects of economic production processes on the environment, animal health, and human health¹⁶⁴. Moreover, GDP does not account for inequalities in the distribution of income and wealth across households and individuals¹⁶⁵, and its growth does not indicate whether the societal quality of life has improved¹⁶⁶.

Limitations in the human capital approach: Strictly applied, the use of the human capital approach would have confined the analysis only to marketed production and working population. Therefore, DALYs lost within the age groups below the minimum legal age for working¹⁶⁷ and above retirement age of 60 years and above¹⁶⁸ would have been monetarily valued at zero. Furthermore, the DALYs lost among people who cannot work due to disability would be valued at zero. However, since the constitution of Mauritius^{68,119}, the constitution of the WHO¹⁶⁹, and the UN Universal Declaration of Human Rights¹⁷⁰ prohibit discrimination against any person, we value every DALYs lost (irrespective of age group) at the same non-health GDP per capita. Our approach is consistent with the lifetime income-based approach developed and applied by Jorgenson and Fraumeni¹⁷¹⁻¹⁷⁴ in the context of education-related human capital.

Limitations in the DALYs calculations: We summarize some of the limitations, already discussed by the GBD Study, that are inherent in the calculation of the two components (YLD and YLL) of the DALYs. According to the GBD 2017 Mortality Collaborators¹⁷⁵, the mortality data used 'include vital registration systems, sample registration systems, household surveys (complete birth histories, summary birth histories, sibling histories), censuses (summary birth histories, household deaths), and Demographic Surveillance Sites' (p. 1684). Some of the limitations include the use of sibling history data, which may introduce survivor bias and recall bias; estimates of the completeness of vital registration are based on the use of uncertain death distribution methods; and they cannot capture all fatal discontinuities¹⁷⁶. Unlike the rest of the WHO African region, where the completeness of the primary cause of death data is 6% owing to fragile vital registration systems, in Mauritius, the proportion is 100%¹¹, meaning that mortality estimates are likely to be more accurate than in the rest of the region.

According to the GBD 2017 Disease and Injury Incidence and Prevalence Collaborators¹⁷⁶, 'YLDs were estimated as the product of a prevalence estimate and a disability weight for health states of each mutually exclusive sequela, adjusted for comorbidity' (p.1789). Some of the limitations highlighted by authors include the fact that even though comorbidity distributions are known to vary by cause, age, sex, location, and time, the comorbidity adjustment in GBD 2017 assumes independent distributions of comorbid conditions. In addition, calculations of GBD for some causes depend strongly on clinical data, which are prone to selection bias for segments of the population that have disproportionate access to health services¹⁷⁶.

In the DALY calculations, the GBD 2017 DALYs and HALE Collaborators⁴² assume independence of uncertainty between YLLs and YLDs, even though this assumption may lead to underestimation of the total uncertainty for DALYs. The authors also highlight that DALY estimates are influenced by the availability of data for YLL and YLD estimations.

Conclusion

The DALYs lost had a substantive monetary value equivalent to 31.4% of GDP for Mauritius in 2019. Full achievement of the national targets related to SDG3 targets 3.1-3.4 and 3.6 would save the country about Int\$ 2.4 billion, or 8% of total GDP in 2019. If fully implemented, Mauritius' health-related policies, strategies, and plans might give the country a high chance of averting a significant number of DALYs. The implementation process is also buttressed with a robust legislative framework aimed at addressing the causes of ill-health in Mauritius.

However, as the AU ministers of health underscored in their commitment on an accountability mechanism, the existence of policies, strategies, declarations, decisions, and resolutions does not necessarily assure attainment of national and internationally agreed health development goals¹⁷⁷. The health ministers called on governments and other relevant stakeholders at national, regional, and continental levels to provide committed, sustained, and aligned resources for accelerated and monitored implementation of a national health development policy framework.

In terms of all socioeconomic indicators, Mauritius has accomplished substantially more than the other 46 WHO African region countries¹¹. However, to sustain the health (and related) gains, it is essential not to be complacent. Therefore, it is vital for the Mauritius government and the domestic private sector to work together to strengthen further the national health system (including the social protection mechanisms to reduce reliance on OOPS), the other systems that tackle social determinants of health¹⁶, and the national health research system^{178,179} to reduce the burden of disease further and to advance the quality of life of the people of Mauritius. Finally, given the negative economic impact of the ongoing COVID-19 global pandemic¹⁸⁰, all health-related systems ought to ensure that all resources are utilized efficiently^{53,181}.

Abbreviations

AARR	Average annual rate of reduction
AMU	Arab Maghreb Union
AU	African Union
CEMAC	Central African Economic and Monetary Community
CHEPC	Current health expenditure per capita
CMNND	Communicable, maternal, neonatal, and nutritional diseases
DALY	Disability-adjusted life year
DALY ₁	DALYs lost from first disease
DALY ₂	DALYs lost from second disease
DALY ₃	DALYs lost from third disease
DALY _{γ}	DALYs lost from γ^{th} disease
DALY _{ND}	DALYs lost from neonatal disorders
EAC	East African Community
GBD	Global burden of disease
GDPPC	Mauritius GDP per capita
GDP	Gross domestic product
HDI	Human development index
HIV/AIDS	Human immunodeficiency virus/acquired immunodeficiency syndrome
IMF	International Monetary Fund
INJ	Injuries
IHME	Institute for Health Metrics and Evaluation
Int\$	International dollars or purchasing power parity (PPP)
LBs	Live births
MD	Maternal disorders
MMR	Maternal mortality ratio
MMR ₂₀₁₉	Maternal mortality ratio in 2019
MMR _{T3.1}	Projected maternal mortality ratio in 2030 supposing target 3.1 is fully realized
MOVD ₁	Monetary value of DALYs from the first disease
MOVD ₂	Monetary value of DALYs from the second disease
MOVD ₃	Monetary value of DALYs from the third disease
MOVD _{γ}	Monetary value of DALYs from the γ^{th} disease
MOVD _{MD2030}	Projected monetary value of DALYs lost from MDs in 2030
MOVD _{MD2019}	Monetary value of DALYs lost from MDs in 2019
MOVD _{ND2030}	Projected monetary value of DALYs lost from neonatal disorders in 2030
MOVD _{ND2019}	Monetary value of DALYs lost from neonatal disorders in 2019

<i>MOVD_{ND} - SAVING</i>	Projected monetary value of DALYs savings upon attainment of national SDG3.2-related target
<i>MOVD_{NTD2030}</i>	Projected monetary value of DALYs lost from NTDs in 2030
<i>MOVD_{NTD2019}</i>	Monetary value of DALYs lost from NTDs in 2019
<i>MOVD_{NTDs} SAVING</i>	Probable saving in monetary value of DALYs lost to NTDs by 2030
NCD	Non-communicable disease
ND	Neonatal disorder
<i>ND₂₀₁₉</i>	Neonatal mortality rate in 2019
<i>ND_{T3.2}</i>	Projected neonatal mortality rate in 2030 assuming target 3.2 is realized
NHGGPPC	Non-health gross domestic product per capita
NTD	Neglected tropical disease
<i>NTD_{D2019}</i>	Number of deaths from NTDs in 2019
<i>NTD_{DT3.3c}</i>	Projected number of deaths from NTDs in 2030, assuming target 3.3c is reached
OOPS	Out-of-pocket payments
PYLL	Potential years of life lost
RC	WHO Regional Committee for Africa
SADC	Southern African Development Community
SDG	United Nations Sustainable Development Goal
SDG3	Sustainable Development Goal 3
TB	Tuberculosis
TMOVD	Total monetary value of DALYs from all 157 causes in Mauritius in 2019
UN	United Nations Organization
UNDP	United Nations Development Programme
UNGA	United Nations General Assembly
UHSCI	Universal health service coverage index
UNICEF	United Nations Children's Fund
US\$	United States dollar
WHA	World Health Assembly
WHO	World Health Organization
WHO/AFRO	World Health Organization Regional Office for Africa
YLD	Years lived with disability

Data availability

Underlying data

The DALYs data are from the Institute for Health Metrics and Evaluation (IHME) global burden of disease (GBD) Study 2019 database: <http://ghdx.healthdata.org/gbd-results-tool>⁴.

Methodological details and sources of data used in the GBD study 2019 are from: [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9)⁴³.

Figshare: Data used to estimate the monetary value of Disability-Adjusted Life Years (DALYs) lost from all causes in Mauritius in 2019. <https://doi.org/10.6084/m9.figshare.13573391>⁶⁰.

Figshare: Excel template used to estimate monetary value of Disability-Adjusted Life Years (DALYs) lost from all causes in Mauritius in 2019. <https://doi.org/10.6084/m9.figshare.13573985>⁶¹.

Extended data

Figshare: The monetary value of DALYs associated with communicable, maternal, neonatal, and nutritional diseases in Mauritius in 2019. Online Resource (Extended results data). <https://doi.org/10.6084/m9.figshare.13573439>⁶².

Figshare: The monetary values of DALYs associated with noncommunicable diseases in Mauritius in 2019. Online Resource (Extended results data). <https://doi.org/10.6084/m9.figshare.13573469>⁶³.

Figshare: The monetary value of DALYs associated with injuries in Mauritius in 2019. Extended results data. <https://doi.org/10.6084/m9.figshare.13573481>⁶⁴.

Figshare: Summary of the Legislative framework for health development in Mauritius. Extended data. <https://doi.org/10.6084/m9.figshare.13580315>⁶⁸.

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