

Monitoring equity in universal health coverage with essential services for neglected tropical diseases: an analysis of data reported for five diseases in 123 countries over 9 years



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Summary

Background A service coverage index has recently been proposed to monitor progress towards universal health coverage (UHC), and baseline results for 2015 are available. However, evidence on equity in that progress is scarce. The service coverage index did not consider services for neglected tropical diseases (NTDs), a group of preventable diseases defined by WHO member states on the basis of the disproportionate burden they place on their poorest, remotest, and otherwise most marginalised communities. Because of the much-needed equity lens that it could provide, NTD service coverage should not be neglected in efforts to monitor UHC progress.

Methods We developed an index focused on coverage of services for NTDs, comparable in methods to the UHC service coverage index. On the basis of data availability, we focused on preventive chemotherapy, which was recently included in the highest-priority package of essential UHC interventions. We used data reported to WHO since 2008 for the five NTDs amenable to preventive chemotherapy (lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminthiases, and trachoma) to develop an NTD service coverage index based on the geometric mean of coverage rates for individual NTD services with regularly reported data. We then compared this NTD service coverage index with the UHC service coverage index. A high UHC index value and a low NTD index value suggest that a country might not be adequately prioritising interventions for the poor. We measured Spearman rank-order correlation (ρ) of the NTD service coverage index with income inequality, as measured by the Gini coefficient (range of 0–1), where values of the Gini coefficient close to 1 indicate higher income inequality, and a negative correlation was evidence of socioeconomic barriers to health service coverage for people who are least well off.

Findings At least 123 countries can monitor NTD service coverage by use of a simple index. The median national NTD index was 32 in 2016, an increase from 3 in 2012, and from 0 in 2008. In 2015, the NTD index was lower than the UHC index in 81 of the 113 countries for which both NTD and UHC indices are available, by up to 80 points. The NTD index was negatively but weakly correlated with income inequality; this correlation was strongest in the African Region ($\rho=-0.46$ in 2008, $\rho=-0.32$ in 2015), suggesting that high-income inequality, although associated with low coverage of services targeting the poor, does not preclude the extension of that coverage.

Interpretation The NTD index can be used to measure equity in progress towards UHC. A broader NTD index including services for other NTDs could be developed at regional and country levels. Comparing the NTD and UHC service coverage indices reveals that some countries that are performing well by the measure of the UHC service coverage index still have work to do in prioritising services for their poorest and otherwise most marginalised communities. Our results offer hope that socioeconomic barriers to health service coverage can be overcome.

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Introduction

Universal health coverage (UHC) has been adopted as national policy by many countries since a resolution by WHO in 2005.¹ The importance of UHC in global development has been reflected in the Sustainable Development Goals (SDGs) target 3.8, to “achieve UHC,

including financial risk protection”, and in the promise to leave no one behind. Although UHC is just one of 169 SDG targets, its centrality has been highlighted by the WHO Director-General and the President of the World Bank Group.^{2,3} The UN Statistical Commission has adopted the following two indicators to monitor

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Research in context

Evidence before the study

In 2017, Hogan and colleagues described a universal health coverage (UHC) index to monitor progress on UHC that was based on 16 tracer indicators. Baseline results for the year 2015 were described for 183 countries. However, evidence on equity in that progress remains scarce. The UHC index was limited to only a subset of four tracer indicators to summarise inequalities by household wealth. Even then, sufficient data were available for only 52 of the 183 countries they analysed, including only 25 of 47 countries from the WHO African Region. We did not do a systematic search of the scientific literature.

Added value of the study

We developed a coverage index focused on services for a group of neglected tropical diseases (NTDs), defined by WHO member states on the basis of the disproportionate burden they place on

their poorest, remotest, and otherwise most marginalised communities. We analysed NTD service coverage data collected since 2008 from 123 countries, including 44 of 47 countries from the African Region. We present evidence that an NTD service coverage index could be used to monitor equity in progress on UHC.

Implications of all the available evidence

NTD service coverage can be measured by a simple index that is similar in methodology to that of the UHC service coverage index. Comparing UHC and NTD service coverage indices revealed that some countries that are performing well by the measure of the UHC service coverage index still have work to do in prioritising services for their poorest populations and otherwise most marginalised communities. Our results offer hope that socioeconomic barriers to health service coverage can be overcome.

progress towards target 3.8: coverage of essential health services (3.8.1); and the proportion of households with large expenditures on health as a share of total household consumption or income (3.8.2).

In 2017, Hogan and colleagues⁴ described a UHC service coverage index based on 16 tracer indicators grouped into four categories, each with four indicators. Following the definition of SDG target 3.8.1, the four indicator categories are: reproductive, maternal, newborn and child health; infectious diseases; non-communicable diseases; and service capacity and access and health security. Four indicators were selected within each category on the basis of the following criteria: (1) epidemiological burden and the presence of cost-effective interventions; (2) conceptual soundness, with a measurable numerator and denominator, and a clear target; (3) feasibility, with current, comparable data available for most countries; and (4) usability, in the sense that it is easy to communicate.³ With epidemiological burden as a criterion, the selected services are of benefit to most socioeconomic groups. The possible exception is insecticide-treated bednets for malaria, an almost exclusively rural disease.

Hogan and colleagues⁴ emphasised that these tracer indicators could be selected to track progress in UHC service coverage, but that they do not define service coverage within UHC or provide a comprehensive measurement of service coverage within UHC.³ They also acknowledged that few of the selected indicators fulfil all criteria.³ For example, insecticide-treated bednets were available only for 40 countries with a high burden of malaria.

The UHC service coverage index, as developed by Hogan and colleagues,⁴ does not include any services for neglected tropical diseases (NTDs). The NTDs are a group of infectious diseases defined by WHO member states on the basis of the disproportionate burden that

they place on their poorest, remotest, and otherwise most marginalised communities.⁵ Omitted from the Millennium Development Goals, they are now part of the SDGs as target 3.3 to end the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases by 2030.^{6,7} Progress towards ending NTDs will be measured by decreases in the number of people needing treatment and care, from a baseline of 1.6 billion people in 2015.⁸

Target 3.8 on UHC is defined as access to quality essential health-care services and access to safe, effective, quality, and affordable essential medicines and vaccines for all. Strategies to end NTDs (including preventive chemotherapy, disease management, vector management, and veterinary public health) are consistent with that definition. Preventive chemotherapy is the mass administration of a single dose of a safe and quality-assured drug, either alone or in combination with other drugs, as a public health intervention. Several NTD interventions, including preventive chemotherapy, were recently included in the Disease Control Priorities project's highest-priority package of essential UHC interventions.⁹

In 2016, more than 1 billion of the 1.5 billion people needing treatment and care for NTDs worldwide were in middle-income countries.⁸ The odds of infection or disease are often two times higher in people from socioeconomically disadvantaged groups than in their better-off compatriots.¹⁰ NTDs affect the least well off populations that UHC must reach to make good on the promise of the SDGs to leave no one behind.¹¹ In some countries, it is largely a question of reaching beyond fixed health facilities. NTD programmes reduce the financial burden on affected populations in the way medicines are delivered—free of charge and often through communities.

The success of community-directed distribution of preventive chemotherapy drugs, including in remote

areas or those affected by conflict, has inspired a similar approach for other health services.¹² Evidence for its collateral effects on broader health systems suggests that most distributors are involved in at least one other health service, including immunisation, water and sanitation, family planning, vitamin A supplementation, insecticide-treated bednets, and home management of malaria.¹³ On this basis, integrated NTD programmes can best be seen as essential UHC for the least well off.

Hogan and colleagues⁴ assessed inequalities in coverage by household wealth quintile. They were limited to a subset of four of the 16 tracer indicators measured through Demographic and Health Surveys or Multiple Indicator Cluster Surveys, namely family planning coverage; antenatal care; coverage of diphtheria, tetanus, and pertussis vaccine; and access to at least basic sanitation. Even then, they had sufficient data for only 52 of the 183 countries analysed, including only 25 of 47 countries from the WHO African Region. We therefore propose an alternative approach based on coverage of services targeting the poor, rather than coverage of general services for the poor.

Others have argued that essential services for NTDs could be used as a tracer of equity in progress towards UHC.⁶ WHO and the World Bank have asserted that “monitoring preventive chemotherapy coverage remains key to ensuring that the diseases of the least well-off are being prioritized from the very beginning of the path towards UHC”.¹⁴ We developed an NTD service coverage index that is methodologically comparable to the UHC service coverage index. Here we describe the NTD service coverage index and compare it to the UHC service coverage index to show its usefulness in monitoring equity in progress toward UHC.

Methods

Calculation of the index

In line with the UHC service coverage index, we developed an NTD service coverage index based on the geometric mean of coverage rates for individual NTD services with regularly reported data. More formally,

$$\bar{x}_{geom} = \sqrt[n]{\prod_{i=1}^n x_i} = \sqrt[n]{x_1 \cdot x_2 \cdot \dots \cdot x_n}$$

Where x_i is the coverage rate for NTD service i and n is the total number of NTD services included in the index for a given country. If a country is not endemic for the NTD requiring service i , then the index does not include service i for that country. As coverage rates are expressed as percentages, the resulting index ranges from 0 to 100.

As with the UHC service coverage index, use of the geometric mean increases the sensitivity of the NTD service coverage index to very low coverage among individual NTD services. Again, as with the UHC index and in line with the promise of the SDGs to leave no

one behind, coverage rates are not weighted by the size of the population in need or by any other variable.

We used R software to calculate the index and for further statistical analysis and visualisation.

Data sources

The NTD service coverage index was designed to accommodate any NTD service coverage data routinely reported to WHO by its member states. Globally, coverage data are currently limited to preventive chemotherapy. Preventive chemotherapy coverage is based on the number of people needing and receiving medicines, divided by the number of people needing those medicines. Need is determined by the level of prevalence of a disease at the district level; WHO recommends preventive chemotherapy for the entire population living within a district with a prevalence exceeding disease-specific thresholds. Data on preventive chemotherapy coverage were available via WHO's Global Health Observatory from at least 123 member states for the years 2008–16.⁸ These data are reported to WHO as part of the process of joint activity planning, requesting medicines, and reporting on performance and outcomes of preventive chemotherapy for the following five NTDs: lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminthiasis, and trachoma. Data are reported through electronic forms, called the preventive chemotherapy Joint Application Package, which include data validation rules to identify potential errors or data paradoxes.¹⁵ Data are further validated by WHO data managers at regional and global level before submitting to the WHO Global Health Observatory.

For the purposes of the index, preventive chemotherapy coverage was limited to age groups eligible for medicine donations. For lymphatic filariasis, onchocerciasis, and trachoma, the entire affected population was eligible to be covered by donations. For schistosomiasis and soil-transmitted helminthiasis, donations managed through WHO cover school-aged children only; other donors are known to provide treatment of soil-transmitted helminthiasis for children younger than school age.

UHC service coverage index values were available from Hogan and colleagues for 183 countries.⁴ Both NTD and UHC indices were available for 113 of the 123 countries with an NTD index. We obtained Human Development Index (HDI) values for 2015 from the UN Development Programme, and Gini coefficients in the latest available year from the World Bank.^{16,17} The external share in total health expenditure was available from WHO's Global Health Expenditure Database.¹⁸

Assumptions and analysis

Assumptions were necessary to deal with zero and non-reported coverage and with coverage in non-endemic countries. We considered that there is a limit of reporting,

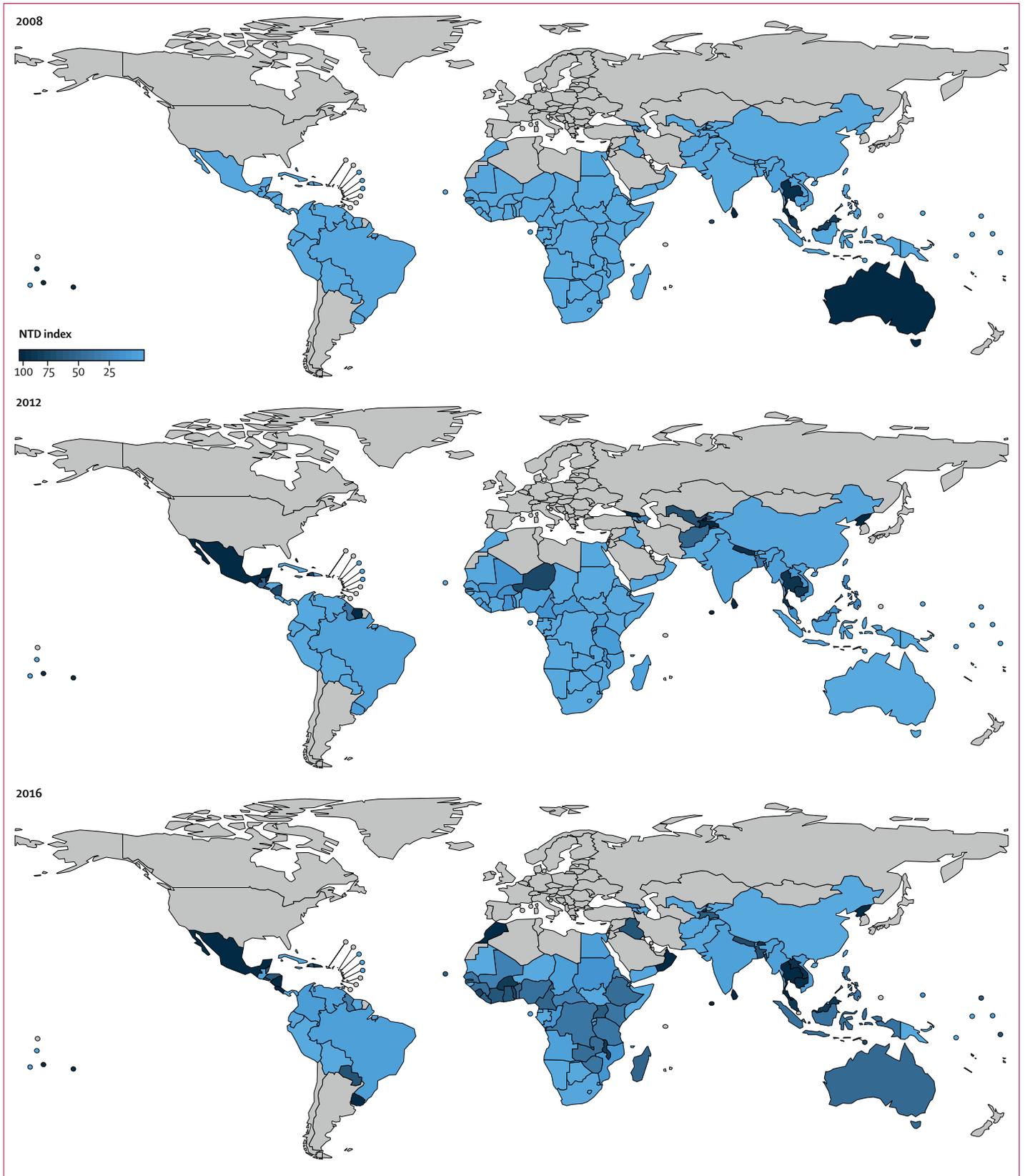


Figure 1: NTD service coverage index, by country, 2008, 2012, and 2016

Current index is based on a geometric mean of preventive chemotherapy coverage for five diseases: lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminthiases, and trachoma. NTD=neglected tropical diseases.

such that zero or non-reported coverage in endemic countries is actually a small but positive coverage rate just below this limit. The lowest ever reported positive preventive chemotherapy coverage is 0.1%. We therefore set individual NTD service coverage to 0.1% in countries for which coverage was required but reported as 0% or not reported at all. This adjustment avoids index values of 0 for countries that failed to report coverage for only one of many NTD services. Zero or non-reported coverage occurred in 97 of the 314 datapoints (country-disease coverages) in 2015.

We also considered that individual NTD service coverage should be recorded as 100% in formerly endemic countries that no longer need intervention (ie, that are in post-preventive chemotherapy surveillance or have been validated or verified for elimination). This adjustment avoids the occurrence of drops in the index when countries achieve elimination targets. It affects only 135 of the 2826 datapoints (country-year-disease coverages) in our dataset. We did not include in the index individual NTD service coverage for those diseases for which a country had no recent history of endemicity.

Hogan and colleagues measured correlation of the UHC service coverage index with the HDI.⁴ However, the

HDI is a national average and, like all averages, conceals disparities between populations within the same country. We therefore measured Spearman rank-order correlation (ρ) of the NTD service coverage index with income inequality, as measured by the Gini coefficient, within a range of 0–1.¹⁶ Values of the Gini coefficient closer to 1 indicate higher income inequality. A negative correlation was interpreted as evidence of socioeconomic barriers to health service coverage for people who are least well off.

We compared the UHC service coverage index with the NTD service coverage index at the national level, interpreting the difference between the two (the so-called differential in UHC and NTD coverage) as a tracer of equity. Because the UHC index excludes all NTD services, and because the services of the UHC index are meant to be of benefit to all socioeconomic groups, whereas NTD services are targeted at the poorest, a large positive differential in UHC and NTD coverage was interpreted to mean that health systems were not prioritising services for people who are least well off.

Unfortunately, the scale of the UHC index is partly arbitrary because of rescaling of several indicators by Hogan and colleagues.⁴ This rescaling means that the differential of the coverage of UHC and NTD services is arbitrary. We therefore considered coverage differentials using the UHC service coverage subindices for infectious diseases (ID subindex) and for reproductive, maternal, newborn, and child health (RMNCH subindex), for which tracer indicators were incorporated

	Population needing preventive chemotherapy in 2016 (thousands)					Coverage for preventive chemotherapy in 2016 (%)					Index values	
	Lymphatic filariasis	Onchocerciasis	Schistosomiasis	Soil-transmitted helminthiases	Trachoma	Lymphatic filariasis	Onchocerciasis	Schistosomiasis	Soil-transmitted helminthiases	Trachoma	2015	2016
Algeria	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Angola	5396	5553	3282	11 235	NA	1	2	50	26	NA	1	7
Benin	2990	6642	1384	2495	1155	56	57	59	96	37	18	58
Botswana	NA	NA	151	236	NA	NA	NA	0	29	NA	0	2
Burkina Faso	8582	256	2574	7451	4289	64	95	88	100	100	58	88
Burundi	NA	1698	1012	3927	2467	NA	80	91	96	0	16	16
Cape Verde	NA	NA	NA	146	NA	NA	NA	NA	61	NA	0	61
Cameroon	16 968	10 867	2098	9017	1639	71	75	77	61	26	20	58
Central African Republic	3300	2486	559	1764	2035	16	50	66	40	17	<1	32
Chad	3182	3820	2070	381	6139	51	68	0	6	38	1	10
Comoros	514	NA	NA	195	NA	0	NA	NA	0	NA	0	0
Republic of the Congo	963	597	69	1685	NA	12	79	25	3	NA	38	16
Côte d'Ivoire	16 757	3070	2440	2196	2068	73	95	84	85	32	13	69
Democratic Republic of the Congo	38 738	41 152	9589	26 016	5462	42	76	58	67	13	11	44
Djibouti	NA	NA	NA	111	0	NA	NA	NA	0	100	32	3
Equatorial Guinea	420	99	30	145	NA	0	0	0	0	NA	0	0
Eritrea	70	NA	218	NA	1498	31	NA	52	NA	18	3	31
Ethiopia	5753	17 402	8230	28 755	74 205	45	80	36	41	64	47	51

(Table continues on next page)

	Population needing preventive chemotherapy in 2016 (thousands)					Coverage for preventive chemotherapy in 2016 (%)					Index values	
	Lymphatic filariasis	Onchocerciasis	Schistosomiasis	Soil-transmitted helminthiases	Trachoma	Lymphatic filariasis	Onchocerciasis	Schistosomiasis	Soil-transmitted helminthiases	Trachoma	2015	2016
(Continued from previous page)												
Gabon	346	76	165	459	NA	0	0	36	14	NA	0	1
Gambia	NA	NA	108	82	0	NA	NA	0	47	100	1	8
Ghana	1790	5169	3941	9874	0	74	84	67	41	100	63	70
Guinea	7162	6782	1508	2079	5449	73	66	25	47	53	11	50
Guinea-Bissau	1565	485	130	512	1075	0	0	0	33	88	9	1
Kenya	3679	NA	1324	9462	4626	60	NA	42	60	23	22	43
Lesotho	NA	NA	NA	531	NA	NA	NA	NA	0	NA	0	0
Liberia	2714	2912	537	844	NA	74	74	31	90	NA	10	62
Madagascar	18 863	NA	3497	4390	NA	44	NA	48	92	NA	54	58
Malawi	Surveillance	2285	2967	7335	4010	100	83	96	88	79	84	89
Mali	18 343	5529	2526	7019	3597	69	72	100	100	1	21	35
Mauritania	NA	NA	413	NA	294	NA	NA	0	NA	0	16	0
Mauritius	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mozambique	20180	18	5803	11 988	6473	74	0	93	57	45	1	18
Namibia	NA	NA	206	811	NA	NA	NA	0	21	NA	0	1
Niger	10 887	NA	2409	9317	5457	0	NA	0	0	52	11	<1
Nigeria	123 313	53 084	16 429	45 678	21 838	54	67	57	33	37	15	48
Rwanda	NA	NA	969	4380	NA	NA	NA	0	100	NA	48	3
São Tomé and Príncipe	188	NA	4	81	NA	0	NA	0	0	NA	7	0
Senegal	8534	915	1591	6422	2773	71	69	35	63	15	62	44
Seychelles	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sierra Leone	7138	5333	594	2998	NA	78	79	71	97	NA	82	81
Somalia	NA	NA	319	4904	NA	NA	NA	0	0	NA	0	0
South Africa	NA	NA	2550	3888	NA	NA	NA	0	100	NA	0	3
South Sudan	1660	7532	1494	4808	1959	0	0	28	41	9	<1	3
Sudan	13 394	501	4988	17 181	4980	7	53	24	7	36	10	19
Swaziland	NA	NA	105	21	NA	NA	NA	94	86	NA	0	90
Togo	Eliminated	5403	1800	2975	NA	100	54	94	68	NA	78	77
Uganda	6910	1976	5255	16 389	1623	72	97	37	58	73	43	64
Tanzania	15 370	6154	5224	15 924	4661	82	67	90	47	7	43	44
Zambia	11 298	NA	2831	4449	4981	92	NA	32	57	40	52	51
Zimbabwe	7678	NA	2230	5153	1556	79	NA	93	75	7	3	44

NTD=neglected tropical diseases. NA=neglected tropical diseases for which no preventive chemotherapy is needed.

Table: NTD service coverage index, WHO African Region, 2016

on their natural scale. We also looked at the difference in a country's rank (the best rank being 113 of 113 countries) according to the UHC and NTD indices. This differential for UHC and NTD rank is not affected by scaling.

In a multivariable linear model, we regressed the rank differential on the Gini coefficient, controlling for HDI, the percentage of the total population needing preventive chemotherapy (the relative size of the vulnerable population), and the external share in total health expenditure (a proxy for global health initiatives). If the differential is positively associated with the external share in total health expenditure, it could have more to do with the integration of services within health systems than with inequity in health systems per se.

Results

Many countries, including low-income countries, made advances in the NTD service coverage index between 2008 and 2016 (figure 1). The year 2008 marks the start of the global plan to combat NTDs in 2008–15, the year 2012 marks the launch of WHO's Roadmap to control, eliminate, or eradicate NTDs by 2020, and the year 2016 marks the beginning of the SDGs for 2030.¹⁹ The index shows that progress in extending NTD service coverage can be achieved quickly.

Some countries succeeded in achieving minimum 65% coverage targets set by WHO's Roadmap (table). However, many countries, including middle-income countries, continue to miss this and other (more ambitious)

targets. In the context of UHC, Boerma and colleagues²⁰ recommended that a general target for intervention coverage could be a minimum of 80% coverage in the poorest or any other disadvantaged population.

Hogan and colleagues⁴ reported that the global median of national UHC index values in 2015 was 65 (range 22–86) and 43 (29–76) in the African Region. The global median of national NTD index values in 2015 was 32 (0–100) and 39 (0–90) in the African Region—an increase from 0 (range 0–100) globally and from 0 (range 0–3) in the African Region in 2008.

Hogan and colleagues⁴ also reported that the UHC service coverage index in 2015 was highly correlated with the HDI ($\rho=0.91$). We found that the correlation with the HDI was lower for the NTD index in 2015 ($\rho=0.11$) than for the UHC index.

The NTD index correlated negatively but weakly with income inequality, both globally ($\rho=-0.21$) and in the African Region ($\rho=-0.32$). The NTD index of 2008 was more strongly negatively correlated with income inequality in the African Region ($\rho=-0.46$). By comparison, the UHC service coverage index in 2015 was positively correlated with income equality, globally ($\rho=0.17$) and in the African Region ($\rho=0.46$).

The NTD index did not correlate with the UHC index ($\rho=0.00$), ID subindex ($\rho=0.04$), or RMNCH subindex ($\rho=0.04$) at the global level. In the African Region, the NTD index was weakly negatively correlated with the UHC index ($\rho=-0.31$) and, to a lesser extent, the ID subindex ($\rho=-0.12$) and RMNCH subindex ($\rho=-0.06$). These correlations are depicted in a correlogram in the appendix.

The NTD index was lower than the UHC index in 34 of the 44 countries in the African Region that had both NTD and UHC index values (figure 2). Of the 44 countries, the NTD index was also lower than the ID subindex in 32 countries and lower than the RMNCH subindex in 38 countries. The same data for other WHO regions are shown in the appendix. Across all six regions, the NTD index was lower than the UHC index in 81 of 113 countries. The NTD index was also lower than the ID subindex in 77 of 113 countries and lower than the RMNCH subindex in 87 of 113 countries.

The coverage differential of UHC and NTD service coverage in 2015 was positively but weakly correlated with income inequality globally ($\rho=0.21$) and in the African Region ($\rho=0.37$), suggesting that income inequality is not an insurmountable obstacle to closing the gap in coverage between services for the poor and services for the population as a whole. A similar result is obtained using the rank differential for UHC and NTD coverage, which is also positively but weakly correlated with income inequality globally ($\rho=0.28$) and in the African Region ($\rho=0.52$).

In a multivariable regression analysis, the association between rank differential for UHC and NTD coverage and the Gini coefficient was positive and statistically significant ($p=0.00356$) for the 85 countries with

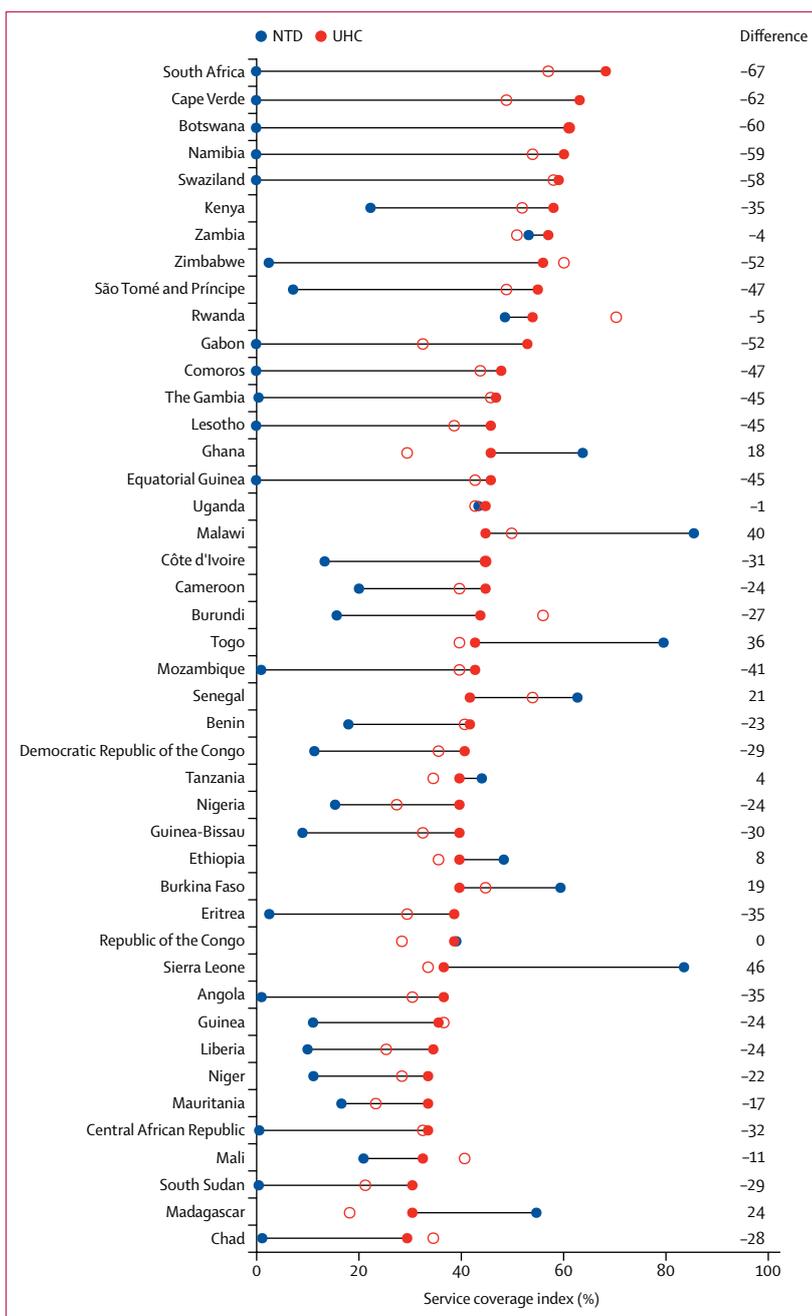


Figure 2: NTD and UHC service coverage indices, WHO African Region, 2015

The NTD service coverage index is plotted in blue; the UHC service coverage index is plotted in red (full circle), with the infectious disease (ID) subindex also in red (empty circle); point differences between the NTD and UHC indices (the UHC-NTD coverage differentials) are shown in the right column. NTD=neglected tropical diseases. UHC=universal health coverage.

complete observations. The association with HDI was also positive and statistically significant ($p<0.0001$). These two variables alone explain almost half the variation between countries ($R^2=0.45$).

See Online for appendix

We found no statistically significant association with the percentage of the total population needing preventive chemotherapy or the external share in total health

expenditure. In other words, we have no evidence that inequity in coverage is related to the relative size of the vulnerable population or to dependence on global health initiatives.

Discussion

We propose an NTD service coverage index that is simple to calculate and is methodologically comparable to the UHC service coverage index described by Hogan and colleagues.⁴ Like the UHC index, the proposed NTD index emphasises equity and integrated delivery across services. In the logic of leaving no one behind, very high coverage for one disease or service does not substitute for very low coverage for another disease or service, even if the population in need is small.

On the basis of available data, we have calculated the NTD index using preventive chemotherapy coverage for five NTDs in 123 countries over 9 years. Although preventive chemotherapy coverage has been reported in WHO's Weekly Epidemiological Record,¹⁵ this is the first analysis of the full data series. There are valid concerns about the quality of preventive chemotherapy coverage data, with survey findings suggesting that actual preventive chemotherapy coverage is lower than that reported to WHO.²¹ However, any bias would probably underestimate the difference between this NTD index and the UHC index.

The NTD index was adopted for the African Leaders Malaria Alliance Scorecard for Accountability and Action and launched at the 30th African Union Summit on Jan 28, 2018. The data used to calculate the NTD index are owned by WHO member states and reported by the district up to the national level. The NTD index can be disaggregated and analysed at the most appropriate level, for accountability and action.

As data become available, the NTD index will be expanded to track coverage for disease management, vector management, and veterinary public health. With logical categories of NTD services (eg, mass treatment, individual treatment, and active surveillance), a geometric mean of geometric means could be used to give equal weight to each category of service rather than to each NTD.

By focusing on treatment of the diseases of poor and otherwise marginalised communities (with internationally donated medicines), the NTD index provides a simple way of assessing equity in health service coverage. Other available measures of inequality are based on maternal and child health services that benefit entire populations; by definition, these measures exclude services that are specifically targeted at the poorest populations.²²

We present evidence that the UHC index is not strongly correlated with the NTD index. We conclude that the NTD index, based on services targeting the poorest, gives additional weight to a segment of the population that the UHC index might be missing and is therefore complementary to it. The NTD index can be used to monitor equity in progress on the UHC index in at least

113 countries. For example, in 2015, South Africa did not provide coverage to populations needing preventive chemotherapy for schistosomiasis and soil-transmitted helminthiasis (NTD index of 0). Yet the UHC service coverage index suggested that South Africa is the best performing country in the African Region (UHC index of 60). In 2016, South Africa achieved nearly 100% coverage of the 3.9 million school-aged children and younger needing preventive chemotherapy for soil-transmitted helminths but still did not deliver preventive chemotherapy to the 2.6 million school-aged children needing it for schistosomiasis (NTD index of 3). Had South Africa achieved 80% coverage (a UHC target) for schistosomiasis, it could have better argued that UHC reform was prioritising the people who are least well off (as would have been reflected in an NTD index value of 89).

Our results suggest that socioeconomic barriers can prevent the pursuit of equity in service coverage, but the results also offer hope that these barriers can be overcome. In countries where the NTD index exceeds the UHC index, preventive chemotherapy might be being implemented independently of the other health services. In this case, other programmes might do well to look at mobilising community distributors of NTD drugs for the delivery of other essential services for the poor.

More generally, countries with a large or increasing differential in UHC and NTD coverage should investigate further whether progress towards UHC is truly prioritising the people who are least well off. In automotive mechanics, the differential is what allows wheels to move at different speeds in a turn. In UHC reform, facility-based curative treatment and care often moves faster than the rest of the system. Reform that prioritises community-based and outreach services, including but not limited to those of the proposed NTD index, is more likely to reach the poor.

Contributors

CF conceived the study. CF, MB, PSM, and GB developed the methods. AM, HZ, and MPR collected and validated the data. MB analysed the data. MRCS and GB supervised the study. CF wrote the first draft of the Article. All authors revised and approved the final version of the Article. The authors alone are responsible for the views expressed in this Article, which do not necessarily represent the views, decisions, or policies of the institutions with which they are affiliated.

Declaration of interests

We declare no competing interests.

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