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Guest Editor:
Dr. Jai Prakash Narain
Assessing the characteristics of 110 low- and middle-income countries' noncommunicable disease national action plans

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ABSTRACT

Noncommunicable diseases (NCDs) are a leading contributor to preventable mortality and impoverishment in low- and middle-income countries (LMICs). To support countries in developing holistic and integrated NCD plans, the World Health Organization (WHO) has produced a NCD Multisectoral Action Plan (MSAP) guidance. To date, over 160 countries have produced MSAPs and uploaded them to the WHO's NCD document repository. We examined the content and comprehensiveness of the MSAPs uploaded by all 110 LMICs, with reference to the WHO guidance. Overall, the MSAPs included 71% of the elements recommended by the WHO, however, there was a tendency to present situational analyses and recommended actions without providing costings or an overall funding plan. We found no correlation between MSAP comprehensiveness (alignment with the WHO guidance) and policy implementation. There were no significant differences in MSAP alignment by region or income group. Countries with higher universal health coverage indices had lower MSAP alignment score. We concluded that the existence of a comprehensive MSAP is not enough to guarantee policy implementation, and that the WHO should focus its support on helping countries to translate plans and policies into concrete actions to address NCDs.

Keywords: Global health, noncommunicable diseases, policy analysis

Summary

Noncommunicable diseases (NCDs) are a leading contributor to preventable mortality and impoverishment in low- and middle-income countries (LMICs). To support countries in developing holistic and integrated NCD plans, the World Health Organization (WHO) has produced a NCD Multisectoral Action Plan (MSAP) guidance. To date, over 160 countries have produced MSAPs and uploaded them to the WHO's NCD document repository. We examined the content and comprehensiveness of the MSAPs uploaded by all 110 LMICs, with reference to the WHO guidance. Overall, the MSAPs included 71% of the elements recommended by the WHO, however, there was a tendency to present situational analyses and recommended actions without providing costings or an overall funding plan. We found no correlation between MSAP comprehensiveness (alignment with the WHO guidance) and policy implementation. There were no significant differences in MSAP alignment by region or income group. Countries with higher universal health coverage indices had lower MSAP alignment score. We concluded that the existence of a comprehensive MSAP is not enough to guarantee policy implementation, and that the WHO should focus its support on helping countries to translate plans and policies into concrete actions to address NCDs.

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coverage (UHC) indices had lower MSAP alignment score. We concluded that the existence of a comprehensive MSAP is not enough to guarantee policy implementation, and that the WHO should focus its support on helping countries to translate plans and policies into concrete actions to address NCDs.

**Background**

Globally, NCDs are responsible for 63% of disability-adjusted life years and 71% of all deaths. Both of these proportions are rising over time.\cite{1-5} Whereas the proportion of deaths caused by NCDs is high but relatively stable in high-income countries at >80% of all deaths, the proportion has been rising quickly in LMICs, albeit starting from a low baseline.\cite{5} Findings from Ethiopia, India, Kenya, and Nepal suggest that NCDs are the leading cause of impoverishing out-of-pocket health expenditure.\cite{6}

The WHO has committed to support Member States in tackling NCDs via the 2030 Agenda for Action and the 13th General Programme of Work.\cite{7,8} The organization already provides technical assistance using policy dialog platforms, technical packages, practical tools, analysis work, and NCDs emergency kits.\cite{9,10} Acknowledging that strong MSAPs are an important element for national NCD responses, the WHO has also produced an MSAP toolkit that is based on a multifaceted NCD planning logic model considering the inputs, processes, and outcomes required to integrate effective policies and deliver high-quality NCD services.

The WHO recommends that each country’s MSAP covers five main areas: assessment, engagement, strategic agenda setting, implementation, and monitoring and evaluation (M and E), as well as aligning with the WHO NCD Global Action Plan and the menu of unanimously adopted NCD policy options and interventions (including the “Best Buys”).\cite{11,12} The guidance follows the classic “4 × 4” conceptualization of NCDs which focuses on cancer, diabetes, cardiovascular diseases and chronic respiratory diseases, and the four major risk factors: tobacco, alcohol, unhealthy diet, and physical inactivity.

Over 160 countries have produced national NCD MSAPs and uploaded them to the WHO online NCD document repository, including 80% of all LMICs. The aim of this study was to assess the content of all LMIC plans and their alignment with the WHO guidance, highlighting policy areas that are absent from NCD plans, and identifying countries that may need additional support in developing strong plans and tackling NCDs. Traditional proxies used to direct technical NCD support include gross domestic product (GDP), UHC indices, and the underlying risk of premature NCD mortality.\cite{13,14} We sought to assess the extent to which these markers correlated with MSAP alignment. We hypothesized that countries with weakly aligned MSAPs would not necessarily be resource-constrained countries, nor those with developing health systems or the highest NCD burden. Finally, we aimed to test whether MSAP alignment correlated with implementation of the NCD policies listed in the Global Action Plan.

**Study Data and Methods**

**Study design and data sources**

We conducted a systematic document analysis of publicly available MSAPs. To date, 110 LMICs have uploaded documents labeled “integrated NCD policies” within the “NCD policies, strategies, and action plans” section of the WHO online NCD document repository.\cite{15} We used the official WHO “MSAP Checklist and Guidance” to develop our data extraction checklist.\cite{16}

**Development of the data extraction checklist**

We used a three-stage approach to develop a robust extraction form. In Stage 1, the core content areas in the WHO guidance were mapped by the authors. These researchers then developed a pilot extraction form with 43 items [Appendix 1] and a codebook to define each item, detail the scoring criteria, and reference the appropriate WHO source.

This initial form was piloted on one non-English language MSAP by seven different researchers, who then met to debrief on initial inter-rater agreement and the degree to which the pilot form adequately captured the core domains presented in the WHO documents. One item was dropped (“Does the MSAP provide global key process indicators?”) on the basis that it was poorly defined; two additional items were added; and one item was redefined to bring additional clarity, producing a modified extraction form of 44 items [Appendix 1]. A non-English language MSAP was selected in order to test the feasibility of using online translation software (Google Translate) for non-English MSAPs.\cite{17} All reviewers agreed that the translation performed well but that a greater range of languages should be tested before settling on this particular software.

In Stage 2, pairs of researchers independently used the modified extraction form to extract data from...
two non-English language MSAPS from each of the six WHO world regions. Reviewer dyads met to discuss any discrepancies before the wider research group met to discuss their experiences with the modified extraction form. Inter-reviewer agreement was calculated for each item using Cohen’s kappa. The items with the lowest level of agreement were discussed further, in order to tighten the codebook definitions.

At this stage, six items were dropped from the modified extraction form as the researchers felt that they did not capture core content. Eight items that were felt to overlap were condensed into three new items. Appendix 1 summarizes these amendments. All reviewers agreed that Google Translate performed sufficiently well for the purposes of assessing the presence or absence of our predefined MSAP components of interest, and to continue using it for non-English MSAPS.

The final data extraction form had 31 items, split into five domains that mirror the WHO template: Assessment, Engagement, Strategic Agenda, Implementation, and M&E. In the third stage, any queries or ambiguities that arose from reviewing the remaining MSAPs were raised with the entire research team at regular meetings in order to refine the codebook and ensure a consistent approach.

**Multisectoral action plan evaluation**

Dual independent review was used to extract data from each MSAP. The final version of the checklist was used to re-extract data from the 13 MSAPs already assessed in the pilot stages. All MSAPs were divided into ten deciles using computer randomization. The wider team met after each decile had been completed to discuss coding issues and to calculate inter-rater agreement. Once the a priori Cohen’s kappa threshold >0.75 was exceeded (“excellent agreement”),[18] the research team completed the remainder of the MSAPs using single review. Any uncertainties, for instance from poor translation or ambiguity, were raised with the corresponding author and discussed at the regular team meetings. Final decisions were made by group consensus. Reviewers recorded all queries, comments, and ambiguities on the shared data extraction spreadsheet, available here.

We used descriptive statistics to summarize the core characteristics of the MSAPs, including languages, dates, and overall alignment with the WHO guidance, assessed by awarding 1 point for each item in our 31-item checklist. These country-level scores should be viewed purely as assessing alignment with the WHO recommendations. It is recognized that MSAP alignment scores do not necessarily reflect MSAP quality or integrity.

We used the most recent document if multiple MSAPs had been uploaded for different years, and when the year designation in the document file title contradicted the year designation stated in the document text, we used the year presented in the document text. Where two or more documents were provided that covered the same year, we treated the collection of uploaded documents as one unified MSAP. If a MSAP did not specify an action but pointed to another document, for example, “For salt reduction targets see the national diet strategy 2015–2025,” we only awarded a point if that additional document had been uploaded to the WHO repository under the MSAP designation.

**Analytical approaches**

During the data extraction pilot phase, the research team noted that a number of policy documents did not seem to be MSAPs: either they referenced other documents (not uploaded in the WHO repository) that appeared to be the national MSAP, or they were broader strategic health sector plans, implying that there was no specific NCD MSAP for the given country. The scores derived from these documents are likely to underestimate the true level of alignment. To negate any artifact error, we removed these countries from the main analysis but included them in a sensitivity analysis.

We used descriptive statistics to assess the prevalence of recommended MSAP components and produced a heat map to visualize the overall alignment of each MSAP with the WHO recommendations.

We used analysis of variance testing to examine whether mean MSAP alignment scores differed significantly between the six WHO world regions and across World Bank income groups. If ANOVA suggested a statistically significant mean difference between the groups, we then used Tukey’s multiple pairwise comparisons (Honest Significant Differences).

We assessed the correlation between MSAP score and traditional indices used to target support: GDP per capita, UHC index, and risk of premature NCD mortality. We hypothesized that countries with weaker economies and health systems or a high risk of premature mortality (traditional recipients of the WHO support) would not necessarily have the least well-aligned MSAPs as minimal resources are required to develop a well-aligned
document. We obtained the GDP per capita data from the 2017 Global Burden of Disease covariates and 2015 UHC service coverage index data from the WHO Global Health Observatory.\cite{4,18,19} Risk of premature mortality data was obtained from the WHO Global Health Observatory.\cite{18} We assessed normality using QQ plots and Shapiro–Wilk normality tests, and used Pearson or Spearman correlation depending on whether the data were normally distributed.

Finally, we assessed whether MSAP alignment scores were associated with implementation of the WHO-backed NCD policies. We used 2019 policy implementation data presented in the 2020 WHO NCD Progress Monitor Report.\cite{20} This document reports the country-level implementation status of 19 policies from the WHO NCD Global Action Plan – the same document that informed the development of the WHO MSAP guidance. Allen et al. have previously produced overall policy implementation scores for each LMIC that we used to assess the correlation with MSAP alignment scores.\cite{21} Using Spearman and Pearson correlation, we performed two analyses: one assessing all MSAPs published prior to 2019, and a second on all MSAPs published ≤2015.

**Sensitivity analyses**

We re-ran all analyses on the full set of 110 documents uploaded to the WHO repository with the MSAP designation, even if the documents themselves did not purport to be MSAPs. To test whether the translation software may have artificially raised or lowered MSAP alignment scores, we used a two-sided t-test to determine if there were statistically significant differences between the mean scores of English and translated MSAPs. All statistical analyses were performed on R 4.0.3, and all tests of statistical significance were assessed using an alpha level of 0.05.\cite{22}

**Ethics and funding**

Ethical approval was not required for this study. The research was fully funded by the Government of the Republic of Korea through the WHO.

**Study Results**

A total of 110 LMICs uploaded MSAP documents to the WHO NCD repository that they designated as “multisectoral action plans.” The included MSAPs had a mean start date of 2015, with a date range of 2002–2019. Overall, 12 countries had MSAPs comprising multiple documents. Sixteen countries had uploaded MSAP documents from more than one year.

Sixty of the MSAPs were written in English (54.5%), 20 in French (18.0%), 11 in Spanish (10.0%), 6 in Russian (5.5%), 2 in Portuguese (1.8%), and 11 other national languages were used for the remaining 11 MSAPs.

The mean alignment score was 68.8% (21.3/31.0 items; range: 4.0 to 31.0; standard deviation [SD] =5.7), and there was a left skew to the distribution [Figure 1].

During review, we found that 15 countries had uploaded documents that did not purport to be MSAPs, or had other issues that may have led to systematic underestimation of the national alignment score. For example, El Salvador only uploaded the implementation plan component of their MSAP. These 15 documents were excluded from the subsequent analyses. A full country list and rationale for exclusion is provided in Appendixes 2 and 3.

After removing the 15 non-MSAP documents, the mean alignment score for the remaining 95 MSAPs rose from 68.7% to 71.0% (range: 12.9% to 100.0%). The score distribution retained a left skew (Shapiro–Wilk normality test: \( P <0.001 \)).

Over 90% of plans included the following six WHO-recommended items: NCD morbidity and mortality data, risk factor data, goals and targets, and actions targeting surveillance and the strengthening of governance and health systems. The least widely included elements were background economic indicators, actions targeting palliative care and chronic respiratory diseases, costs for key actions, and funding plans [Figure 2].

Mean alignment was highest in lower-middle income countries (LMICs) (mean = 23.9), and ANOVA suggested

![Figure 1: Histogram of MSAP alignment scores across 110 MSAPs](image-url)
that alignment score differed significantly between the income groups ($P = 0.040$) [Figure 3]. However, Tukey's Honest Significant Difference testing suggested that there were no significant pairwise differences between lower-middle versus low-income countries ($P = 0.075$), nor lower-middle versus upper-middle-income countries ($P = 0.076$).

Mean alignment score was highest in the Eastern Mediterranean and African regions, with approximately three-quarters of the items included in these countries' MSAPs [Figure 4]. The 15 European LMICs had the lowest alignment, with a third of the WHO-recommended items absent [Figure 5]; however, differences between the WHO regions were not statistically significant.

While inclusion of some items was low across the board, such as costings, there was marked regional variation in other areas. For instance, all Eastern Mediterranean MSAPs set goals and targets that were based on a situational analysis and aligned with the Global Action Plan. South East Asian MSAPs tended not to include actions that specifically targeted the prevention and management of named disease groups, and two-thirds of European MSAPs did not include M and E indicators [Figure 5].

Traditional markers that are used to direct financial and technical support correlated poorly with MSAP alignment scores [Table 1 and Figure 6]. All three indices exhibited weak negative associations; however, only UHC index achieved statistical significance at the 0.05 level ($rho = -0.25, P = 0.016$)

Furthermore, alignment score was not associated with NCD policy implementation, irrespective of whether the MSAPs were published pre-2019 or ≤2015.

### Sensitivity analyses

When we included all 110 documents uploaded to the WHO repository, the $P$ values for all correlation

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**Table 1: Correlation values of country characteristics versus multisectoral action plan score**

<table>
<thead>
<tr>
<th></th>
<th>All 110 documents</th>
<th>95 MSAPs</th>
<th>Data availability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$rho$</td>
<td>$P$</td>
<td>$rho$</td>
</tr>
<tr>
<td><strong>GDP/capita</strong></td>
<td>$-0.127$</td>
<td>$0.195$</td>
<td>$-0.089$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No data for Cook Islands, Nauru, Niue, Micronesia</td>
</tr>
<tr>
<td><strong>UHC index</strong></td>
<td>$-0.287$</td>
<td>$0.003$</td>
<td>$-0.252$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No data for Cook Islands, Nauru, Niue, Marshall Islands</td>
</tr>
<tr>
<td><strong>Risk of premature NCD mortality</strong></td>
<td>$-0.066$</td>
<td>$0.500$</td>
<td>$-0.0901$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No data for Cook Islands, Nauru, Niue, Marshall Islands</td>
</tr>
<tr>
<td><strong>NCD policy implementation (&lt;2019)</strong></td>
<td>$-0.109^*$</td>
<td>$0.275$</td>
<td>$0.03^*$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>101 countries included$^*$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>87 countries included$^*$</td>
</tr>
<tr>
<td><strong>NCD policy implementation (≤2015)</strong></td>
<td>$-0.018^*$</td>
<td>$0.891$</td>
<td>$-0.056^{**}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>63 countries included$^*$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>55 countries included$^*$</td>
</tr>
</tbody>
</table>

MSAPs - Multisectoral action plans, GDP - Gross domestic product, UHC - Universal Health Coverage, NCD - Noncommunicable diseases

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Figure 2: Prevalence of each of the 31 WHO-recommended items among 95 MSAPs. SDOH: Social determinants of health

Figure 3: Alignment scores by income group
coefficients generally improved, but GDP per capita, risk of premature mortality, and NCD policy implementation all remained statistically nonsignificant at the 0.05 \( \alpha \) level [Table 1].

The mean alignment score for MSAPs written in English was 22.2 and the mean score for non-English MSAPs was 21.6. The mean difference value was 0.8 (95% confidence interval: –1.6–2.9; \( P = 0.590 \)) [Figure 7].

Post hoc analysis
Given that MSAP alignment score was not associated with policy implementation, we identified countries with poorly aligned MSAPs and low levels of policy implementation. Five countries had MSAP alignment scores < 1 SD below the mean (<16.5) and policy implementation scores < 1 SD below the mean (<5.1) [Table 2].

Discussion
Main findings
To date, 110 LMIC documents have been uploaded to the WHO NCD data repository, of which 95 purport to be MSAPs. Among this subset, 71% of the WHO-recommended elements were present in the documents. There was no significant regional variation, and MSAP alignment scores were not correlated with GDP per capita, income group, or risk of premature NCD mortality. There was a weak negative correlation between UHC index and MSAP alignment, suggesting that countries with the least developed health systems may have followed the WHO guidance more closely when developing their MSAPs.
Looking across the WHO-recommended elements, most countries had included background epidemiological data on NCDs, set targets and objectives, and detailed specific actions to address tobacco, alcohol, physical inactivity, and diet. Inclusion of actions to address specific diagnostic conditions – especially chronic respiratory disease – was much lower, suggesting that countries placed a stronger focus on preventive measures. More than a third of all MSAPs did not include M&E indicators or an implementation strategy, and more than half of all MSAPs did not include costs for key actions or an overall funding plan. This suggests a gap in the features designed for MSAPs.
to hold countries accountable for implementing the actions planned in the MSAPs. This is furthered by the weak correlation between MSAP scores and NCD policy implementation.

Although alignment scores were high overall, we found that MSAP alignment did not correlate with implementation of NCD policies in 2019. Previous research has also suggested that overall NCD service readiness is low across LMICs, and Bollyky et al. have found that low-income countries facing the fastest NCD epidemiological transitions are the least well prepared to tackle these conditions.

A number of research teams have examined the relationship between NCD plans and their translation into policy implementation in different world regions. Juma et al. found high levels of government engagement with the development of NCD plans and policies across five African countries but a marked implementation gap – aligning with our own findings. The authors cite several barriers that prevent plans from translating into action, including industry interference and inadequate political commitment, resources, local data, and technical capacity. These themes recur in Nyaaba et al.’s examination of NCD policy implementation in Ghana. Future actions that build on this assessment of MSAP comprehensiveness could include support to countries to update their MSAPs; MSAP quality appraisal, with a particular focus on actionability and implementation; and retroactive MSAP assessments to compare intent with attainment.

Murphy et al. found that population-level policies in the Caribbean were slow to be ratified and implemented due to lack of personnel trained in policy development and a reliance on foreign consultants. Similarly, Tuangratananon et al. found that seven South East Asian countries had well-developed NCD MSAPs, but they did not necessarily translate into action due to low levels of institutional capacity, inadequate funding, weak intersectoral coordination, and lack of standardized monitoring and evaluation processes to track progress. An ASEAN expert review of NCD policy gaps found that surveillance and multisectoral engagement were particular issues for South East Asian countries, requiring a renewed emphasis on “whole-of-government” approaches.

In their analysis of 151 countries, Allen et al. found that just under half of all WHO-recommended NCD policies were being implemented worldwide, and that region, GDP, and income group were not significantly associated with implementation in fully adjusted analyses. Isaranuwatchai et al.’s “Best Buys, Wasted Buys, and Contestable Buys” provides in-depth analysis of the factors that determine the real-world effectiveness of NCD policies, strongly emphasizing the importance on local context in national planning activities. Ideally, countries should tailor their plans to meet their unique population health needs in combination with their specific geographic, demographic, and economic contexts.

Based on the totality of evidence, while MSAPs are widely perceived as indispensable elements for national NCD strategies, the existence of a comprehensive and well-aligned MSAP is not in itself sufficient to supporting policy implementation. We recommend that the WHO focuses further technical support on the basis of both policy implementation and MSAP alignment, rather than focusing on countries with low MSAP alignment scores. Support for building capacities for implementation is also needed.

**Limitations**

While our sample included every document uploaded by an LMIC, this sample does not represent all LMICs. Other countries have produced MSAPs but have not uploaded them to the WHO repository. Overall inter-reviewer agreement was 0.77 (“excellent agreement”) across the documents subject to dual review, and we had a robust system for identifying areas of inter-reviewer disagreement; however, not every document was subject to dual review.

Points were only awarded if a country had uploaded one or more documents that contained the relevant data. In some instances, MSAPs cited supplementary documents but had not uploaded them to the repository. This will have resulted in an underestimation of alignment score. Moreover, a plan can look good on paper but may be worthless if it does not reflect reality or plan for the correct scenarios. Assessing the MSAPs for comprehensiveness is a start, but future actions should include supporting countries to update their plans, assess the quality of the plan and whether it is rooted in implementation, and retroactively assess plan performance after it is executed.

Inclusion scores were highest when the MSAP domain score could be achieved through only one variable. The prevalence of inclusion was lower when MSAP domains required specific data for multiple linked variables. Unsurprisingly, there were many ways a MSAP could score for health system strengthening actions, while the
multilayered nature of domains like “each assessment action is costed” predispose a lower inclusion prevalence.

Due to resource constraints, documents were not professionally translated. There is a risk that we missed poorly translated elements in documents written in a language not spoken by our team. However, our sensitivity analysis is reassuring in that there was no systematic mean difference in MSAP alignment scores.

The main limitation of our approach is the unintentional but unavoidable normative implication that well-aligned MSAPs are “good” MSAPs. Our findings underline the fact that inclusion of all elements recommended by the WHO does not necessarily translate into policy implementation. Countries may have developed comprehensive and well-thought-out MSAPs but written them in a way that does not align with the current WHO guidance.

Conclusions

Four-fifths of all LMICs have uploaded MSAPs to the WHO portal, and these documents are reasonably well aligned with the WHO recommendations. Countries with less well-aligned MSAPs are not the traditional subset of LMICs that face the greatest resource constraints and epidemiological challenges.

While most countries included situational analyses and listed actions to tackle behavioral risk factors, fewer countries outlined funding, implementation, and M&E strategies. This may partly explain the lack of correlation between MSAP alignment and policy implementation, however, broader research highlights a multitude of additional factors at play.

While MSAPs are a means of supporting the implementation of NCD policies, they are insufficient in themselves, and probably should not be used as process indicators for progress towards NCD outcomes.

We recommend that the WHO tailors its support on a case-by-case basis, ensuring that MSAP development assistance is supplemented with holistic support for the broader policy implementation process.

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Funded and sponsored by the World Health Organization. However, the authors alone are responsible for the views expressed in this article and they do not necessarily represent the decisions, policy or views of the World Health Organization.

Conflicts of interest

There are no conflicts of interest.

References

13. Bollyky TJ, Templin T, Cohen M, Dieleman JL. Lower-income countries that face the most rapid shift in noncommunicable disease burden are also the least prepared. Health Aff (Millwood) 2017;36:1866-75.


### Appendixes

**Appendix 1: Development stages for the extraction form**

**Stage 1: Pilot data extraction form**

<table>
<thead>
<tr>
<th>MAP details</th>
<th>Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link to MAP</td>
<td>Country</td>
</tr>
<tr>
<td>Language of MAP</td>
<td>Link to MAP</td>
</tr>
<tr>
<td>Does the title suggest that this document is a national multisectoral action plan for NCDs?</td>
<td>Language of MAP</td>
</tr>
<tr>
<td>MAP year</td>
<td>Does the title suggest that this document is a national multisectoral action plan for NCDs?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alignment items</th>
<th>Situational analysis. Does the NCD MAP include specific statistics and relevant sociodemographic information?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Population and health indicators</td>
<td>1. Population and health indicators</td>
</tr>
<tr>
<td>2. NCD mortality and morbidity</td>
<td>2. NCD mortality and morbidity</td>
</tr>
<tr>
<td>3. NCD risk factors</td>
<td>3. NCD risk factors</td>
</tr>
<tr>
<td>4. Economic and health expenditure indicators</td>
<td>4. Economic and health expenditure indicators</td>
</tr>
<tr>
<td>5. SDOH (impacts of NCDs on development and social burden)</td>
<td>5. SDOH (impacts of NCDs on development and social burden)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Does the MAP mention preexisting national NCD plans/actions/policies?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the MAP integrated into the master health plan?</td>
</tr>
<tr>
<td>Does assessment provide recommendations including priorities for action?</td>
</tr>
<tr>
<td>Was the MAP developed with the input of multiple stakeholders within the health sector?</td>
</tr>
<tr>
<td>Was the MAP developed with the input of stakeholders from outside the health sector?</td>
</tr>
<tr>
<td>Does the MAP identify the roles and responsibilities of all stakeholders?</td>
</tr>
<tr>
<td>Does the MAP set national goals and targets?</td>
</tr>
<tr>
<td>Are these based on the results of the situational analysis (i.e., actions mapped to the national context)?</td>
</tr>
<tr>
<td>Are these aligned with the Global Action Plan objectives or voluntary targets?</td>
</tr>
<tr>
<td>Is there a “NCD target doc” uploaded for this country?</td>
</tr>
<tr>
<td>If yes, then what year is it from?</td>
</tr>
<tr>
<td>Are there actions pertaining to strengthening governance?</td>
</tr>
<tr>
<td>Are there actions pertaining to prevention and health promotion?</td>
</tr>
<tr>
<td>Are there actions pertaining to improving management of NCDs?</td>
</tr>
</tbody>
</table>

| 15. Check the “NCD target docs” tab |
| 16. Check the “NCD target docs” tab |
| 17. Advocacy |
| 18. Leadership |
| 19. Coordination |
| 20. International cooperation |
| 21. Tobacco |
| 22. Alcohol |
| 23. Unhealthy diet |
| 24. Physical inactivity |
| 25. Air pollution |
| 26. The MAP mentions specific actions for prevention and/or health promotion without specifying a specific risk factor. Can only get this if scored 0 in the preceding 4 |
| 27. The MAP sets out specific actions to improve the early detection and effective treatment of cardiovascular diseases |
| 28. The MAP sets out specific actions to improve the early detection and effective treatment of diabetes |
| 29. The MAP sets out specific actions to improve the early detection and effective treatment of cancer |
| 30. The MAP sets out specific actions to improve the early detection and effective treatment of chronic respiratory diseases |

Contd...
<table>
<thead>
<tr>
<th>Alignment items</th>
<th>31. If the MAP mentions specific actions for the early detection and treatment of “NCDs” without specifying a specific disease group. Can only get this if scored 0 in the preceding 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there actions pertaining to NCD surveillance (e.g., STEPS or</td>
<td>32. The MAP sets out specific actions to improve palliative care</td>
</tr>
<tr>
<td>national health survey)</td>
<td>33. The MAP sets out specific actions to strengthen health system for NCDs</td>
</tr>
<tr>
<td>Are there actions pertaining to monitoring and evaluation of NCD</td>
<td>34. The MAP includes actions to strengthen national NCD surveillance and monitoring and evaluation of NCD programs. One or more of the below must be mentioned: Include routine collection of NCD data in the national health information system/administer a STEPS or comprehensive health examination survey/any other actions that is described or presented as improving NCD surveillance</td>
</tr>
<tr>
<td>programs?</td>
<td></td>
</tr>
<tr>
<td>Are there actions pertaining to facilitating NCD research?</td>
<td>35. The MAP outlines one or more action to monitor and evaluate one or more NCD program</td>
</tr>
<tr>
<td>Does the MAP list key actions, with timeframes, costs, and responsible agents?</td>
<td>36. The MAP includes one or more of: develop a prioritized research agenda/capacity building for research/developing a research network/boosting research funding</td>
</tr>
<tr>
<td>Does the MAP include a plan to raise funding to support implementation?</td>
<td>37. The map lists the key actions, and for each element provides timeframes</td>
</tr>
<tr>
<td>Does the MAP include implementation strategies?</td>
<td>38. The map lists the key actions, and for each element provides costs</td>
</tr>
<tr>
<td>Does the MAP define a national M&amp;E framework for monitoring the</td>
<td>39. The map lists the key actions, and for each element provides responsible agents</td>
</tr>
<tr>
<td>implementation of the MAP?</td>
<td>40. The MAP includes a plan designed to secure funding for implementation of the actions/recommendations outlined in the MAP</td>
</tr>
<tr>
<td>Does the MAP identify a set of indicators (with data sources) to</td>
<td>41. The MAP provides concrete actions to enhance adoption, implementation, and sustainability of the interventions</td>
</tr>
<tr>
<td>monitor impact and outcomes on NCDs?</td>
<td>42. Definition: The MAP presents a framework that will be used to guide the process of monitoring the national MAP, including three or more of: inputs/process/outputs/impact/outcomes</td>
</tr>
<tr>
<td>NCD - Noncommunicable diseases, SDOH - Social determinants of health</td>
<td>43. The MAP outlines which indicators and data sources are to be used to monitor impact and outcomes</td>
</tr>
</tbody>
</table>
## Final extraction form

### Background

<table>
<thead>
<tr>
<th>MAP details</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link to MAP</td>
<td></td>
</tr>
<tr>
<td>Language of MAP</td>
<td></td>
</tr>
</tbody>
</table>

Does the title suggest that this document is a national multisectoral action plan for NCDs?  

MAP year

1. NCD mortality and morbidity  
2. NCD behavioral risk factors  
3. Any mention of demographic indicators  
4. Any mention of economic indicators  
5. SDOH explicitly mentioned in the text  
6. SDOH addressed in the MAP but not explicitly mentioned in the text

Does the MAP mention preexisting national NCD plans/actions/policies?  

Was the MAP developed with the input of multiple stakeholders within the health sector?  

Was the MAP developed with the input of stakeholders from outside the health sector?  

Does the MAP set national goals and targets?  

Are these based on the results of the situational analysis (i.e., actions mapped to the national context)?  

Are these aligned with the global action plan objectives or voluntary targets?  

Are there actions pertaining to strengthening governance?  

Are there actions pertaining to prevention and health promotion?  

Are there actions pertaining to improving management of NCDs?  

Are there actions pertaining to NCD surveillance?  

Are there actions pertaining to NCD surveillance (e.g., STEPS or national health survey)?  

The MAP lists timeframes for each key action?  

The MAP lists costs for each key action?  

Does the MAP list responsible agents for each key actions?  

Does the MAP include a plan to raise funding to support implementation?  

Does the MAP include implementation strategies?  

Does the MAP identify a set of indicators to monitor impact and outcomes of NCDs?  

---

NCD - Noncommunicable diseases, SDOH - Social determinants of health

## Final extraction form

### Background

<table>
<thead>
<tr>
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Are there actions pertaining to NCD surveillance (e.g., STEPS or national health survey)?  

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The MAP lists costs for each key action?  

Does the MAP list responsible agents for each key actions?  

Does the MAP include a plan to raise funding to support implementation?  

Does the MAP include implementation strategies?  

Does the MAP identify a set of indicators to monitor impact and outcomes of NCDs?  

---

NCD - Noncommunicable diseases, SDOH - Social determinants of health
Phase 1:

Phase 1 of the Codebook contained 44 total items and was piloted on 12 MSAPs. The original codebook developed in partnership with the WHO contained domains: Assessment, Engagement, Strategic Agenda, and Implementation. Each domain consisted of specific components, which were further subdivided into specific items. After Phase 1 of MAP data extraction, two additional items were added in the Strategic Agenda domain, increasing the total number of items to 46.

Phase 2 codebook contained 46 items. Upon completion of Phase 2, the reviewers agreed to drop 15 items from the codebook and revised one item, leaving a total of totaling 31 items. The items dropped across the codebook domains include: Assessment (four dropped items), Engagement (one dropped item), Strategic Agenda (eight dropped items, one revised), and Implementation (one dropped item). Thus, the final codebook used in Phase 3 of data extraction contained a total of 31 items.

<table>
<thead>
<tr>
<th>Component</th>
<th>Item</th>
<th>Add or dropped or restructured</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1 to Phase 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategic agenda</td>
<td>The MAP mentions specific actions for prevention and/or health promotion without specifying a specific risk factor</td>
<td>Add</td>
<td>This could only get this a point if the proceeding actions all scored 0</td>
</tr>
<tr>
<td></td>
<td>If the MAP mentions specific actions for the early detection and treatment of &quot;NCDs&quot; without specifying a specific disease group?</td>
<td>Add</td>
<td>This could only get this a point if the proceeding actions all scored 0</td>
</tr>
<tr>
<td><strong>Phase 2 to Phase 3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment</td>
<td>Population health indicators</td>
<td>Dropped</td>
<td>Too broad of interpretation</td>
</tr>
<tr>
<td></td>
<td>Economic and health expenditure indicators</td>
<td>Dropped</td>
<td>Not an essential elimination of NCD and inter-rater agreement was not significant (58%)</td>
</tr>
<tr>
<td></td>
<td>SDOH</td>
<td>Restructured</td>
<td>Challenging to justify elements that should be included, and the definition is hard to consistently define. We opted to add a point if SDOH were specifically mentioned, and a second point if the reviews felt that the MAP addressed SDOH without explicitly naming it</td>
</tr>
<tr>
<td></td>
<td>MAP states that the plan aligned with overarching national health plan</td>
<td>Dropped</td>
<td>Low validity as a number of plans were integrated into national health plans but not specified in MSAPs</td>
</tr>
<tr>
<td></td>
<td>MAP moves beyond identifying potential action to prioritize these actions and/or provides recommendations</td>
<td>Dropped</td>
<td>Duplication with item 8%-100% alignments between item 8 during first round of scoring</td>
</tr>
<tr>
<td>Engagement</td>
<td>Does MAP identify the roles and responsibilities of all stakeholders?</td>
<td>Dropped</td>
<td>Overlap with Item 17</td>
</tr>
<tr>
<td>Strategic agenda</td>
<td>Is there a target doc uploaded for this country?</td>
<td>Dropped</td>
<td>WHO advises that countries present goals in MAP style?</td>
</tr>
<tr>
<td></td>
<td>If yes (10.1), what year</td>
<td>Dropped</td>
<td>See above</td>
</tr>
<tr>
<td></td>
<td>Are there actions pertaining to strengthening governance, consisting of four separate items (1 point for containing actions for each) (a) advocacy, (b) leadership, (c) coordination, and (d) international cooperation</td>
<td>Restructured</td>
<td>Difficulty identifying these actions. The four items were restricted into one item &quot;The MAP sets out specific actions with the explicitly stated aim of strengthening governance, or advocacy, or coordination, or international cooperation&quot;</td>
</tr>
<tr>
<td></td>
<td>The MAP mentions specific actions for prevention and/or health promotion without specifying a risk factor</td>
<td>Dropped</td>
<td>Too vague in data extraction</td>
</tr>
<tr>
<td></td>
<td>The MAP mentions specific actions for the early detection and treatment of &quot;NCDs&quot; without specifying a specific disease group</td>
<td>Dropped</td>
<td>All items fit under the &quot;Health System Strengthening&quot; item</td>
</tr>
<tr>
<td></td>
<td>The MAP outlines one or more actions to monitor and evaluate one or more NCD programs</td>
<td>Dropped</td>
<td>Overlap with component 21, and hard to define planning compared to actual action</td>
</tr>
<tr>
<td>Implementation</td>
<td>The MAP presents a framework that will be used to guide the process of monitoring the national MAP, including three or more of: inputs/process/outputs/impact/outcomes</td>
<td>Dropped</td>
<td>The definition was poorly defined, inhibiting robust and reproducible data extraction. MSAPs may well have used a well-established M&amp;E framework that does not align with the five elements above. Most MSAPs did not explicitly state that they were or were not using a framework, so it was difficult to reliably determine. There was also overlap with component 21</td>
</tr>
</tbody>
</table>

Phase 3 = Total of 31 items. NCD - Noncommunicable diseases, SDOH - Social determinants of health, MSAPs - Multisectoral action plans
Appendix 2: LMICs that had not submitted MSAPs

We used the World Bank 2019 Analytic Classification. We included all 110 LMICs that had submitted documents to the WHO data repository. The 29 LMICs that had not submitted MSAPs were:


Note that Nauru and Romain have both graduated to high-income countries since 2019.

Source: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519

Appendix 3: Reason for excluding 15 MSAPs from the main analysis

Algeria  
https://extranet.who.int/ncdccs/Data/DZA_B3_plan%20strat%C3%A9gique_MNT2015-2019.pdf  
The MAP appears to be written as a summary/framework document that is accompanied by more detailed plans for communications, monitoring and evaluation (not yet developed), financing, and operations/implementation.

Argentina  
https://extranet.who.int/ncdccs/Data/ARG_B3_estrategia%20nacional%20de%20prevencion%20y%20control%20de%20ENT.pdf  
Appears to be a resolution for the creation of such a MAP rather than a MAP itself.

Armenia  
Appears to be a policy document signaling the decision to implement a MAP, rather than a MAP itself.

DR Congo  
https://extranet.who.int/ncdccs/Data/COD_B3_PLAN STRATEGIQUE MULTISECTORIEL MNT 2016-2020.docx  
Draft version of a document replete with editorial comments. Clearly not the final version, but also references multiple other documents that might represent the MAP.

El Salvador  
This document is one element of the broader MAP; the implementation plan. The broader MAP has not been uploaded.

Eswatini  
https://extranet.who.int/ncdccs/Data/SWZ_B3_Swaziland National NCD Policy 2016.docx  
This is a policy document rather than a MAP.

Georgia  
https://extranet.who.int/ncdccs/Data/GEO_B3_NCD%20strategy%202017-2020-Geo.pdf  
Poor translation. Removed as MAP alignment score may be artificially low.
Indonesia
https://extranet.who.int/ncdccs/Data/IDN_B3_STRATEGIC%20ACTIONS%20FOR%20THE%20PREVENTION%20AND%20CONTROL%20OF%20NCD[English].docx

This is the isolated implementation plan with an overview of actions and goals. It is chapter 5 of a larger document.

Kazakhstan
https://extranet.who.int/ncdccs/Data/KAZ_B3_%D0%B4%D0%B5%D0%BD%D1%81%D0%B0%D1%83%D0%BB%D1%8B%D0%BA.pdf

Poor translation. Removed as MAP alignment score may be artificially low.

Lebanon
https://extranet.who.int/ncdccs/Data/LBN_B3_Final%20plan%202014.pdf

This appears to be a broader strategic objective document rather than a MAP.

Mexico
https://extranet.who.int/ncdccs/Data/MEX_B3_Estrategia%20Nacional%20para%20Prevenci%C3%B3n%20SOD.pdf

A number of the tables could not be translated. Removed as MAP alignment score may be artificially low.

Philippines

Unclear whether this is a MAP or a preliminary policy framework.

Tajikistan
https://extranet.who.int/ncdccs/Data/TJK_B3_NCD%20Strategy_Eng.pdf

The document references a wide range of other plans and strategy documents that have not been uploaded but seem to collectively represent the overall national MAP.

Togo
https://extranet.who.int/ncdccs/Data/TGO_B3_togo_annex_2_ncd_strategy_2012_2015.pdf

Poor translation. Removed as MAP alignment score may be artificially low.

United Republic of Tanzania
https://extranet.who.int/ncdccs/Data/TZA_B3_NCD%20Strategic%20Plan%202016%20‑%202020v0.3.pdf

The document mentions many related documents that have more specific details for strategies for tobacco control, mental health, nutrition, cancer, palea took care, breast cancer, cervical cancer, and alcohol. These have not been uploaded but appear to collectively represent the national MAP.