



Full length article

Health in nationally determined contributions: a policy analysis of 191 countries

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A B S T R A C T

Background: Nationally Determined Contributions (NDCs) describe the commitments made by each country to reduce its greenhouse gas emissions. Assessing how health is considered in NDCs is critical to understand how countries plan to protect their populations' health from climate change.

Methods: This policy analysis investigated how health was considered by NDCs for 191 countries across seven domains: health co-benefits, health adaptation, health impacts, sustainable healthcare, health inequalities, women, and other. It included quantitative analysis, which summarised the score for each domain, and qualitative analysis using content analysis to identify common themes (i.e., recurring patterns/concepts).

Results: The mean of the total score was 4.7 (SD 3.5) points for the first submission, with median of 5 [range 0–12] points. For the second submission, the mean of the total score was 3.2 (SD 3.7) points, with median of 2 [range 0–12] points. The mean of the total score for the third submission was 7.3 (SD 3.2) points, with median of 9 [range 0–13] points. Latin American and Caribbean States achieved the highest scores. Content analysis identified important themes, such as the direct and indirect impacts of climate change on health, the need to adopt bold policies to protect the population with early warning systems and other health protection interventions, the need to build resilient health systems, the co-benefits of transitioning to renewable energy sources, the unequal impact of climate change, and the importance of gender equality and women's vulnerability.

Conclusions: Although health is considered by the NDCs of most countries, this is often superficial and does not capture the entirety of the health impacts and co-benefits. There is a need to consider health across all domains of climate mitigation and adaptation to prevent climate change from widening health inequalities and to inform planning to mitigate negative impacts on population health. Full consideration of health impacts and co-benefits is likely to strengthen the moral and economic cases for nations to prioritise action on climate change and to prevent ideology-based minimisation of the need for action.

Introduction

The impact of climate change on population and planetary health has become increasingly evident and severe for the past few years (Pathak and McKinney 2021). Extreme weather events are the most visible and harmful consequence of human-driven climate change (Arbuthnott and Hajat 2017). Policy makers across the globe are recognising to some extent the need to adopt bold policies and make strong commitments to divest from fossil fuels and switch to green sources of energy to avoid the most dramatic impacts of climate change. For instance, it is estimated that the heatwaves of 2022 in Europe resulted in about 62 thousand excess deaths, particularly among older adults (Ballester et al., 2023). The catastrophic floods in Pakistan in 2025 led to the deaths of nearly

1,000 people, while the 2022 monsoon floods caused over 1,700 deaths and 8 million displaced people (Sarkar 2022). These are just a few examples of the catastrophic impact that climate change is having on population health, but many others could be mentioned in all continents. As with most public health crises, the impacts of climate change are unequal as women, children, older adults, disabled people, and deprived communities are particularly vulnerable and have the least resources to adapt and respond (Wabnitz et al., 2026; Zahnnow et al., 2025).

The recognition of the importance of understanding the impact of climate change on health led to the creation of a health day at the 28th UN Conference of the Parties (COP). meeting in 2023. Besides the health imperative for adaptation, health is also important in climate mitigation.

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<https://doi.org/10.1016/j.envint.2026.110473>

Received 2 May 2026; Received in revised form 8 July 2026; Accepted 19 August 2026

Available online 21 August 2026

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On one hand, health systems account for about 4–5% of greenhouse gas emissions (GHG) globally and hence the need for sustainable health systems that prioritise prevention and environmentally friendly care pathways (Braithwaite et al., 2024). On the other hand, there are significant health co-benefits from switching to green sources of energy, such as a reduction in long-term conditions associated with air pollution and increased physical activity resulting from active travel (Reynolds et al., 2024). Despite this, evidence suggests that many countries do not recognise the importance of health and are not yet implementing policies to protect and promote population health in the context of climate change.

Nationally Determined Contributions (NDCs) are developed by each party to implement policies aligned with the Paris Agreement commitments. They summarise the efforts of each country to reduce national GHG emissions and adapt to the impacts of climate change. The Paris Agreement (Article 4, paragraph 2) requires each Party to prepare, communicate and maintain successive NDCs. These policy documents describe the domestic mitigation measures that each country commits to implement to reduce its GHG emissions to an extent compatible with the 1.5°C global warming pledged to in the Paris agreement. Parties shall pursue domestic mitigation measures, with the aim of achieving the targets of such contributions. It is intended that the NDCs altogether achieve the committed target of GHG that is compatible of a maximum of 1.5°C global warming above pre-industrial temperature (Tong et al., 2025).

The Lancet Countdown has been tracking mentions of health in NDCs (Indicator 5.4.1) and shown that the initial increase in countries mentioning health keywords in their NDCs (from 135 [70%] of 192 in the first round of NDCs to 162 [94%] of 172 in the second round) has not continued into the third round of NDCs, with 57 (84%) of submitted NDCs mentioning a health keyword (Romanello et al., 2025). There were significant differences between countries across the continuum of socioeconomic development. Very high human development index (HDI) countries were the least likely to reference health, with only 67% (14 of 21) of their NDCs doing so. In contrast, 100% (19 of 19) of NDCs from high HDI countries, 89% (16 of 18) of NDCs from medium HDI countries, and 86% (6 of 7) of NDCs from low HDI countries included health key words. However, this indicator only tracks mention of health without delving into how health is considered in detail. The Global Climate and Health Alliance also launched the Healthy NDCs scorecard in 2021 and updated it in 2023 to measure the extent to which NDCs considered health (Global Climate and Health Alliance, 2021, Global Climate and Health Alliance, 2023). The top-ranking country was Costa Rica (13 out of 15 points) followed by Colombia, Laos and Senegal (12 out of 15 points). Australia, Brazil, Iceland, New Zealand, North Korea, Norway, São Tome and Principe, Ukraine and Vanuatu were at the bottom of the rank with zero points. However, this analysis has not been updated with the most recent NDCs. Therefore, an in-depth analysis of how health is considered in the most recent NDCs is lacking. This study aimed to (1) assess the number of mentions of health, and (2) analyse how health was conceptualised and considered in the most recent NDCs.

Methods

Study design

We analysed NDC documents published in the UNFCCC registry for 191 countries (97 countries for the first submission, 79 countries for the second submission, and 110 countries for the third submission). We undertook qualitative and quantitative analyses to investigate to what extent health and inequalities, particularly gender inequalities and women's health, were considered in those policies.

Data extraction

We extracted NDC policies from the UNFCCC registry (United

Nations Climate Change, 2026) We searched for the key words “health”, “women/girl”, “sex/gender”, “mortality”, “disease”, “illness”, “healthcare”, “adaptation/resilience”, “nutrition”, “inequalities”, and “age/old/elder/children”. Whenever a word was present, we extracted the context and coded it according to the following criteria:

- 0 – no mention
- 1 – minimal/general mention but lack of detail
- 2 – well explained mention with relevant details.

In short, we awarded 1 point to generic mentions of the domain under assessment (e.g., mention of women among several other vulnerable groups, mention of health co-benefits without specifying them); we awarded 2 points to specific and detailed mentions of the domain under assessment, which demonstrated good understanding and commitment to address the impacts and contributions of each domain (e.g., thorough explanation of the health impacts and co-benefits with examples, enumeration of the impacts on women's health and wellbeing and importance of gender equality and inclusion of women in policy development). We used the categories described in Table 1: health impacts, health co-benefits, health adaptation, sustainable healthcare, inequalities, women and gender, and other. The latter included all mentions to health not considered in other domains. The domains included in the scoring system were developed deductively initially based on pre-defined categories extracted from previous publications and scorecards and the COP themes and then refined inductively based on the extracted text (Global Climate and Health Alliance, 2023). The inclusion of women and gender as a separate category is based on our previous publications (Pinho-Gomes and Woodward 2024). We created a codebook with the keywords and scoring criteria to improve inter-rater agreement.

We did not include mentions of health in the index and reference list. We also excluded all mentions of health not related to human health, such as soil health, animal health or ecosystem health. Countries that reported their NDCs in Russian and Arabic were excluded (Belarus, Iran

Table 1
Categories for data extraction.

Category	Description
Health co-benefits	Mention of health co-benefits of climate mitigation (i.e., decarbonisation), mainly reduction in air pollution, increasing physical activity from active transport, and healthy sustainable diets. These refer to the shared benefits for population and planetary health of shifting the global economy to renewable and clean energy sources.
Health impacts	Mention of impacts of climate change on health (e.g., vector-borne diseases, extreme weather, etc.), including both acute and protracted impacts on physical and mental health.
Health adaptation/resilience	Mention of health system adaptation to cope with impact of climate change (e.g., increased capacity to provide healthcare in response to extreme weather, redesign of the built environment to cope with high temperatures, early warning systems, etc.)
Sustainable healthcare	Acknowledgement of contribution of health systems to climate change and adoption of sustainable healthcare practices.
Health inequalities	Mention of the disproportionate impact on certain population groups, such as women, children, deprived groups, etc.
Women and gender	Any mention to gender inequalities or involvement of women in policy making and the NDC specifically. This domain included both health impacts that are disproportionate on women and girls (e.g., sexual violence, greater dependence of women on economic sectors that are vulnerable to extreme weather, etc.) and gender inequalities, such as the exclusion of women from the negotiations related to climate change).
Other	Anything else not covered by the other categories but related to health, e.g., research and policy.

(Islamic Republic of), Kyrgyzstan, Libya, Russian Federation, Tajikistan, Turkmenistan, and Uzbekistan) as we did not have native speakers in the team and found online translations to be unreliable. Greenland was also excluded as it does not currently have its own NDC. We did not undertake full manuscript review but focused on sections relevant for this analysis considering the high number of NDCs and that many sections were not relevant for this analysis. Some text sections could be coded in one or more domains if they mentioned different aspects of climate mitigation and adaptation to climate change.

As the analysis was undertaken by several researchers, we first all scored two NDC documents to standardise the scoring procedure (Barbados and Australia). We then reviewed in duplicate 20 (approximately 20%) NDCs and compared scores between reviewers for all domains. The Kendall's Coefficient of Concordance for the quantitative analysis was between $W = 0.96$ and 0.97 for all domains. Discordances were resolved by a third reviewer.

Qualitative data analysis

We undertook content analyses for each category of data to explore how health and inequalities, especially gender inequalities, were considered in each category. We also extracted data related to women's health and wellbeing. The extracted data were then analysed using content analysis. As the qualitative analysis was carried out by several researchers (ACPG, KW, EM, JG, GCF, RH, CDB), 20 (approximately 20%) NDCs were analysed in duplicate to ensure consistency across researchers. The Kendall's Coefficient of Concordance was between $W = 0.92$ and 0.98 for all domains. Discordances were resolved by a third reviewer.

Quantitative data analysis

We computed the total number of points achieved by each country across all categories for a maximum of 14 points (i.e., 7 times 2 points available for each domain). We summarised the data by UNFCCC regional groups: African States, Asian States, Eastern European States, Latin American and the Caribbean States, and Western European and Other States (Table S1). Other States included Australia, Canada, Iceland, New Zealand, Norway, Switzerland and the United States of America. These groups are used for electing the Bureau and are reflected in the rotation of the Conference of the Parties (COP) presidency. We analysed the change in scores from the first, second, and third NDC submissions.

Results

Overall findings

We included 191 countries (Table S1), which reported their NDCs in English, Spanish, French, and Chinese (Fig. S1). There were 97 countries in the first round, 79 in the second round, and 110 in the third round. There were 54 countries in Africa, 56 countries in the Asia-Pacific, 33 countries in Latin America and the Caribbean, 23 countries in Eastern Europe, and 25 countries in Western Europe and Other regions. The

quantitative and qualitative analyses are described separately below.

Quantitative analysis

The mean of the total score was 4.7 (SD 3.5) points for the first submission, with median of five, minimum of zero and maximum of 12 points. For the second submission, the mean of the total score was 3.2 (SD 3.7) points, with median of two, minimum of zero and maximum of 12 points. The mean of the total score for the third submission was 7.3 (SD 3.2) points, with median of nine, minimum of zero and maximum of 13 points. The mean scores for each domain are provided in Table 2 and demonstrate an improvement over time between 9% for Sustainable healthcare and 210% for Other. The number of points for each domain for each country and region is provided in Table S12 (Excel spreadsheet).

For the first submission, there were 16 countries with zero points (Albania, Bahrain, Cook Islands, Djibouti, Guinea-Bissau, Guyana, Iraq, Jordan, Malawi, Nauru, Palau, Democratic People's Republic of Korea, Qatar, Senegal, San Marino, and Eswatini). There were two countries with 12 points (Laos People's Democratic Republic and Cape Verde). For the second submission, there were two countries with 12 points (Guatemala and Panama) and 35 countries with zero points (Argentina, Austria, Belgium, Bulgaria, Cyprus, Czechia, Germany, Denmark, Spain, Estonia, Finland, France, Greece, Honduras, Croatia, Hungary, Ireland, Italy, Liechtenstein, Lesotho, Lithuania, Luxembourg, Latvia, Malta, Netherlands, New Zealand, Poland, Romania, Singapore, Slovakia, Slovenia, Sweden, Ukraine, and Holy See). The third submission had three countries with zero points (Bahrain, Republic of Korea, and Holy See) and one country with 13 points (Sri Lanka). Fig. 1 displays the world map with colours corresponding to the number of points for the most recent NDC submission for each country (Fig. 2).

When countries were grouped into regions, there were significant differences (Tables S2–S4). For the first submission, Latin American and Caribbean States had the highest total score (mean 6.25 SD 3.38 points), whilst Western European and Other States had the lowest score (mean 2.00 SD 2.35 points). Latin American and Caribbean States had consistently the highest scores for all sectors apart from Other. For the second submission, the lowest total scores were achieved by Eastern European States (mean 0.36 SD 0.93 points) and the highest scores were achieved by Latin America and the Caribbean (mean 5.88 SD 4.03 points). In the third submission, the best countries were in Africa (mean 8.23 SD 2.96 points) and Asia-Pacific States achieved the lowest total scores (mean 6.50 SD 3.66 points). The number of countries per region included in each round is provided in the footnotes of Tables S2–S4.

Qualitative analysis

A detailed description of the content of each domain is provided in Supplementary Data (Tables S5–S11). In this section, we have summarised the key points for each domain, which are broadly similar across submission rounds.

Health adaptation

There were fifteen themes (Table S5) identified for health adaptation: general acknowledgement of necessity of health adaptation

Table 2
Evolution of consideration of health dimensions in Nationally Determined Contributions.

Submission	Total	Adaptation	Impacts	Co-benefits	Sustainable healthcare	Inequalities	Women	Other
First	4.66	0.99	0.74	0.64	0.33	0.69	1.03	0.23
Second	3.24	0.66	0.55	0.44	0.11	0.54	0.79	0.15
Third	7.34	1.20	0.86	1.17	0.35	1.41	1.61	0.73
Change	2.67	0.21	0.12	0.53	0.03	0.72	0.58	0.49
% Change	57.32	21.24	15.94	82.42	8.58	103.07	56.13	209.88

These domains were identified from previous scorecards and the COP themes and agreed by team members. Other refers to anything not included in the other domains. There were 98 countries in the first round, 80 in the second round, and 110 in the third round.

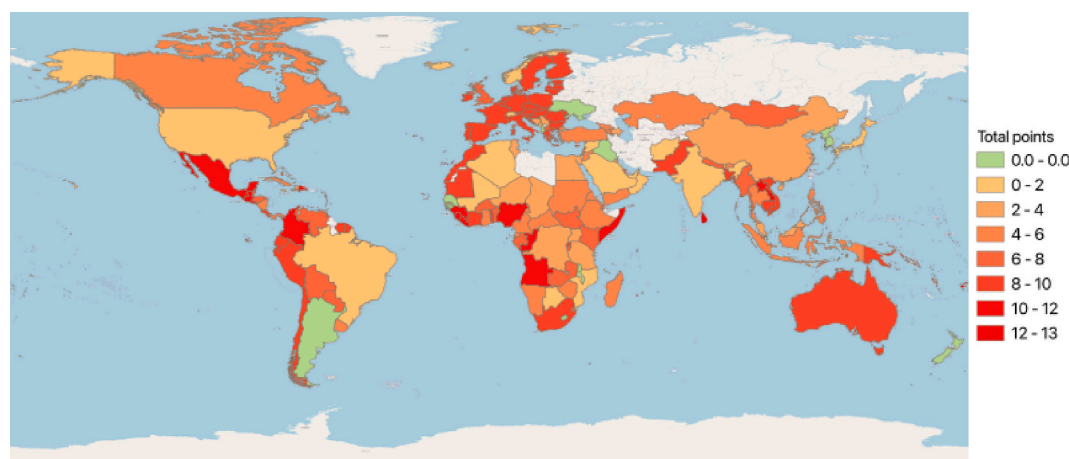


Fig. 1. World map illustrating the total points for each country for the most recent Nationally Determined Contributions This figure illustrates the number of points achieved by each country for their most recent Nationally Determine Contributions policies (2025–2026). The maximum number of points available was 14 (2 times seven domains: health impacts, health adaptation, health co-benefits, sustainable healthcare, inequalities, women & gender, and other). Countries in white (Belarus, Iran (Islamic Republic of), Kyrgyzstan, Libya, Russian Federation, Tajikistan, Turkmenistan, and Uzbekistan) have no data as we were unable to analyse their NDCs. Greenland does not currently have its own NDC.

measures; early warning and communication systems for health risks due to extreme weather events; increased risk awareness; emergency preparedness; climate resilient health infrastructure; increased healthcare workers trained; increased access to healthcare; sustainable climate finance; improved health services for climate vulnerable populations; integration of climate information into health information systems; protecting community health and social infrastructure (e.g., potable water access and sanitation, health, education, early childhood, community support, community development, culture, sport and recreation, parks and emergency services); integrate response strategies into national policy; achievement of sustainable development goals; climate-resilient health systems (e.g., building, retrofitting, and strengthening health facilities to withstand climate impacts including floods, droughts, and extreme weather events, developing national health adaptation plans and integrating climate considerations into health sector policy, conducting systematic assessments of climate risks and vulnerabilities for health infrastructure and systems to ensure service continuity); establishing integrated surveillance and early warning systems linking climate data with disease monitoring and health outcomes.

Health impacts

This analysis identified eight major thematic categories of climate change impacts on health in NDCs (Table S6). The themes included immediate health threats due to extreme weather and infectious diseases (including vector-borne diseases and other infectious diseases), chronic effects, such as mental health, and non-communicable diseases; and systemic challenges (e.g., vulnerable infrastructures and services). Countries consistently recognised that certain populations are particularly vulnerable and should be prioritised for adaptation, including children, older adults, pregnant women, marginalised communities, and outdoor workers because they experience increased health risks and have limited ability to adapt. Many nations emphasised the need for integrated climate policies that take into account the increased vulnerability of certain populations; develop enhanced surveillance systems for extreme weather events and improve healthcare and social infrastructure and services (e.g., water and sewage systems) to increase resilience to direct and indirect climate change-related threats to public health, thus recognising health is a climate change vulnerable sector. Many NDCs also included the indirect impact of climate change on health, for instance, by acknowledging that climate change threatens the availability of essential food systems and reduces the nutritional quality of food crops.

Health co-benefits

There were nine themes (Table S7) identified as health co-benefits: air quality and respiratory health improvement (e.g., reduction of air pollutants (PM_{2.5}, NO_x, SO₂, black carbon) by switching from fossil fuels to green energy sources); clean cooking solutions and renewable energy improving household/indoor air quality; water, sanitation and hygiene (e.g., improved access to clean water and sanitation infrastructure reducing waterborne, vector-borne and climate-sensitive diseases (e.g., cholera, malaria, dengue); sustainable transport and active mobility (e.g., health benefits from reduced vehicular emissions and promotion of walking/cycling); waste management and circular economy (e.g., health improvements through better waste management, reducing exposure to pollutants and disease vectors); food security and nutrition (e.g., climate-smart agriculture and sustainable food systems supporting nutritional health); ecosystem health and public health linkages (e.g., recognition that healthy ecosystems support human health through various pathways); vulnerable populations and health equity (e.g., targeting health co-benefits for women, children, elderly, and marginalised groups); economic benefits of health improvements (i.e., quantified economic value from health co-benefits of climate action).

Sustainable healthcare

There were five themes (Table S8) related to sustainable healthcare: green energy sources in healthcare facilities (e.g., transitioning health facilities to solar, renewable, and low-carbon energy sources to reduce emissions and ensure reliable power supply); sustainable healthcare waste management (e.g., implementing safe, non-burn waste management technologies and achieving proper waste segregation in healthcare settings); health system decarbonisation (e.g., reducing greenhouse gas emissions from health sector operations including anaesthetic gases, transport, and facility emissions); health workforce education and capacity building (e.g., training healthcare workers and communities on climate change impacts, health risks, and protective actions); climate-resilient health infrastructure (e.g., applying environmental certification standards and ecological design principles to healthcare facility construction and renovation).

Health inequalities

Regarding health inequalities, four themes (Table S9) were identified: recognition of climate vulnerable groups (i.e., youth, children, older adults, women, pregnant women, indigenous communities, people experiencing poverty and with chronic diseases or disabilities); groups with limited resources to respond to climate impacts (i.e., need to

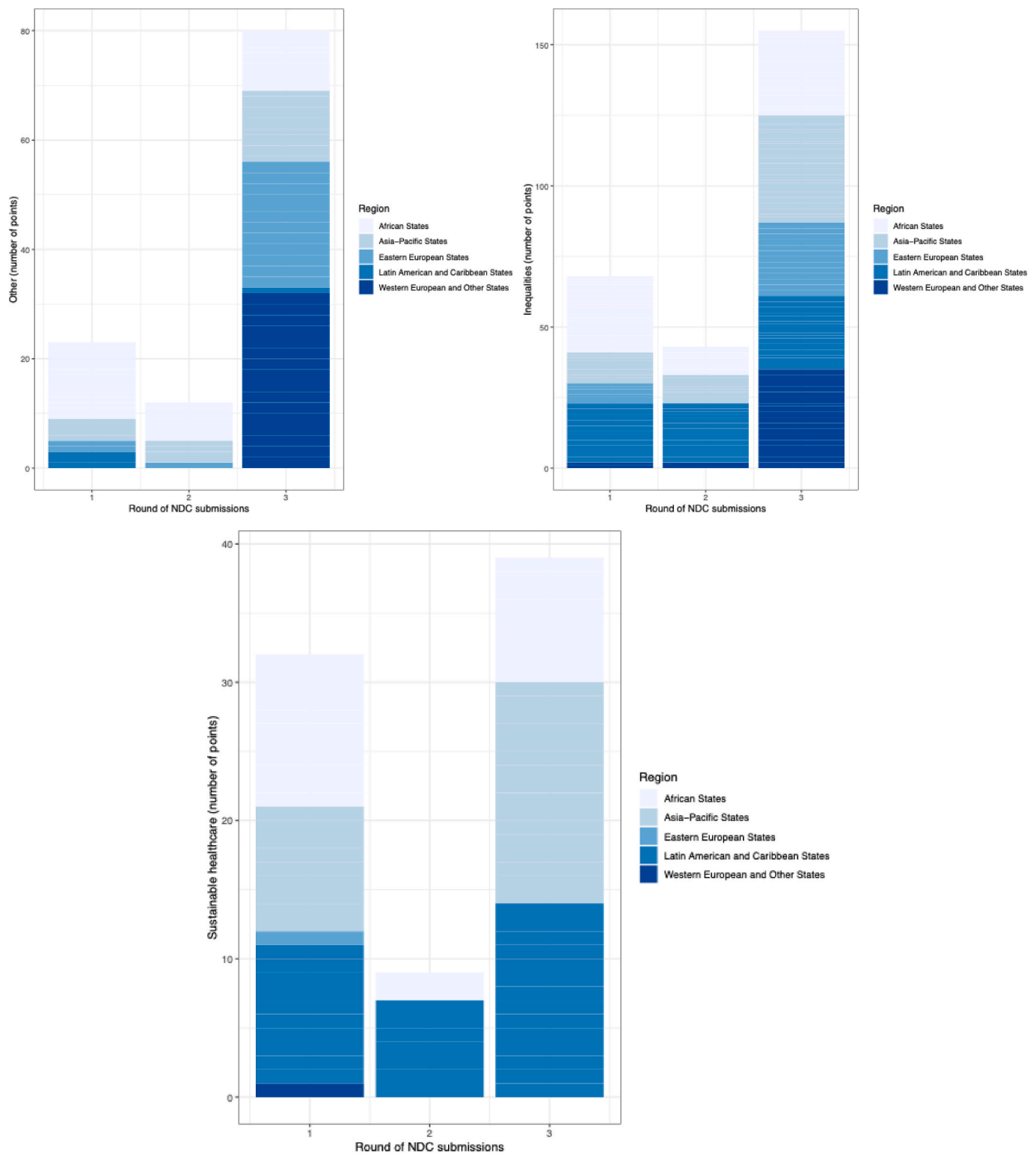


Fig. 2. Evolution of consideration of health dimensions in Nationally Determined Contribution This figure illustrates the number of points for each domain for each region stratified by round of NDC submissions. There were 98 countries in the first round, 80 in the second round, and 110 in the third round. There were 54 countries in Africa, 54 countries in the Asia-Pacific, 33 countries in Latin America and the Caribbean, 23 countries in Eastern Europe, and 24 countries in Western Europe and Other regions.

prioritize vulnerable groups in disaster management and in climate action including consultation during adaption planning and ongoing analysis throughout); inclusive climate-resilient economic opportunities and empowerment (i.e., economic opportunities for and empowerment

of women, youth and other vulnerable groups); inclusive insurance, risk financing, and loss & damage funding (i.e., disaster planning, particularly considering the needs of vulnerable groups in terms of insurance, social protection and financial assistance).

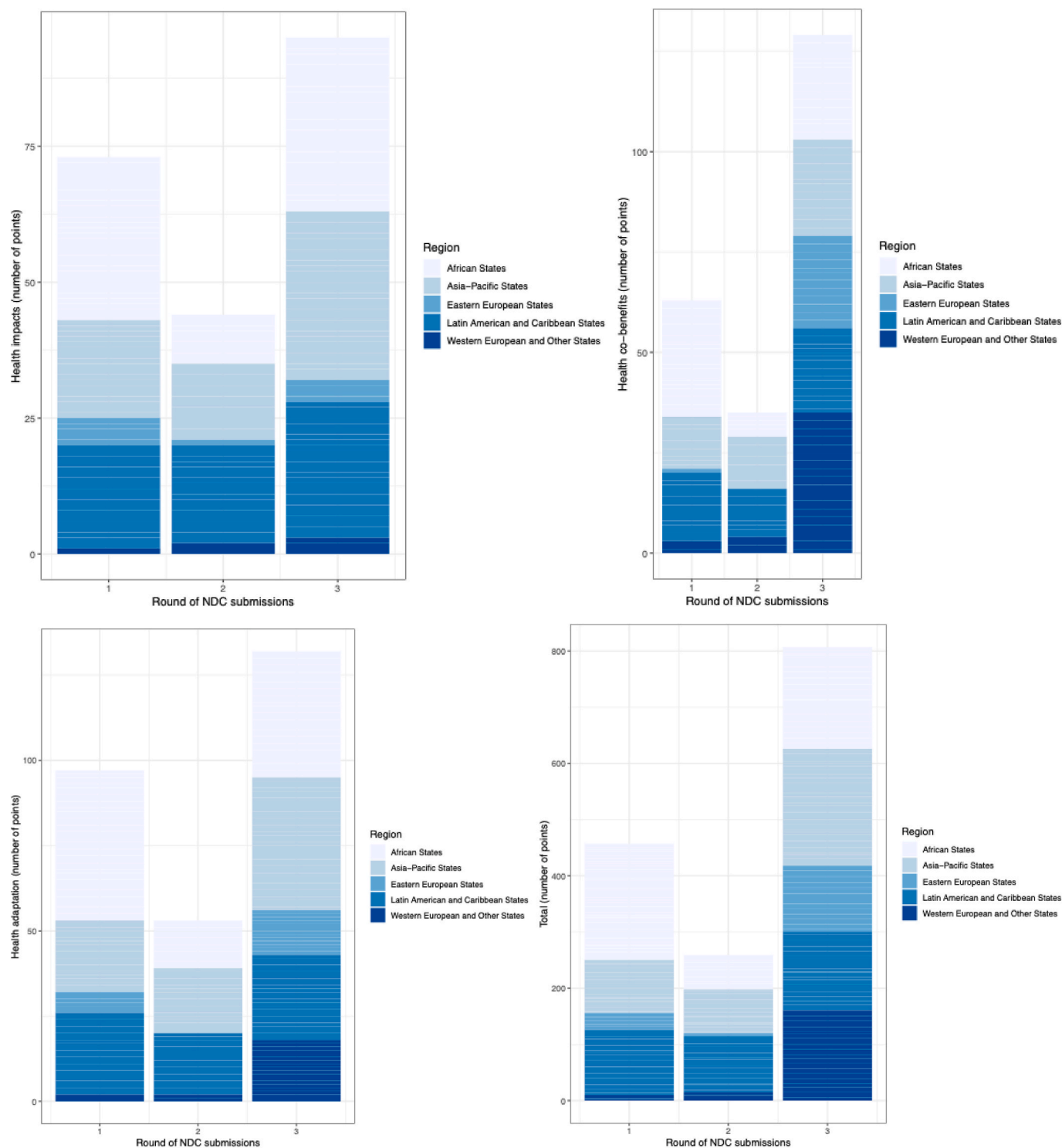


Fig. 2. (continued).

Women and gender

For women and gender, there were five main themes: women's increased vulnerability to the impacts of climate change both in terms of health and welfare (e.g., their dependence on subsistence agriculture, which is very vulnerable to extreme weather events); gender equality, women's rights and empowerment; women as agents of change for climate mitigation; need for sex and gender disaggregated data; and women's representation in country delegations at COP meetings and in policy making at country and international level (Table S10). These themes were considered in different ways depending on women's

position and role in society and gender equality. Women were often mentioned among several vulnerable groups, such as the elderly, and people experiencing homelessness or working outdoors.

Other

In addition to the specific health themes, NDCs considered two additional themes: the impact of climate change on the wider determinants of health and hence the indirect impact of climate change on health; and the need for further research to identify vulnerability and develop more efficient and reliable green energy sources (Table S11).

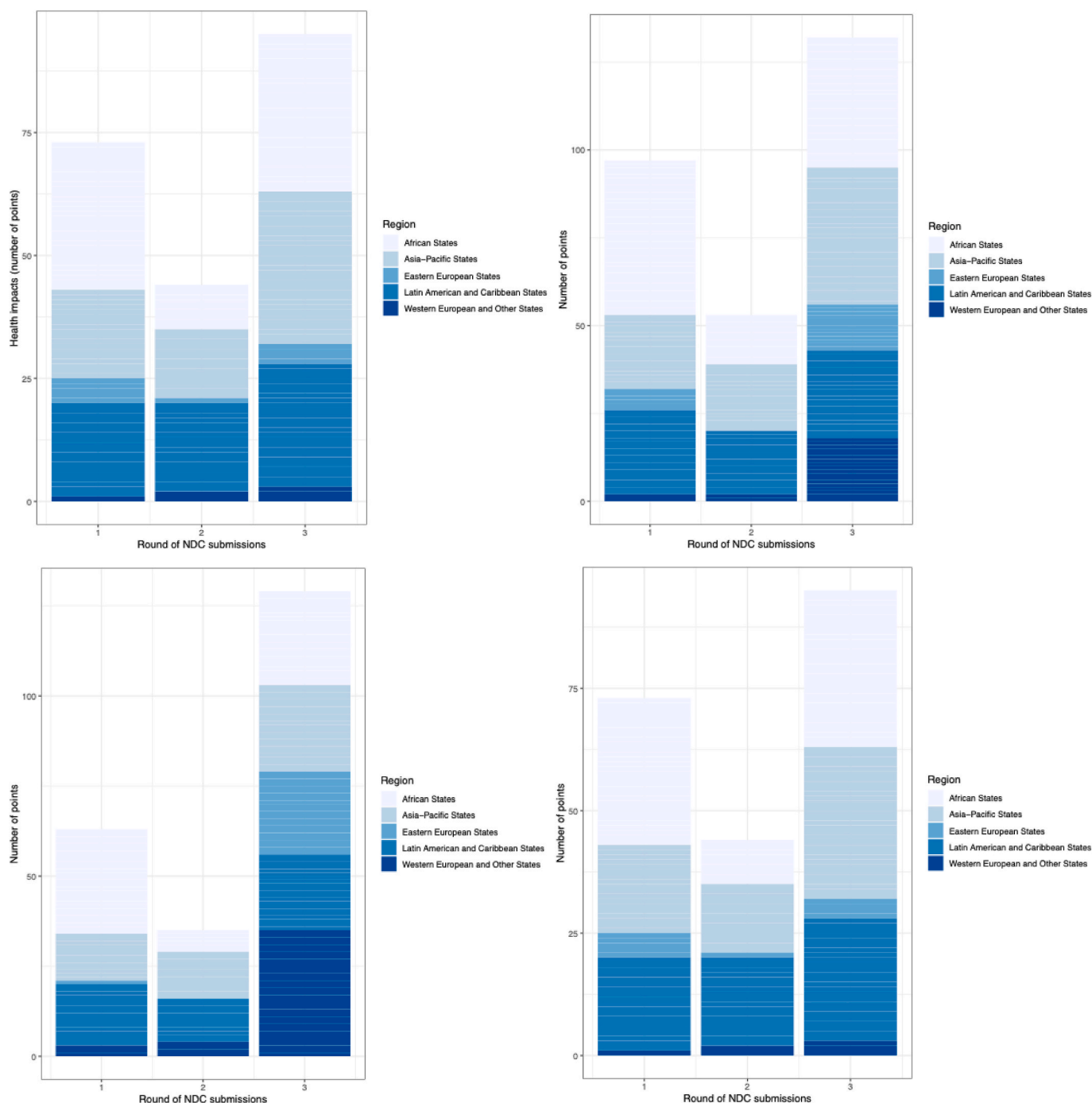


Fig. 2. (continued).

Discussion

This policy review of the NDCs of 191 countries investigated the inclusion of health across seven domains: health adaptation, health impacts, health co-benefits, sustainable healthcare, inequalities, women and gender, and other. There was increasing recognition of the health dimension of climate change across rounds of NDC submissions, particularly for health co-benefits and inequalities. Qualitative analysis revealed several themes for each domain, which overall emphasised the need to take health into account both for climate adaptation to reduce the impact on health and build resilient health systems, and for climate mitigation to reap the health co-benefits, especially for the most vulnerable population groups.

There have been several NDC reviews, which resulted in scorecards. However, our analysis has the advantage of being up to date as of February 2026 and including almost all the UNFCCC parties. The Global Climate and Health Alliance (GCHA) published their healthy NDC scorecard in 2023 ([Global Climate and Health Alliance, 2023](#)). It analysed NDCs across eight categories (emissions target ambition, integrated planning and governance, climate impacts on health, action in the health sector, action in other health determining sectors, financial commitments for climate-health action, participation and equity, monitoring and reporting) for ten countries (US, Uruguay, Brazil, Japan, New Zealand, United Arab Emirates, the UK, Switzerland, Botswana, and Canada). Despite the differences in the categories assessed as there is only one common domain (climate impacts on health), the findings

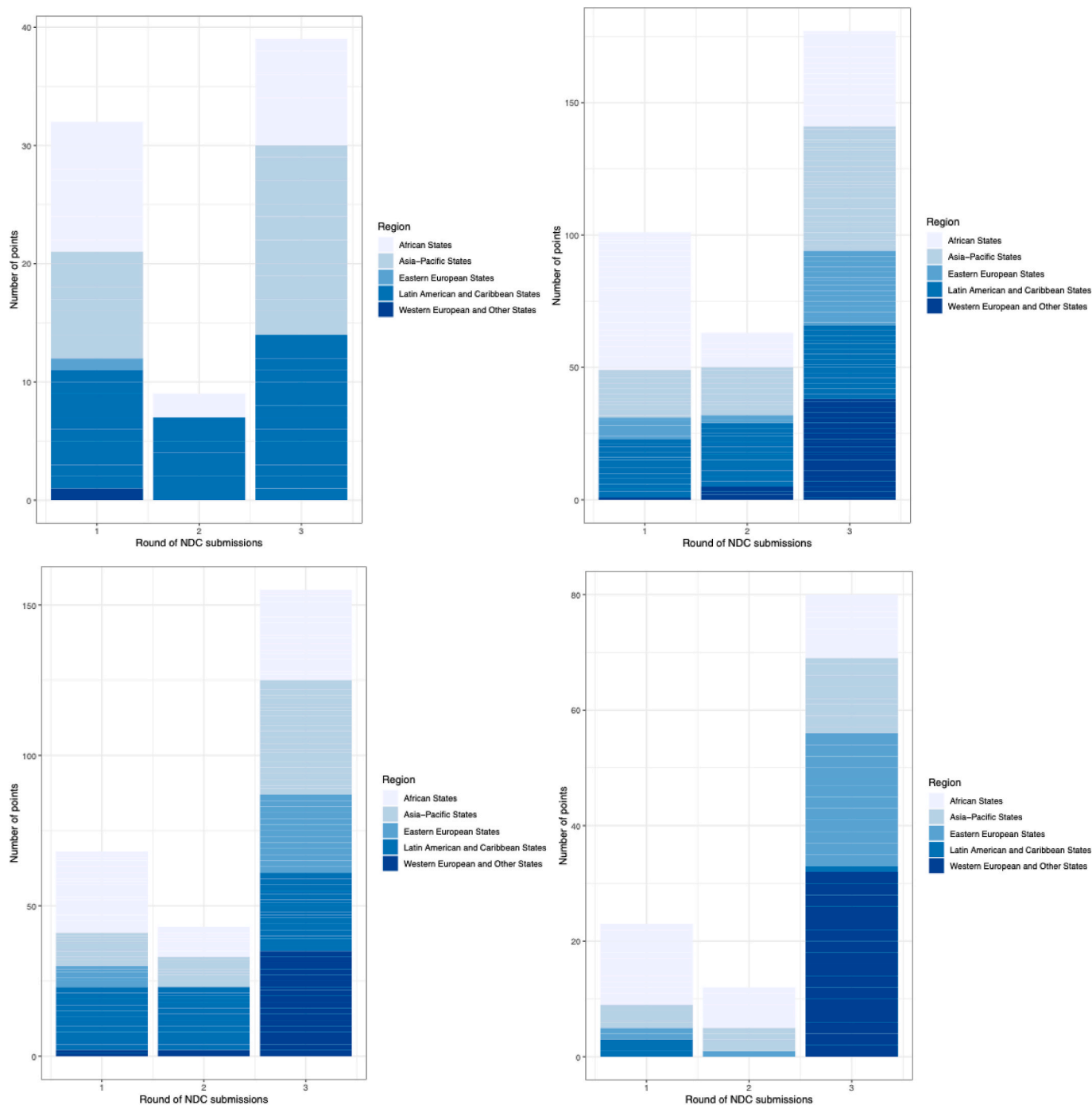


Fig. 2. (continued).

are broadly similar. Middle-income countries, e.g. Brazil, performed relatively well in many areas, such as deforestation, just transition, and recognising health co-benefits. High-income countries (e.g., the US, the UK, and New Zealand) performed poorly in many categories, showing limited mitigation ambition and mostly overlooking the health dimensions of climate change. Low-income countries (e.g., Botswana) were remarkable in their actions and achievements in the consideration of health in climate mitigation and adaptation despite their limited resources and reliance on international aid.

Similarly to our study, the GCHA scorecard demonstrated that most NDCs consider the health co-benefits of climate mitigation but lack health-specific targets that acknowledge the multiple impacts of climate change on health. This may be at least partially explained by the lack of

funding committed to health adaptation and loss and damage (Pinho-Gomes and Jamart 2024). Furthermore, there was a clear lack of ambition in protecting health from climate impacts. Although the health consequences of climate change were generally acknowledged, there was not appropriate investment in adaptation policies to reduce that impact. This may be due to lack of financial incentives to support building health and health system resilience to climate change. As the health consequences of climate change exacerbate over time, it will be critical to match the recognition of health impacts with appropriate adaptation funding. For instance, multilateral funds, such as the green climate fund or the adaptation fund, could support the most severely affected countries with grants (non-repayable funds) instead of loans. The latter further exacerbate the challenges experienced by these

countries (Pinho-Gomes and Jamart 2024).

The Lancet Countdown also includes an indicator related to the inclusion of health in NDCs (indicator 5.4.1) (Romanello et al., 2025). Although this indicator relies simply on counting the number of mentions of the word “health” and does not include a qualitative analysis, its findings are similar to ours. It reported that of all the submitted NDCs as of September 2025, 57 (84%) referenced health. Very high human development index countries were the least likely to consider health with only 14 out of 21 (67%) mentioning health. High and medium human development index were the most likely to reference health with 89% (16 of 18) and 86% (6 of 7), respectively, doing so. However, this analysis was limited by only counting mentions of health without considering the context in which health was mentioned.

The main strengths of our study are the inclusion of almost all the UNFCCC countries except those for which our team did not have native speakers, i.e., Russian and Arabic. We also relied on native speakers to undertake the data extraction, thus avoiding misinterpretation due to inaccurate translations. As most countries reported their NDC in English, Spanish, Portuguese and French, this resulted in the exclusion of only eight countries, which is unlikely to have a material impact on our findings. This study has some limitations. First, it relied on a subjective analysis of the NDCs even if we tried to be as objective as possible and standardise the data extraction and coding approaches. Second, we included the most recent NDCs when the analysis was undertaken in February 2026. It is possible that some countries have updated their NDC since then. Third, it was not possible to undertake full text review of the documents due to the large number of NDCs included. This may have resulted in missing some relevant sections. Fourth, although we identified children as a vulnerable group in the inequalities domain, we did not specifically explore the topic of children’s vulnerability and needs. Fifth, as the NDC register only includes the most recent NDC documents, we could not undertake a longitudinal analysis for each country and the comparisons between rounds need to be interpreted cautiously as the inclusion of different countries may at least partially account for the gradual increase in the number of points achieved by each round. Sixth, the domains included in the codebook are not exhaustive or completely independent.

This study has important implications for climate and health policy. It demonstrates the need to consider all aspects of health in NDCs in order to avoid, or at least reduce, the substantial impact of climate change on population health and health systems, whilst maximizing the co-benefits of climate mitigation. This study also highlights the need to model the societal and economic costs of projected health impacts in each country to highlight and localise the moral and economic case for action on climate change and buttress against dismissal of these on ideological grounds.

As NDCs are updated every five years, the next release is due in 2030, when it would be ideal to increase the breadth of policies protecting and improving public health. From the perspective of health protection, these could include, for instance, improved early warning systems that are universal yet proportional to the increased vulnerability of certain groups (e.g., women and children, older adults, deprived communities), climate-resilient health systems able to withstand the impact of extreme weather events (Lowe et al., 2011). Sustainable healthcare policies and interventions should consider the health co-benefits of climate mitigation besides reducing the climate impacts of healthcare systems (Bodirsky et al., 2025; Xie et al., 2025). Regarding gender equality and women’s rights, there is a clear need to increase their representation in country delegations and involvement in decision making at COP meetings and in their countries (van Daalen et al., 2024). Despite the inclusion of gender in the UNFCCC documents and the gender day at COP meetings, most country delegations have very few women (van Daalen et al., 2024). Evidence shows that women are key agents of change in climate adaptation and mitigation in their communities and countries (Wrayet al., 2023). The lack of women’s involvement in climate change policy likely reduces the societal impact and relevance of climate-related

policies (Wrayet al., 2023). Although gender quotas are not the ideal solution for their lack of representation, it may be a necessary step until gender equality is embedded in the COP negotiations and the importance of their seat at the negotiating table is widely acknowledged. It is, though, important to consider that the countries with the greatest gender inequalities are those with the smallest GHG emissions and least responsibility for the climate crisis (Pinho-Gomes and Woodward, 2024). High-income countries have relatively high gender equality and account for the majority of GHG emissions. Multilateral climate funds perpetuate the dependency of the latter on international aid, which restricts their ability to adapt and implement green policies as they are insufficient to address the multiple impacts of climate change (Alcaynaet al., 2023). Finally, governments should include in their NDCs firm commitments to invest in industrial sectors and agricultural practices that reduce the GHG emissions and R&D to improve renewable energy technology and passive cooling solutions.

Conclusion

Although the health dimensions of climate change appear to be increasingly recognised by policy makers, health and women’s health, in particular, remain insufficiently considered in NDCs, especially in high-income countries. It is critical to involve women in policy and decision making to maximise climate adaptation and mitigation worldwide.

Declarations

Ethics approval and consent to participate

This study did not require ethics approval, as it does not involve human or animal participants.

Consent for publication

All the authors consent for publication of this manuscript.

Funding

This study was funded by an Advanced Fellowship awarded to ACPG by the National Institute for Health and Care Research (NIHR). The funders had no influence in this study. The views expressed are those of the authors and not necessarily those of the NIHR or the Department of Health and Social Care.

Authors’ contributions

ACPG and EM designed this study. All authors extracted and analysed the data. ACPG drafted the manuscript. All authors critically reviewed and edited the manuscript.

Author statement

The authors declare that all procedures were performed in compliance with relevant laws and institutional guidelines.

CRediT authorship contribution statement

Ana-Catarina Pinho-Gomes: Writing – review & editing, Writing – original draft, Visualization, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Katherine C. Dibbon:** Writing – review & editing, Data curation. **Gabriela Cipriano-Flores:** Writing – review & editing, Data curation. **Rachel Hulme:** Writing – review & editing, Data curation. **Jessica Gong:** Writing – review & editing, Data curation. **Jane Hirst:** Writing – review & editing, Supervision, Conceptualization. **Alice Witt:** Writing – review & editing, Data curation. **Kate Womersley:** Writing – review & editing, Data curation.

Celestine Donovan-Bradley: Writing – review & editing, Data curation. **Edward Mullins:** Writing – review & editing, Validation, Investigation, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.envint.2026.110473>.

Data availability

All data are provided in the manuscript and supplementary data.

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