Non-communicable disease policy implementation from 2014 to 2021: a repeated cross-sectional analysis of global policy data for 194 countries

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Summary

Background Non-communicable diseases (NCDs) are the world's leading cause of death and disability. Global implementation of WHO-recommended NCD policies has been increasing with time, but in 2019 fewer than half of these policies had been implemented globally. In 2022, WHO released updated data on NCD policy implementation, on the basis of surveys conducted in 2021 during the COVID-19 pandemic. We sought to examine whether the trajectory of global policy implementation changed during this period.

Methods In this repeated cross-sectional analysis, we used data from the 2015, 2017, 2020, and 2022 WHO progress monitors to calculate NCD policy implementation scores for all 194 WHO member states. We used Welch's ANOVA and Games-Howell post-hoc pairwise testing to examine changes in mean implementation scores for 19 WHO-recommended NCD policies, with assessment at the global, geographical, geopolitical, and country-income levels. We collated sales data on tobacco, alcohol, and junk foods to examine the association between changes in sales and the predicted probability of implementation of policies targeting these products. We also calculated the Corporate Financial Influence Index (CFII) for each country, which was used to assess the association between corporate influence and policy implementation. We used logistic regression to assess the relationship between product sales and the probability of implementing related policies. The relationship between CFII and policy implementation was assessed with Pearson's correlation analysis and random-effects multivariate regression.

Findings Across the 194 countries, in the years preceding publication of each progress monitor, mean total policy implementation score (out of a potential 18·0) was 7·0 (SD 3·5) in 2014, 8·2 (3·5) in 2016, 8·6 (3·6) in 2019, and 8·6 (3·6) in 2021. Only the differences in mean implementation score between 2014 and the other three report years were deemed statistically significant (pairwise $p<0·05$). Thus the steady improvement in mean global NCD policy implementation stalled in 2021 at 47·8%. However, from 2019 to 2021, we identified shifts in individual policies: global mean implementation scores increased for policies on tobacco, clinical guidelines, salt, and child food marketing, and decreased for policies on alcohol, breastmilk substitute marketing, physical activity mass media campaigns, risk factor surveys, and national NCD plans and targets. Six of the seven policies with the lowest levels of implementation (global mean score <0·4 out of a potential 1·0) in both 2019 and 2021 were related to tobacco, alcohol, and unhealthy food. From 2020 onwards, we identified weak or no associations between sales of tobacco, alcohol, and junk foods and the predicted probability of implementing policies related to each commodity. Country-level CFII was significantly associated with total policy implementation score (Pearson's r –0·49, 95% CI –0·59 to –0·36), and this finding was supported in multivariate modelling for all policies combined and for all commercial policies except alcohol policies.

Interpretation NCD policy implementation has stagnated. Progress in the implementation of some policies is matched by decreased implementation of others, particularly those related to unhealthy commodities. To prevent NCDs and their consequences, and attain the Sustainable Development Goals, the rate of NCD policy adoption must be substantially and urgently increased before the next NCD progress monitor and UN high-level meeting on NCDs in 2024.

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Introduction

Non-communicable diseases (NCDs) are responsible for more than 70% of deaths and disability globally, and this burden is increasing with time.[1] WHO has recommended a suite of population-level policies to tackle NCDs that was endorsed by all 194 of its member states in 2013 (panel).[2] WHO has conducted a series of global country capacity surveys to assess the extent to which each member state has implemented these policies. The findings have been reported in the 2015, 2017, 2020, and 2022 NCD progress monitor reports, each of which pertain to data collected in the preceding year.[3–6] Fewer than half of all the

Research in context

Evidence before this study

Non-communicable disease (NCD) policy implementation might have been affected in several ways during the early phases of the COVID-19 pandemic. In some cases, emergency policies were implemented to protect against NCD risk factors. In other cases, NCD policy work has been put on hold while authorities address the challenges and consequences of the pandemic. Four WHO reports, the NCD progress monitors, provide data on the level of implementation of 19 so-called best buy policies to prevent and address NCDs across the 194 WHO member states, for the years 2014, 2016, 2019, and 2021. Based on the first three reports, we previously showed that on average, less than half of the policies had been implemented globally by 2019, with consistent improvements in global mean scores year on year; although negative trends for several market-related policies were identified. We also previously analysed the association between an index of protections against corporate financial influence (Corporate Financial Influence Index [CFII]) and NCD policy implementation, identifying an independently significant association, particularly in countries with little or no democratic governance.

Added value of this study

This study assesses the trajectory of NCD policy implementation during the early phases of the COVID-19 pandemic. We also performed a series of novel analyses to explore global implementation patterns. We combined data from the four WHO progress monitor reports to assess the level of NCD policy implementation and associations with key factors, including sales of unhealthy commodities during the pandemic. We found that global average NCD policy implementation stagnated from 2019 to 2021. Improvement in the implementation of some policies was offset by reduced implementation of others, including those relating to physical activity, national NCD planning, and alcohol. Additionally, we found that policy makers do not seem to have responded to early pandemic-related changes in consumption patterns of tobacco, alcohol, and unhealthy foods and soft drinks.

Implications of all the available evidence

We know that NCDs predispose people to poor COVID-19 outcomes; however, the implementation of evidence-based policies to prevent NCDs has stagnated, in particular with regard to unhealthy commodities as risk factors. During the pandemic, although a few high-profile emergency measures targeting NCDs have been successful in some countries, in many cases, particularly in low-income and lower-middle-income countries, the sales of unhealthy commodities have increased. Policy makers should review how the population attributable risk fraction has changed for each major risk factor in their setting and implement effective policies accordingly. Protections against corporate financial influence have marginally improved worldwide, although remain an important and largely unaddressed factor in the NCD syndemic.

recommended policies had been fully implemented by 2019, although slow gains were being made year-on-year.[7]

Our previous work based on the data for 2014–19 identified geopolitical inequalities, inadequate action on alcohol, unhealthy food restrictions, and particular tobacco policies, and an alarming association of poor implementation with the absence of safeguards against corporate financial influence over policy making processes.[7–9] In early 2022, the WHO progress monitor reported NCD policy implementation data from the latest round of country capacity surveys, conducted in 2021 at the height of the COVID-19 pandemic and global lockdowns.[6] At this time, the syndemic relationship between infectious diseases and NCDs was in focus, with the then UK Prime Minister Boris Johnson calling attention to obesity as a major factor for his intensive care admission.[10,11] In addition, during the height of the pandemic there was unprecedented public tolerance of civil liberty restrictions, and the imposition of temporary measures to ban the sale of alcohol in a number of states.[12] Since 2020, Botswana, India, and South Africa have restricted tobacco sales,[13] New Zealand introduced legislation to ban the sale of tobacco for those born after 2008,[14] and a number of other states are considering similarly unprecedented measures to tackle the commercial determinants of NCDs.[15] At the same time, national lockdowns appear to be associated with reductions in physical activity and a sharp increase in demand for junk food (ie, packaged foods and soft-drinks high in calories, salt, fat, or sugar), alcohol, and cigarettes in many settings.[16–19]

In this study, we aimed to examine whether the trajectory of global NCD policy implementation changed at the onset of the pandemic. We also aimed to assess whether corporate financial influence changed during the initial lockdown period. The Corporate Financial Influence Index (CFII) is a proxy for regulatory safeguards against financial influence over politicians, political parties, and policy making processes, with such influence explaining 22·6% of the variance in NCD policy implementation in 2019.[9] Our specific objectives were to summarise changes in policy implementation scores before and during the pandemic at the global, regional, and income-group levels; to examine the association between changes in tobacco, alcohol, and junk food sales and changes in the implementation of relevant commercial policies with time; and to calculate CFIIs for each country using 2021 data, to subsequently assess the correlation between CFII and policy implementation, and the proportion of variance in policy implementation scores explained by CFII.

Panel: **WHO-recommended non-communicable disease policies at the state level**

1 Establish time-bound national targets on the basis of WHO guidance.
2 Establish a functioning system for generating reliable cause-specific mortality data on a routine basis.
3 Conduct a stepwise approach to non-communicable disease (NCD) risk factor surveillance survey or a comprehensive health examination survey every 5 years.
4 Develop an operational multisectoral national strategy or action plan that integrates the major NCDs and their shared risk factors.
5 Implement measures to reduce affordability by increasing excise taxes and prices on tobacco products.
6 Implement measures to eliminate exposure to second-hand tobacco smoke in all indoor workplaces, public places, and public transport.
7 Implement plain, standardised packaging or large graphic health warnings on all tobacco packages.
8 Enact and enforce comprehensive bans on tobacco advertising, promotion, and sponsorship.
9 Implement effective mass media campaigns that educate the public about the harms of smoking, tobacco use, and second-hand smoke.
10 Enact and enforce restrictions on the physical availability of retail alcohol (via reduced hours of sale).
11 Enact and enforce bans or comprehensive restrictions on exposure to alcohol advertising (across multiple types of media).
12 Introduce excise taxes on alcoholic beverages.
13 Introduce national policies to reduce population salt and sodium consumption.
14 Introduce national policies that limit saturated fatty acids and virtually eliminate industrially produced trans-fatty acids in the food supply.
15 Implement the WHO set of recommendations on marketing of foods and non-alcoholic beverages to children.
16 Introduce legislation and regulations fully implementing the International Code of Marketing of Breast-milk Substitutes.
17 Conduct at least one recent national public awareness programme and motivational communication for physical activity, including mass media campaigns for physical activity behavioural change.
18 Introduce evidence-based national guidelines, protocols, and standards for management of major NCDs through a primary care approach, that the government or competent authorities has recognised and approved.
19 Provide drug therapy, including glycaemic control, and counselling for eligible persons at high risk to prevent heart attacks and strokes, with emphasis on primary care.

Methods

Study design and procedures

In this repeated cross-sectional analysis, we used the policy implementation data from the NCD progress monitors on all 194 WHO member states.[3–6] As in previous studies,[7,8] we transcribed national NCD policy implementation scores from the 2015, 2017, 2020, and 2022 NCD progress monitors, according 1 point for full implementation, 0·5 points for partial implementation, and 0 points for policies that had not been implemented or when no data were reported (reasoning that it was more likely that these policies were not implemented than implemented). Full details on the definitions for implementation of each policy are available in each of the progress monitor reports. To enable fair comparisons across all years, we excluded the tobacco mass media campaigns policy, as it was not included in the 2015 progress monitor report. We used the WHO classifications for regional groupings and The World Bank 2021 analytical classification for income groups. We report data using the year in which it was collected (ie, the year preceding the respective report publication).

To contextualise our examination of NCD policy trends and assess how key risk factors evolved, we examined changes in sales of tobacco, alcohol, and junk foods before and after 2019. We analysed sales of tobacco, alcohol, and soft drinks, and a range of food products high in fat, salt, and sugar, with food categorisations based on product descriptions and existing taxonomies.[20,21] Sales data were obtained from Euromonitor International's market database (Passport) for 96 countries in our sample between 2008 and 2021. Annual sales data are reported on a per capita basis, with different units of measurement depending on the product (appendix p 1). Ethical approval was not required for this study.

For the **Euromonitor Passport database** see https://www.euromonitor.com/our-expertise/passport

See **Online** for appendix

Statistical analysis

To examine trends in policy implementation with time, we calculated the mean total implementation score for all 19 policies for each year of data collection and used Welch's ANOVA and Games-Howell post-hoc pairwise testing to examine whether differences between each year were significant at the 0·05 level. We produced violin plots that displayed the spread of national scores around the median (plus IQR and range) and mean for each year. Global policy implementation was also presented as a proportion of total possible coverage (mean score out of total possible score) for each year.

We calculated the mean implementation score for each WHO region, for the 2021 World Bank income groups, and for five geopolitical blocs: the 27 countries in the EU (EU27), the 37 countries in the Organisation for Economic

For **The World Bank income group classifications** see https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html

For the **WHO region classifications** see https://www.who.int/countries

Cooperation and Development (OECD), the 15 former Soviet states, the 15 fragile and conflict-affected countries as defined by the World Bank (as of 2022), and the 15 small island developing states defined by the UN (as of 2022). The changes in mean implementation score over the consecutive years of data collection were reviewed at the global, regional, geographical, and geopolitical level, and by income group, with particular focus on score change from 2019 to 2021, immediately before and during the COVID-19 pandemic.

We also calculated the mean implementation score for each individual policy, ranging from 0 (no country had implemented or partially implemented the policy) to a potential maximum of 1 (every country had fully implemented the policy). We displayed changes with time using a clustered bar chart. We isolated the commercial policies (those pertaining to tobacco, alcohol, and diet) and produced a second set of violin plots, and repeated Welch's ANOVA and Games-Howell pairwise testing to examine differences in total implementation scores with time for these commercial policies.

We assessed changes in per-capita sales of tobacco, alcohol, junk food, and soft drink products before and during the COVID-19 pandemic in 96 countries by estimating regression models that incorporated a COVID-19 dummy variable coded as 1 for all years since (and including) 2020, and as 0 for all years before 2020. Our models also controlled for country-level fixed-effects and annual time trends. We conducted a pooled analysis assessing changes across all countries and a disaggregated analysis assessing variation across the different country income groups. Subsequently, we assessed whether changes in sales since 2020 were associated with changes in the probability of at least partially implementing the policies regulating these products. We calculated average marginal effects from logistic regression models incorporating an incidence per-capita sales interaction term, again controlling for country-level fixed-effects and annual time trends. Further details on the models are provided in the appendix (p 12). All models were estimated with use of clustered standard error.

To assess the relationship between corporate financial influence and policy implementation we used the CFII. The CFII is an index capturing the level of protection against corporate financial influence, with the score ranging from 0 (lowest level of corporate financial influence or highest protection) to 100 (highest level of corporate financial influence).[9] The index was constructed for 172 countries with available data via latent factor analysis of six indicators: disclosure of campaign donations, public campaign finance, ban on corporate campaign donations, disclosure of financial and business interests by politicians, legislature corrupt activities, and executive oversight.[9] We updated the CFII scores of each WHO member state for all years using the latest data from the Varieties of Democracy project (version 12), the International Institute for Democracy and Electoral Assistance, and Djankov and colleagues.[22] We calculated mean CFII score at the global level and by WHO region, World Bank income group, and geopolitical bloc. For the 172 countries we calculated Pearson's correlation between CFII and total implementation score in 2021. For the same countries, we regressed total implementation score on CFII, separately for the years 2019 and 2021, to determine the proportion of variance in implementation explained by the index (R^2). We also ran multivariate random-effects regressions for all years to assess the association between policy implementation and CFII. To address potential confounding we included a broad set of economic, cultural, historical, geographical, and demographic factors (appendix pp 17–19).

In each NCD progress monitor report, data are not available for a minority of policies. For our main analyses we assigned these items a policy implementation score of 0 (equivalent to the policy not being implemented), reasoning that it was unlikely that a policy would be implemented but no data would be available. In a sensitivity analysis we checked whether our main results were robust to a compromise between assuming non-implementation for unreported policies and assuming that the level of implementation tracks the level of implementation of the other policies that were reported. We took the mean of: (1) the total score as a proportion of the maximum possible score when unreported policies are assigned a implementation score of 0; and (2) the total score as a proportion of the maximum possible score for the policies reported. The lowest possible score for this continuous measure was 0 and the highest possible score was 1.

We used a statistical significance level (α value) of 0·05 and 95% CIs. All analyses were done in Stata (version 14.2) and R (version 4.2.2).

Role of the funding source

There was no funding source for this study. Open access fees were provided by the London School of Economics and Political Science (London, UK), but the school had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

Across the 194 countries represented in the WHO progress monitors, mean total implementation score for all NCD policies increased from 7·0 (SD 3·5), out of a potential maximum of 18·0, in 2014, to 8·2 (3·5) in 2016, 8·6 (3·6) in 2019, and 8·6 (3·6) in 2021 (figure 1). These scores represented an overall global NCD policy implementation of 38·9% in 2014, 45·6% in 2016, and 47·8% in 2019 and 2021. Only the differences in mean implementation score between 2014 and the other three report years were deemed statistically significant (all p<0·05 for pairwise difference). The number of missing policy scores increased from 101 (2·9%) of 3492 scores

For **The World Bank classification of fragile and conflict-affected countries** see https://www.worldbank.org/en/topic/fragilityconflictviolence/brief/harmonized-list-of-fragile-situations

For the **UN list of Small Island Developing States** see https://sustainabledevelopment.un.org/topics/sids/list

For the **Varieties of Democracy database** see https://v-dem.net/data/the-v-dem-dataset/

For the **International Institute for Democracy and Electoral Assistance database** see https://www.idea.int/data-tools/data/political-finance-database

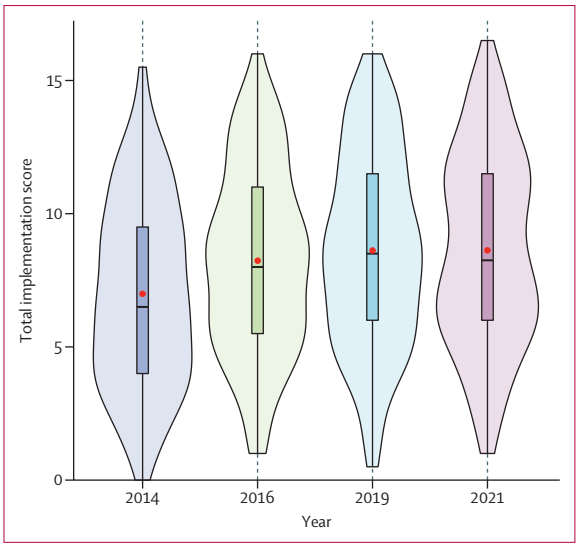

Figure 1: **Distributions of total policy implementation scores in 2014, 2016, 2019, and 2021 for all 194 countries**
Violin plots show the distribution of scores around the median, IQR, and range, and mean (red dots) for each year.

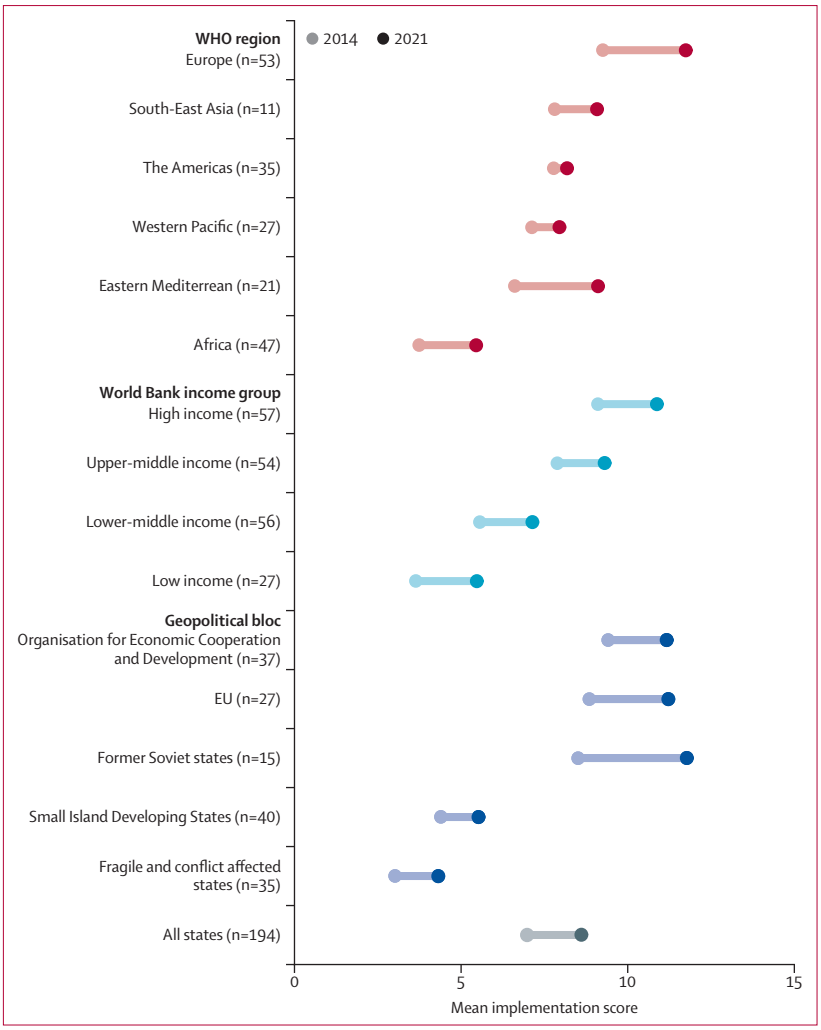

Figure 2: **Change in mean implementation scores from 2014 to 2021**

across all countries in 2019, before the COVID-19 pandemic, to 112 (3·2%) in 2021, during the pandemic.

In 2014–21, mean implementation scores were highest in the Europe region and in high-income countries (HICs), and lowest in the Africa region and in low-income countries (LICs). Regarding geopolitical blocs, mean scores were highest in former Soviet states, OECD countries, and EU27 countries, and lowest in fragile and conflict-affected states. Across the regional, income level, and geopolitical groupings, we observed increases in mean implementation scores between 2014 and 2021; the smallest percentage increase was in the Americas region (5·1%; mean score change 7·8 to 8·2), and the largest increase was in LICs (50·3%; 3·7 to 5·5; figure 2). Between 2019 and 2021, despite low absolute levels of implementation, the Africa region and the LIC category had the largest improvements in mean implementation score (appendix p 2). The largest decrease in this period was seen in the South-East Asia region and in small island developing states. Changes were negligible for the remaining groups (appendix p 2).

Although the global mean implementation score was unchanged between 2019 and 2021, we identified shifts in individual policies. From 2019 to 2021, global mean implementation scores increased for all five tobacco policies, the clinical guidelines policy (one of four national planning policies), the salt policy, and child food marketing policy. During this period, global mean scores decreased for two alcohol policies, the breastmilk substitute marketing policy, the physical activity mass media campaign policy, and three of the four national planning policies (those regarding a national NCD plan, risk factor surveys, and national NCD targets; figure 3). Mean implementation score for the alcohol tax policy did not change. From 2019 to 2021, mean implementation scores for seven policies remained lower than 0·4 (where 1=full implementation in every country and 0=no implementation in any country), and all but one of these policies was related to unhealthy commodities. For the subset of commercial policies (ie, those relating to tobacco, alcohol, and food), we found no significant difference in mean implementation scores in pairwise comparisons of implementation scores between 2019 and 2021 (appendix p 8). As in 2019, the three most widely implemented policies (score >0·6) in 2021 were those regarding clinical guidelines, graphic health warnings on tobacco products, and national NCD targets.

The sales of many unhealthy products did not change significantly since 2020, after onset of the COVID-19 pandemic, compared with pre-2020 sales in the 96 countries we analysed (appendix pp 3–4). The largest changes were seen in a small cluster of product categories, with the patterns reversed for HICs versus LICs and lower-middle income countries (LMICs):

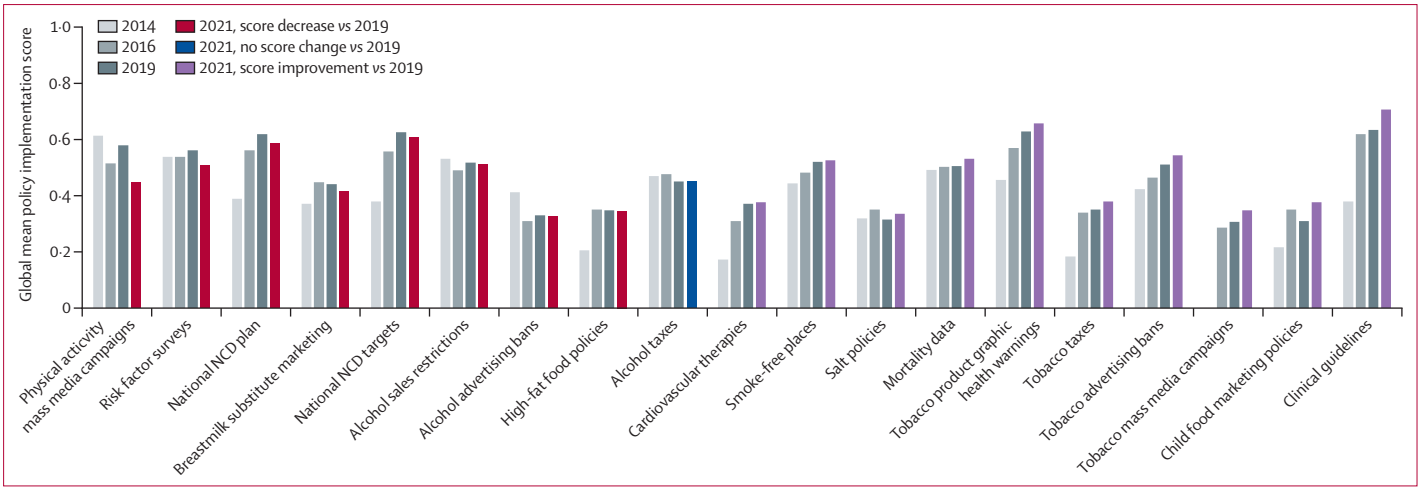

***Figure 3*: Change in global mean policy implementation scores with time**
Policies are sorted by change in implementation score between 2019 and 2021. NCD=non-communicable disease.

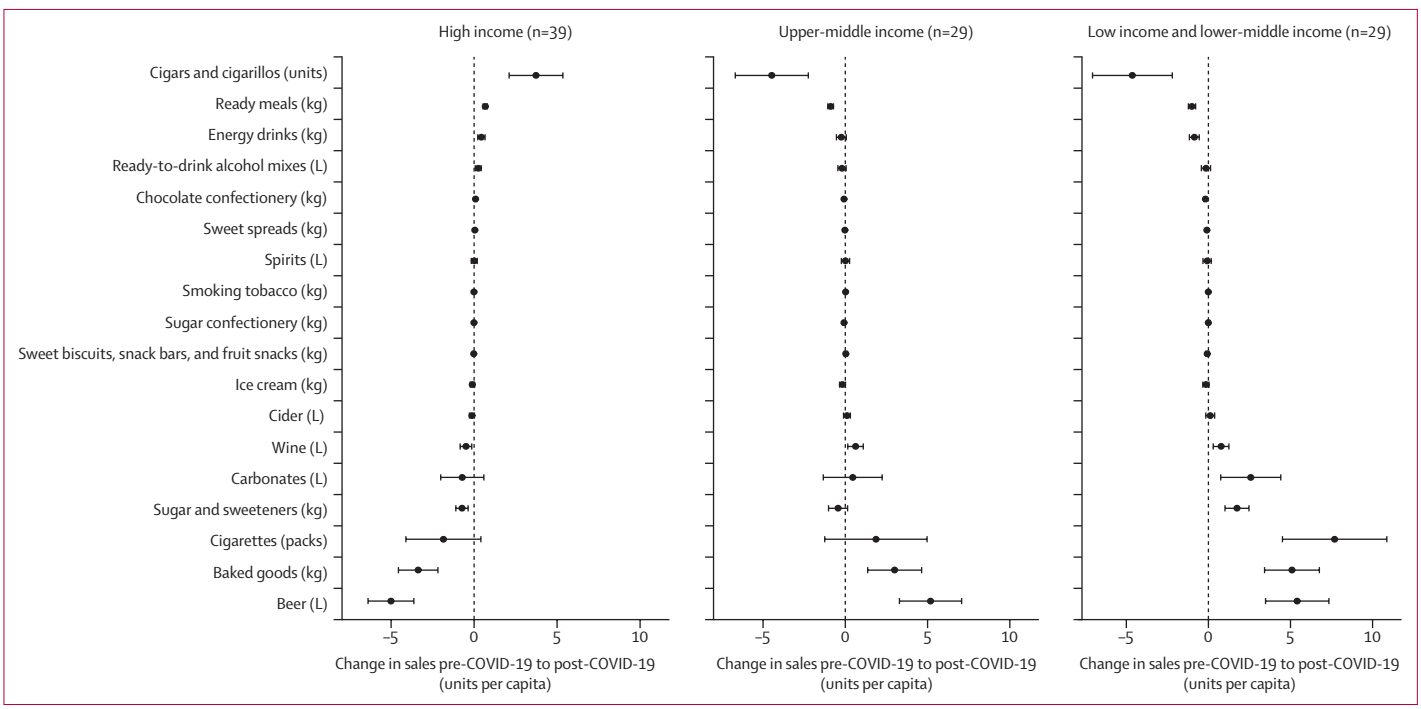

***Figure 4*: Change in mean sales of unhealthy commodities by World Bank country income category during the COVID-19 pandemic**
Pre-COVID-19 refers to all years before 2020, and post-COVID-19 to all years since (and including) 2020.

per-capita sales of beer, wine, sugar and sweeteners, and baked goods significantly decreased in HICs but significantly increased in LICs and LMICs (at the α=0·05 level). Conversely, sales of ready meals and energy drinks significantly increased in HICs but significantly decreased in LICs and LMICs (figure 4). A significant increase in cigarette sales was offset by a modest, significant decrease in cigar and cigarillo sales in LMICs. A significant increase in cigar and cigarillo sales occurred in HICs.

At the global level, a 1-unit change in litres of alcohol sold during the pandemic was not associated with significant changes in the predicted probability of implementing any of the alcohol policies (appendix p 5). This result indicates that countries with pandemic-related increases in alcohol consumption did not implement stricter alcohol regulations in 2021. The same outcome was observed for tobacco sales (appendix p 6) with the exception of one product category: we found that each 1-unit increase in sales of cigars and cigarillos was

significantly associated with a 0·1 percentage point increase (95% CI 0·01 to 0·19) in the predicted probability of implementing a tobacco taxes. Similar negligible but positive associations were found for changes in sales of junk foods and soft drinks and the probability of implementing policies on salt, high-fat foods, and child food marketing. Most of these associations were significant at the α=0·05 level (appendix p 7).

We calculated CFII scores for 172 countries using the latest available data. In 2021 the mean index score was 46·3 points out of a possible 100, which was marginally decreased from 2019 (46·5). In 2021, the lowest corporate influence was in Lithuania (3·1) and the highest was in Qatar (97·6; appendix pp 13–15). In terms of WHO regions, Europe had the lowest mean index score (28·6), and the highest mean score was in the Eastern Mediterranean (62·8), followed by Africa (57·8). With respect to income groups, HICs had the lowest mean score and LICs had the highest mean score. In terms of geopolitical blocs, the EU27 and OECD member states had the lowest mean scores, and fragile and conflict-affected states had the highest score (appendix p 16). Global mean CFII decreased with time, with a 3·4% reduction between 2014 (mean score 47·9) and 2021. The largest decreases in mean CFII over this period were in the region of the Americas (8·2%), former Soviet states (7·4%), and the upper middle-income countries category (7·1%; appendix p 16).

Countries with higher levels of corporate financial influence had the lowest levels of policy implementation (Pearson's *r* –0·49, 95% CI –0·59 to –0·36; figure 5). We found that CFII explained 23·7% of the variance in overall NCD policy implementation scores in 2021, which was similar to the variance explained in 2019 (24·2%). In our random-effects model controlling for several potential confounding factors, we also found that CFII was significantly negatively associated with implementation score for all policies combined and for all commercial policies except alcohol policies (appendix p 19).

The main results produced when assigning an implementation score of 0 for policies without data did not qualitatively differ from those produced by our sensitivity analysis that used a compromised value for mean score for each country, balancing between the mean score for all policies and the mean score for policies reported (appendix pp 9–11, 20).

Figure 5: **Association between CFII and total policy implementation score in 2021**
Pearson's correlation analysis of CFII versus mean policy implementation score in 172 countries with data available. Countries are designated by International Organization for Standardization codes. CFII=Corporate Financial Influence Index.

Discussion

To our knowledge, this study provides the first global analysis of NCD policy implementation since the onset of the COVID-19 pandemic. We found that global implementation of the 19 WHO-recommended policies had stalled in 2021, at 47·8%. Compared with 2019, improvements occurred by 2021 in the implementation of some policies, such as those for tobacco and salt, but these improvements were offset by reduced implementation in several other policies, including in alcohol policies and those regarding the availability of NCD plans, targets, and risk factor surveys.

Despite the now well established link between NCDs and poor COVID-19 outcomes, our findings suggest that policies to prevent and address those diseases have not been sufficiently prioritised during the pandemic. However, some exceptions are evident. Progress in implementing tobacco policies has continued, perhaps helped by emergency public health measures put in place in response to the pandemic, such as the ban on the sale of tobacco and nicotine products in Botswana, India, and South Africa.[13] Indeed, some of those measures had an immediate impact, with South Africa's 20-week ban causing a 30% decrease in cigarette sales, preventing an estimated 2300 premature deaths.[23] The continued progress with tobacco policies might also be linked to the existence of the WHO Framework Convention on Tobacco Control, which is one of the few international treaties related to health. This treaty is also an important inspiration for the ongoing pandemic treaty negotiations at the WHO headquarters in Geneva, Switzerland, even if a recent meta-analysis has put into question the effectiveness of such treaties.[24] Conversely, average implementation was reversed from 2019 to 2021 for two of three alcohol policies, despite high-profile national alcohol bans in India, Kenya, South Africa, and Thailand.[12] The implementation of physical activity mass media campaigns also decreased substantially, probably linked to conflicting public health messaging and stay-at-home orders.[25]

We analysed sales of unhealthy commodities before and during the COVID-19 pandemic, and identified opposing trends for particular tobacco, alcohol, junk

For the **International Organization for Standardization country codes** see https://www.iso.org/iso-3166-country-codes.html

For more on the **pandemic treaty negotiations** see https://inb.who.int

food, and soft drink products in HICs versus LICs and LMICs. We also found that policy makers had not meaningfully responded to changes in sales in 2021, with negligible associations between sales and predicted probability of policy implementation. This finding is important, given that sales and behaviours have changed as a consequence of the pandemic in various ways. These changes risk exposing millions of people to new risk factors, with risk profiles varying by income group. For example, we identified a 0·73 kg per-capita decrease (95% CI –1·10 to –0·36) in sales of sugar and sweeteners from 2019 to 2021 in HICs, but a 1·74 kg per-capita increase (95% CI 1·01 to 2·47) in the sale of these products in LICs and LMICs. These changes have implications for the policy advice and support that WHO offers in each setting, and for system leaders tasked with protecting their populations against changing risks.

Although further analysis and a longer time series are necessary to fully understand the reasons underlying the stagnation in NCD policy implementation globally, we found that the CFII explained 23·7% of variance in policy implementation in 2021. The global average index reduced slightly since 2014, indicating strengthened protections against corporate financial influence. This trend is encouraging. As in 2019, we found that CFII was highest in countries with little or no democratic governance and policy implementation scores tended to be lowest in the same settings, which is concerning in view of continued autocratic tendencies worldwide. Our analysis found evidence of an association rather than causality and we are unable to confirm the underlying reasons. We speculate that countries with the least robust institutional checks and balances on their governments also tend to be the least accountable to their citizens, and these conditions make it easier for politicians to take money from companies and lobbyists in return for stalling on the introduction of policies that might damage industry profits. In a recent commentary piece, Horton argued that the strong early response to COVID-19 seen in China and other autocracies might have provided the exception to the belief that democracy is good for health;[26] however, evidence suggests that democratic rule has made a difference during the pandemic when accompanied by sufficient trust in the government.[27]

As this analysis builds on secondary data sources, the limitations mainly relate to the quality and reliability of those secondary data. We have previously discussed the limitations of the WHO NCD progress reports, including the use of self-reported data and missing information.[7] However, these reports provide the most comprehensive and authoritative information available on global NCD policy implementation. Disruptions caused by the pandemic might have influenced the reliability of data, and the number of missing values did increase by 10% between 2019 and 2021, albeit from a low base. Our main limitation is the fact that policy making takes time, and it might be unrealistic to expect countries to introduce new legislation within a matter of months. We would counter that most countries rapidly introduced new health legislation to tackle COVID-19, and the association between respiratory diseases and NCDs (and by extension their risk factors) is well established and uncontroversial. Furthermore, all 194 WHO member states have repeatedly endorsed the WHO-backed policies for more than a decade and during the early phases of the pandemic received unparalleled public support for introducing effective measures to safeguard health. This opportunity could have been used (indeed, it was in many states) to introduce WHO NCD policies as part of broader packages of measures designed to reduce COVID-19 infections, morbidity, and mortality. Finally, our analysis sought to identify descriptive trends and patterns, and further work that uses causal inference methods will be necessary to distinguish the causal relationships underlying these trends. As further data points emerge, a more robust assessment of the effect of COVID-19 on NCD policymaking will become possible. Our study focuses on how the pre-COVID-19 trajectory changed in 2021.

We found that the slow increase in NCD policy implementation since 2014 stalled in 2021, with modest improvements in some areas offset by rescinded policies. Alcohol policies are an area of concern, while the implementation of tobacco policies continues to improve. Policy makers do not yet seem to have responded to changing consumption patterns since the onset of the COVID-19 pandemic, which we found to vary by national income group. Further work is needed to understand and counter the production, sale, and consumption of unhealthy products. NCD policies should also be considered as part of pandemic preparedness and a renewed focus on NCD policy implementation is urgently needed to reach Sustainable Development Goal 3 ahead of the next NCD progress monitor and the next UN high-level meeting on NCDs in 2024.

Contributors

All authors jointly conceived the paper and analyses. All authors contributed to data collection and analysis. LNA wrote the first draft of the manuscript and supervised the project. All authors revised the manuscript. All authors had full access to all the data in the study and accessed and verified the data. All authors had final responsibility for the decision to submit for publication.

Declaration of interests

LNA has worked on non-communicable disease policy implementation for WHO and the World Bank as a consultant. All other authors declare no competing interests.

Data sharing

We used publicly available data for all analyses, and the data can be obtained without restrictions, with the sources fully referenced in the text. Our statistical code is freely available on GitHub (https://github.com/drlukeallen).

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