



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Contents lists available at ScienceDirect

Environmental Science and Policy

journal homepage: www.elsevier.com/locate/envsci

Policy responses to COVID-19 in Sri Lanka and the consideration of Indigenous Peoples[☆]

Eranga K. Galappaththi^{a,*,1}, Chrishma D. Perera^{a,b,2}, Indunil P. Dharmasiri^{a,3}, James D. Ford^{c,4}, Sarath S. Kodithuwakku^{d,5}, Victoria Chicmana-Zapata^{e,6}, Carol Zavaleta-Cortijo^{e,7}, Kerrie Pickering^{f,8}, Bianca van Bavel^{c,9}, Keith Hyams^g, Ingrid Arotoma-Rojas^{c,10}, Francis Awafo Akugre^{h,11}, Jonathan Nkaluboⁱ, Didacus Bambaiha Namanya^{j,12}, Adelina Mensah^h, Martha M. Hangula^k

^a Department of Geography, Virginia Polytechnic Institute and State University, Blacksburg, United States

^b University of Colombo, Colombo, Sri Lanka

^c Priestley International Centre for Climate, University of Leeds, Leeds, United Kingdom

^d Department of Agricultural Economics & Business Management, University of Peradeniya, Sri Lanka

^e Unidad de Ciudadanía Intercultural y Salud Indígena (UCISI), Facultad de Salud Pública y Administración, Universidad Peruana Cayetano Heredia, Lima, Peru

^f University of the Sunshine Coast, Queensland, Australia

^g Department of Politics and International Studies, University of Warwick, Coventry, UK

^h Institute for Environment and Sanitation Studies, University of Ghana, Accra, Ghana

ⁱ Uganda National Health Research Organization & Mulago National Referral Hospital, Uganda

^j Ministry of Health-Uganda National Health Research Organisation, & Uganda Martyrs, University, Uganda

^k Department of Animal Production, Agribusiness and Economics, University of Namibia, Namibia

ARTICLE INFO

Keywords:

Public health

Pandemic

Prioritizing policy

Justice

Vedda

South Asia

ABSTRACT

COVID-19 has had uneven impacts on health and well-being, with Indigenous communities in the Global South facing some of the highest risks. Focusing on the experience of Sri Lanka, this study identifies key policy responses to COVID-19, documents how they evolved over two years of the pandemic, and examines if and how government responses have addressed issues pertaining to Indigenous Peoples. Drawing upon an analysis of policy documents (n = 110) and interviews with policymakers (n = 20), we characterize seven key policy responses implemented by the Sri Lankan government: i) testing for and identifying COVID-19; ii) quarantine procedures; iii) provisional clinical treatments; iv) handling other diseases during COVID-19; v) movement; vi) guidelines to be adhered to by the general public; and vii) health and vaccination. The nature of these responses changed as the pandemic progressed. There is no evidence that policy development or implementation incorporated the voices and needs of Indigenous Peoples.

[☆] Where the actual work is done: Department of Geography, Virginia Polytechnic Institute and State University, Blacksburg, United States of America.

* Correspondence to: 238-295 West campus Dr., Blacksburg 24061, VA, USA.

E-mail address: eranga.research@gmail.com (E.K. Galappaththi).

¹ (0000-0002-3926-2206)

² (0000-0002-3561-6206)

³ (0000-0002-1426-5726)

⁴ (0000-0002-2066-3456)

⁵ (0000-0001-6174-5995)

⁶ (0000-0003-3875-8004)

⁷ (0000-0003-4969-8959)

⁸ (0000-0001-6019-5522)

⁹ (0000-0001-9338-4602)

¹⁰ (0000-0001-7602-0014)

¹¹ (0000-0002-5064-3202)

¹² (0000-0001-6906-4617)

<https://doi.org/10.1016/j.envsci.2023.03.008>

Received 23 September 2022; Received in revised form 23 January 2023; Accepted 8 March 2023

Available online 14 March 2023

1462-9011/Published by Elsevier Ltd.

1. Introduction

The coronavirus disease (COVID-19) started in Wuhan, China in 2019 and spread rapidly across the world (Islamaj et al., 2021). The World Health Organization announced it as a global pandemic on March 11, 2020 (Dewi et al., 2020), and securing public health has become vital in all countries. Governments worldwide were forced to adapt quickly and formulate policies to strengthen the national capacity to prevent the disease from spreading (Bouman et al., 2021; Dorchach, 2022). Public health measures such as testing for COVID-19 and economic support policies are considered fundamental ways to control the spread of COVID-19 on a global scale (Hung et al., 2021; World Bank, 2020). According to Dewi et al., 2020, 37 countries out of 117 (20.9%) were categorized as "under-reaction" because they did not formulate or implement the required policies. The most prepared countries according to Global Health Security were Brazil and South Africa.

The Asia-Pacific region, especially East Asia, was more successful than other parts of the world in containing the disease (Mao, 2020). The region took early precautions and implemented many non-pharmaceutical interventions, including implementing strict travel restrictions, quarantining foreign returnees, physical distancing, face mask and sanitizer usage, widespread testing, contact tracing, and home quarantining (Hung et al., 2021; Power et al., 2020). East Asia followed a collaborative governance approach in facing COVID-19 which involves the public, private, and civic spheres in public decision-making and management (Mao, 2020). However, developing countries in South and Southeast Asia faced significant economic and social challenges as governments adopted health care and expansionary fiscal strategies to combat impacts (Islam et al., 2020). These responses uniquely affect specific communities such as Indigenous Peoples (Carr, 2020).

Indigenous Peoples identify as part of a distinct cultural group attached to ancestral territories or geographically different traditional habitats. They are the descendants of the original groups that settled in the area before the modern states and current borders. They uphold their cultural and social uniqueness by detaching themselves from the leading society or culture (Shaffril et al., 2020). There are nearly 370 million Indigenous Peoples globally, accounting for roughly 5% of the world population (The World Bank Statistics, 2019). Most (260 million or 70%) are in Asia-Pacific countries (FAO, 2018). Indigenous and marginalized communities, in particular, are uniquely vulnerable to health challenges (Galappaththi et al., 2020; Zavaleta-Cortijo et al., 2020). They already face many difficulties due to political and economic marginalization, loss of land and resources, human rights violations, discrimination, food insecurity, and lack of economic opportunities (Ford et al., 2022; Galappaththi et al., 2020).

The impact of COVID-19 is uneven. Indigenous Peoples suffer more during pandemics because they are remotely located and have less or no health and medical support required to manage the pandemic (Carr, 2020). They generally face higher rates of infection, severe symptoms, and death than do non-Indigenous populations (Henriquez-Trujillo et al., 2021; Power et al., 2020; Serván-Mori et al., 2022). During COVID-19, health outcomes are determined by levels of functional literacy, employment, availability of health insurance, food security, access to running water, health care, and technology (Gabriela Soto-Cabezas et al., 2022; Power et al., 2020). Additionally, Indigenous Peoples are more vulnerable to multiple and interactive stressors, including climate change impacts (Ford et al., 2022; Galappaththi et al., 2021).

The current one-size-fits-all policy responses to COVID-19 ignore the inequalities, racism, discrimination, and poverty that Indigenous communities face (Best, 2018). For instance, Indigenous Peoples in Gabon, Hawaii, Pakistan, and Tanzania faced multiple stressors with no or limited prioritized responses from their governments (Crooks et al., 2020). This includes the exclusion of Indigenous Peoples from the policymaking process, as well as limited policies focusing on them. Proactively incorporating Indigenous values in post-COVID management

approaches can achieve positive changes in the Indigenous communities rather than reactionary management approaches (Carr, 2020).

The inclusion of Indigenous Peoples in planning processes and enabling self-governance can enhance resilience in health, education, and business. Governments should recognize the harm of not addressing ongoing inequalities and build health policies to capture cultural determinants of health (Power et al., 2020). Proper data disaggregation is necessary to understand the experience of Indigenous Peoples during COVID-19 (Curtice and Choo, 2020). Also, evidence of the inclusion of Indigenous Peoples in COVID-19-related policy responses is necessary (Curtice and Choo, 2020). For instance, some countries (e.g., Canada and Australia) prioritized Indigenous Populations in their COVID-19-related government responses. Canada has spent over 302 million USD to provide community-based solutions promoting Indigenous health (Beaulé, 2020). The Australian government allocated 74 million USD to promote mental health among Indigenous Peoples (IAHA, 2020), 57.8 million USD to support preparedness in remote aboriginal communities (Hung et al., 2021) and 123 million USD to promote Indigenous businesses (Wyatt, 2020). Furthermore, it increased social security payments for Indigenous Peoples during COVID-19 as a primary step in alleviating poverty. The Global South, including Sri Lanka, seeks more research attention on health-related policy responses.

The first case of COVID-19 in Sri Lanka was reported on January 27, 2020. A Chinese tourist and a native Sri Lankan tested positive for COVID-19 for the first time on March 11, 2020 (Epidermology Unit, 2020; Jayathilaka, 2021). Following that, the Sri Lankan government took a series of actions to prevent the spread of the disease (Robinson and Kengatharan, 2020). This included closing the international airport and all schools, decelerating of special governmental holidays, implementing a curfew, and banning social gatherings (Senevirathna, 2020; Wickramaarachchi et al., 2020). As a result of these responses cases were reduced. For example, on April 30, 2020, only 15 new cases were reported. In response to the effectiveness of the measures on May 11, 2020 (wave 1) the government lifted lockdown measures (Epidermology Unit, 2020; Erandi et al., 2020). The average daily positive cases reported from May 2020 to September 2020 (i.e., six positive cases daily) were comparatively lower than the number of positive cases reported from March 2020 to April 2020 (i.e., 30 positive cases daily). However, subsequent high peaks of cases were noticed in October 2020 (wave 2), April 2021 (wave 3), and July 2021 (wave 4) (Epidermology Unit, 2020).

The Sri Lankan government consulted local and overseas experts for public health guidance and fiscal response to the pandemic (Rajapaksa et al., 2022). As a result of these consultations, the National Operation Center for Prevention of COVID-19 Outbreak (NOCPCO) was established for COVID-19 management (Amaratunga et al., 2020). NOCPCO communicated current testing, case numbers, mortality numbers, and policy decisions through media briefings (Amaratunga et al., 2020; Rajapaksa et al., 2022). These policy decisions, rules, and regulations were not static but changed in response to the demands of each wave (Epidermology Unit, 2020; President Secretariat, 2022). The COVID-19 vaccination program began in January 2021, and as of January 6, 2023, 97% of the eligible population of the country had been vaccinated with the first dose, while 83% and 56% of the eligible population had been vaccinated with the second and booster doses, respectively (Health Promotion Bureau, 2023; Presidential Secretariat, 2023). Despite limited resources, Sri Lanka has responded to the pandemic with timely modified, preventive strategies aligned with the specific characteristics of the COVID-19 waves (UN, 2020; WHO, 2020). The government formulated its policy responses after considering demographic factors such as age group (i.e., a different vaccination program circulars for school children), gender (i.e., interim guidelines to treat pregnant mothers), and income (i.e., circular to provide an allowance of LKR 5000 (about 15 in USD) for low-income families) (Epidermology Unit, 2020; President Secretariat, 2022).

The importance of considering Indigenous Peoples in policy

responses is documented (Boraluwa et al., 2021; Horn, 2016). Indigenous Peoples of Sri Lanka have adapted to and coped with different stresses (e.g., civil war, tsunami), over the past years (Galappaththi et al., 2020). However, there was limited support from the government to ensure sustainable livelihoods for Indigenous Peoples and there is no specific national policy or legal framework ensuring their rights (The Road Development Authority, 2017). In 2017, Sri Lanka developed the Indigenous Peoples Planning Framework to ensure that Indigenous Peoples' identity, dignity, human rights, livelihoods, and culture. Additionally, Sri Lanka voted to accept the United Nations Declaration on the Rights of Indigenous Peoples. Sri Lanka had the opportunity to consider Indigenous Peoples as a vulnerable group requiring special attention in COVID-19 policy responses (Boraluwa et al., 2021). However, there is no clear understanding of Indigenous Peoples' level of inclusion in COVID-19 policy responses in Sri Lanka. Moreover, to our knowledge, no study has analyzed the nature and evolution of COVID-19-related responses in Sri Lanka over the past two years (2020–2021) with a focus on Indigenous Peoples. To respond to these gaps, this paper maintains three objectives: (1) to identify the key policy responses to COVID-19 in Sri Lanka, (2) to examine how these responses evolved over different COVID-19 waves, and (3) to assess if and how Indigenous Peoples were considered in these responses.

2. Methods

2.1. Indigenous Peoples in Sri Lanka

"Vedda" are Indigenous Peoples of Sri Lanka, the descendants of the island's original neolithic community who have lived there since the 6th century BC (Attanapola and Lund, 2013; Jayashantha and Johnson, 2016; Seligmann and Seligmann, 1911). In 2011, the population of Vedda was reported to be 0.0044% of the total population of Sri Lanka (De Silva and PUNCHIHewa, 2011). However, no recent census has been conducted to determine the exact population of Vedda. Different groups of Vedda live across the island such as Dambana-Vedda, Pollebadda-Vedda, Rathugala-Vedda, and Coastal-Vedda. The livelihood options of Vedda are diversified based on their geographic location. They were originally hunters and gatherers for subsistence purposes (Seligmann and Seligmann, 1911). Today many Vedda rely on subsistence and commercial livelihood activities for food security and nutrition. Many of them practice paddy farming and slash-and-burn cultivation, known as "chena" in Sri Lanka. Some collect bee honey, yams, and fruits. Vedda live in coastal areas (i.e., Coastal-Vedda) and rely heavily on fisheries-related activities such as culture-based fisheries (Galappaththi et al., 2020).

In this study, we partnered with Coastal-Vedda in the Kunjakalkulam community (8°01'23.4"N, 81°24'22.4"E), which is centered in the eastern part of Sri Lanka. The first author has had an ongoing research collaboration with this community since 2016; also, it was the home to the national Coastal-Vedda Chief (Galappaththi et al., 2020). Community members often speak Tamil and their identical Vedda language for communication. According to the Coastal-Vedda Chief (pers. comm.), the pandemic was the most recent external stress that Indigenous Peoples faced. Since the first wave, Indigenous Peoples have been experiencing difficulties associated with their livelihood activities (e.g., limitations in fishing activities and rice farming). Unlike in non-Indigenous communities, the traditional events of Indigenous Peoples were severely affected travel restrictions and limitations on gatherings. Though the Sri Lankan government immediately responded to COVID-19, if and to what extent the government policy responses have been effective in marginalized communities are being determined. For example, Indigenous Peoples-specific information (i.e., infection rate, case fatality rate, unemployment rate, economic/social damage) is not available for informed decision-making.

2.2. Conceptual framework

The co-authors developed the conceptual framework for assessing COVID-19 policy responses based on justice indicators (Byskov et al., 2021; Satyal et al., 2021) and levels of participation in decision-making (David-Chavez and Gavin, 2018) (Table 1). Justice indicators and level of participation measurements suggested in our reference studies have been applied in similar studies (Bélisle et al., 2022; Sadai et al., 2022). This framework includes two coding stages, i.e., descriptive and evaluative, which the first three authors carried out.

First, we assessed the policy response data against the two components of descriptive coding and its characteristics: government (e.g., the scale of the policy instrument's target) and response (e.g., the scope of the response and target group). If the answer to the considering Indigenous Peoples for policy responses was "yes," we moved to the evaluative coding. The evaluative coding consisted of two justice indicators: procedural (i.e., fairness of procedures for decision-making) and distributive (i.e., the outcomes of transformation and its benefits, burdens, and risks). Finally, we analyzed the policy responses against the question "How could this response have been better delivered?" The justice-based approach is essential for examining policy responses, particularly those related to Indigenous Peoples, because of the unequal distribution of interactive stressors such as climatic impacts and the disparity in Indigenous Peoples' ability to respond to them (Coggins et al., 2021; Ford et al., 2022). As a result of a series of in-depth discussions, we developed this framework for data collection, coding, policy prioritization, and synthesis.

2.3. Data collection and analysis

To assess COVID-19 policy responses, data were collected by reviewing policy documents (n = 110) and conducting remote interviews with policymakers (n = 20). We identified policymakers as people who are directly or indirectly involved in or associated with policymaking and implementation. Secondary data on policy responses were collected from policy documents published by the Sri Lankan government. Policy documents include newly formulated COVID-19-related policies of the government, the objectives of each policy, and the roles and responsibilities of policy-implementing institutions. Primary data on how people responded to COVID-19-related policies were gathered using policy interviews. We supplemented data collected from interviews and policy document reviews with ongoing monitoring activities at Vedda communities as part of the COVID Observatories project. We appointed community observers to collect data using community diaries. This included a person from the community and someone from outside the community who translated and communicated with the communities and maintained records/field diaries. Community diaries documented the ongoing impacts of COVID-19 in Coastal-Vedda communities. Following the data collection, we conducted a series of focus group discussions (FGDs) among researchers to develop criteria for policy prioritization and in-depth analyses.

Four steps were followed to assess COVID-19 policy responses (Fig. 1). They were: 1) policy document review, 2) policy interviews, 3) comparison, and 4) criteria development and prioritizing of responses.

Step 1: Policy document review.

The National Epidemiology Unit (NEU) of Sri Lanka was selected as a primary data source for government-issued policy documents and new circulars on COVID-19. The NEU has maintained an official website with up-to-date policy documents and functions as the official institution for communicating policies related to COVID-19 prevention.

To obtain a general understanding of the nature and scope of the policy documents, 110 documents were coded according to the justice-based conceptual framework (Table 1). These documents were published from January 2020 to November 2021. Coding criteria covered two main aspects: i) descriptive coding to provide the background of the response in general and ii) evaluative coding, which focuses on the

Table 1
Justice-based conceptual framework building on (Byskov et al., 2021; Coggins et al., 2021; David-Chavez and Gavin, 2018; Satyal et al., 2021).

| Type of coding | Conceptual framework | | |
|---|--|--|--|
| | Component/ Justice indicator | Characteristics | Descriptions |
| Descriptive coding | Government descriptives | Level of the government response: Scale of the policy instrument's target (local, intermediary, or national) Administrative responsibility (government unit responsible for implementation) | This explains the scale of the policy instrument's target, i.e., local, intermediary, or national. The government/non-government entity with the responsibility of implementing the response. |
| | Response descriptives | Nature and scope of the response Target group of the government response Target group of the government response Associated costs and expenses Monitoring and evaluation | I. What is the nature/scope of the government response? What broader areas (e.g., mobility, religious activities) does the response cover? II. What is the strategic goal of the government response? The specific means by which the goals of the response will be implemented. Does the government response explicitly consider Indigenous Peoples? What are the set expenditures/impositions of the government response? Is there a specific monitoring process for the government response? If "yes", which entity/person is responsible for it? |
| Evaluative coding | Procedural justice (Byskov et al., 2021) | If "yes" to the consideration of Indigenous Peoples above, what is the nature of this inclusion/engagement? Fairness of procedures for decision-making, inclusiveness, and levels of participation in the government response | <u>I. Recognition:</u> To what extent are Indigenous Peoples' needs, perspectives, and knowledge systems recognized within the government response? <u>II. Representation:</u> To what extent are Indigenous Peoples represented within the government bodies designing and implementing the response (i.e., interest organizations, elected officials, chosen representatives)? <u>III. Participation:</u> To what extent do, and could, local communities participate in the government response? Levels of participation in the government response (David-Chavez and Gavin, 2018) Passive Recipients: Indigenous Peoples were not included in the design of the response or in the implementation, just as receivers of government action. Consultative: Indigenous Peoples were consulted in the design of the response. Collaborative: Are Indigenous Peoples intended to work together with the government to implement the response? Collegial: Are Indigenous Peoples intended to collaborate and provide feedback on the implementation of the response? <u>IV. Indigenous:</u> The government response is centered in Indigenous value systems and historical context; community members have authority over the entire process of the response (e.g., self-governance or Indigenous government context). |
| | Distributive justice (Byskov et al., 2021) | How the outcomes of transformation and its benefits, burdens, and risks are distributed | <u>I. Services and resources:</u> To what extent does this government response enable fair and equal distribution of goods and resources required for Indigenous Peoples to survive during the COVID-19 pandemic (e.g., adequate housing, potable water, health care, food, education)? <u>II. Capabilities:</u> To what extent does this government response enable Indigenous Peoples to convert services and resources into opportunities to survive during the COVID-19 pandemic? |
| How could this response have been better delivered? | | | |

consideration of Indigenous Peoples in policy responses. The policy documents were screened and a textual content analysis was conducted. "Texts and phrases" explaining the descriptive and justice indicators given in the framework (Table 1) were extracted from policy documents and pasted into the respective cells in an MS Excel sheet.

Following the initial coding, policy documents were categorized by applying manifest content analysis. Keywords and phrases used to explain the broader categories/objectives of the policy document were recorded and counted. Policy documents with common keywords and phrases were included in the same category. Twenty categories of policy documents were identified, as given in Table S1. One of the co-authors with previous expertise in policy research reviewed and confirmed the identified policy categories.

Step 2: Policy interviews.

Interviews were conducted with policymakers to collect primary data. These interviews aimed to create an understanding of the existing situation in the context of Indigenous/local peoples in terms of knowledge about policy responses during COVID-19, among other stresses. The interview guide was developed to answer questions about the impacts and experiences regarding: a) how participants (their organizations) respond to those impacts, b) what the existing forms of collaboration for COVID-19 responses are, c) what the local government's involvement is in decision-making, and d) what the local actions are to survive. Following purposive sampling, 20 respondents were selected to conduct policy interviews considering their affiliation (i.e., national government bodies), length of time of the position (i.e., more

than two years of experience in work), and their role in COVID-19 policy formulation (i.e., decision making, policy documentation or dissemination of policy documents). The purposive sample covered all sectors related to COVID-19 policies, i.e., health, food systems, and poverty alleviation, at national, regional, local, and community scales (Table S2). The two policy interviewers, who were native speakers of Sinhalese, conducted the interviews. The interviews were carried out primarily through phone calls to minimize the risks of COVID-19 spreading and adhere to government-imposed travel restrictions. A structured questionnaire with open-ended questions providing information about the background, policy-level experience, COVID-19 responses, needs in responding to COVID-19, and COVID-19 in context was used as the data collection instrument (Table S3).

Each interview session lasted about one hour. When more time was required, a subsequent meeting was arranged. Follow-up phone calls were made when further clarification was needed. Before the interview, the interviewers explained the purpose of the research, the voluntary nature of the respondents' participation, and the confidentiality of the information provided. After "informed oral consent" was obtained, the interviewees' responses were documented in notebooks; some were recorded as audio files. The names of the respondents were not recorded. At the end of each interview, the interviewer verified the collected information with the interviewee. When the interviewees disagreed with any information, it was modified as per their input. This interview process was conducted over nine months (March to November 2021).

Interviews were translated into English, transcribed, and organized

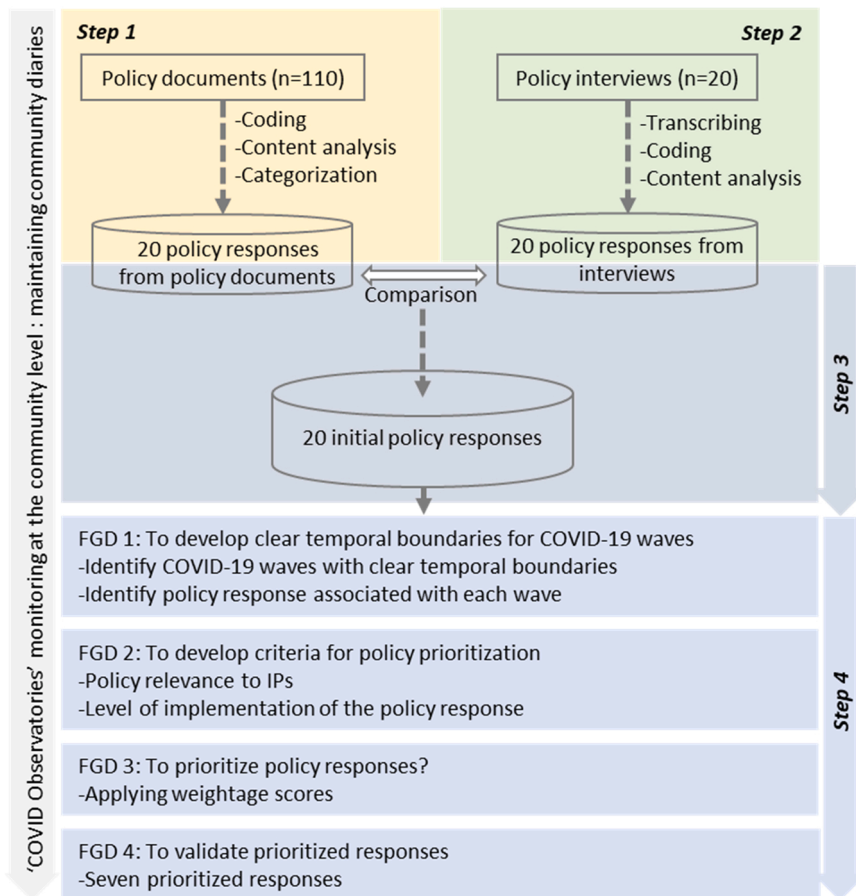


Fig. 1. Flow diagram to illustrate data collection methods and analysis. (FGD: Focus Group Discussions).

in MS Word format. The transcripts were thoroughly read several times before coding. Written transcripts were coded such that it would not be possible to make direct associations between the interviewee and the data that the interviewee provided. Manifest content analysis with a deductive approach was used to analyze the interview data (Table S4). It was conducted with structured codes to categorize the interview data with regard to the 20 policies identified in the process of analyzing the policy documents. The interview data were coded and categorized under each policy, and the frequency of interviews in the same category was counted and recorded. Data were analyzed to identify how the characteristics of the policy responses changed over the two-year study period and the extent to which each response considered the Indigenous Peoples.

Step 3: Comparison.

The responses identified through the policy documents were compared to the policy information collected through the interviews. The comparison aimed to finalize the initial policy response list and confirm whether there were more responses to be added. The policy responses identified from the interviews ($n = 20$) and the policy responses identified from the initial policy coding and categorization ($n = 20$) were the same. Therefore, this study moved forward with the 20 responses.

Step 4: Criteria development and prioritization of responses.

Four focus group discussions were conducted remotely through Zoom, with the participation of three co-authors of Sri Lankan origin (EKG, DP, and ID). These FGDs took place between January 2022 and March 2022. The first FGD took place to develop clear temporal boundaries over two years to distinguish waves of COVID-19. The outcome of the first FGD was to develop a temporal boundary considering criteria including a) the number of positive cases reported, b) the

nature and origin of the positive clusters, c) the lag phases,¹ and d) the fact that COVID-19's spread in Sri Lanka could be divided into waves. The time frames of these waves were clear due to the lag phases (e.g., there was a lag phase between the first and second waves [May, 2020 to September 2020], when no positive cases were reported in any areas of the country). The government has introduced several policies and has often amended previous policies to align with the nature of each wave. Therefore, people's responses to each policy changed over the waves. A temporal boundary was defined to study the variation: March 2020 to May 2020 (first wave); October 2020 to January 2021 (second wave); April 2021 to June 2021 (third wave); and July 2021 to December 2021 (fourth wave).

The first FGD also identified responses related to each COVID-19 wave and further categorized them based on the source of the response. Based on the guiding question(s) of "Can you describe how the government (i.e., national, intermediary, or local) is responding to specific COVID-19 waves (i.e., first to fourth wave)?", data for 20 responses were (re)organized in an MS Excel sheet. Variations in the responses among the waves were compared under each question and the Indigenous context and territories were studied and brought forward for prioritization (e.g., during the first lockdown, the government and NGOs provided food and other essentials to citizens of the country; thereby, Indigenous Peoples received this support. However, during the second wave, Indigenous Peoples did not receive any support).

The second FGD aimed to develop criteria for policy prioritization. FGD members considered two main areas: i) relevance to Indigenous

¹ A period when no or significantly lower numbers of COVID-19 patients were reported

Peoples and ii) level of implementation of the policy response. Further, the discussion highlighted the importance of referring to literature in developing the criteria.

The criteria were developed by building on two existing frameworks. First, the indicators that David-Chavez and Gavin (2018) developed to identify the patterns of Indigenous community engagement were used to analyze the policy relevance to Indigenous Peoples. This framework was selected because it accesses Indigenous community participation in policy and decision-making processes. Five main questions were developed (i.e., criterion 1): i) why were Indigenous Peoples not included in the design of the response or the implementation, and just as receivers of government action? ii) were Indigenous Peoples consulted in the design of the response? iii) are Indigenous Peoples intended to work together with the government to implement the response? iv) are Indigenous Peoples intended to collaborate and provide feedback on the implementation of the response? and v) the government response is centered on Indigenous value systems and historical context; do community members have authority over the entire process of the response?

Second, the framework introduced by Pradhan et al. (2017) was adapted to develop the criteria for analyzing the effectiveness of policy implementation. The major focus here was to relate policy to practice and performance. Three principles of this framework are: a) the relevant policy measures to address a specific issue should be able to address its purpose, b) the policy should be implemented using appropriate practices, and c) the policy should deliver its expected outcome in the considered context (performance). To capture these principles of policy implementation, we developed five question statements (i.e., criterion 2): i) was the policy implemented according to its requirement, in the context of Indigenous Peoples? [purpose]; ii) did Indigenous Peoples automatically follow the policy? [practice]; iii) did Indigenous Peoples get involved in the policy implementation? [practice]; iv) did Indigenous Peoples volunteer in the policy implementation? [practice]; and v) did the activities result in anticipated outcomes? [performance].

The third FGD was conducted to investigate how to use the developed criteria systematically to prioritize the policy responses. The discussion suggested applying separate weightage scores for each criterion, with a final score obtained by adding the weights, and, finally, selecting the responses with the highest overall score as key responses.

Both criteria were applied in a binary manner such that if the answer to any of the questions was "yes," it was considered "1," while if the answer was "no," it was considered "0." A weightage score was assigned to each response depending on the number of "yes (1)" and "no (0)" answers obtained for each response. As such, if any response obtained "yes" for all questions, it was given the highest weightage score, 5, while if a response obtained "no" for all questions, it was given the lowest weightage score, 0. Following this step, a list of weightage scores was obtained reflecting responses relevant to Indigenous Peoples. The weightage scores between the highest and lowest scores varied as follows: "yes" for four questions (score 4); "yes" for three questions (score 3); "yes" for two questions (score 2); and "yes" for one question (score 1). Two different weightage score lists were obtained after the application of the weightage scores criteria. One of the weightage scores reflects the responses relevant to Indigenous Peoples, while the other reflects the level of implementation. A single score was obtained by adding the two weighted scores. The table for prioritization of key government policy responses was developed as an outcome of the second FGD (Table S5).

The application of the developed criteria in policy response prioritization was validated during the fourth FGD. The highest and second-highest scores were prioritized (Table S5). Therefore, three responses with the highest scores and another four responses with the second-highest scores were selected as the final set of prioritized responses. After agreement among all FGD members, we continued this study with the seven prioritized responses. The seven prioritized responses were analyzed using a synthesis format (Table S6).

3. Results

3.1. Prioritized responses

The seven prioritized policy responses are (i) testing and identification of COVID-19, (ii) quarantine procedures, (iii) provisional clinical treatments, (iv) handling other diseases during COVID-19, (v) movement, (vi) guidelines to be adhered to by the general public, and (vii) health and vaccination. This section unfolds the findings related to prioritized policy responses and sources of policy responses and implementation (Fig. 2; Table 2), public responses to such policy, characteristics of policy responses, and the evolution of responses over different COVID-19 waves. Fig. 3 summarizes these changes over different COVID-19 waves.

Response 1: Testing and identification of COVID-19.

In January 2020, the Sri Lankan government introduced COVID-19 testing and identification guidelines to the public before the first wave. The guidelines varied over the four waves because the government made amendments during each wave. During the first wave, all suspected and confirmed COVID-19-positive patients were given PCR tests, initially conducted only by government hospitals. PCR testing facilities were available at only 17 stations around the country and tests were carried out free of charge. Policy documents were amended in mid-March, permitting all private medical laboratories to conduct PCR testing, and specific guidelines were introduced to maintain testing standards. Later, private hospitals were able to perform PCR tests. Individuals suspected of having COVID-19 were quarantined at a center for 14–21 days, and a PCR test was performed. COVID-19-positive patients were transferred to the National Infectious Disease Hospital (IDH) for treatment. The first contacts were quarantined at a separate center. Other contacts (second-level) were traced and home-quarantined. Indigenous Peoples also had access to these tests and procedures.

"Earlier [first wave], all PCR-positive patients were given accommodation facilities in the hospital and closely monitored. The close contacts were traced by us [PHIs] and home-quarantined for 14 days. PCR tests were conducted on them [close contacts] on the 10th day after contacting the COVID-19 patient." (Respondent 01: Public Health Instructor/PHI)

During the second wave, rapid antigen tests (RATs) were introduced; random tests were conducted in public places and near the provincial borders during the third wave. Patients who tested positive on the RATs were sent to intermediate quarantine centers in every district. COVID-19 patients with severe symptoms were transferred to the IDH or another hospital with COVID-19 treatment units. During the fourth wave, the government shifted its focus on testing for COVID-19, which was no longer mandatory; it was enough to quarantine with precautions if anyone showed symptoms. COVID-19-positive patients were home-quarantined.

"Nowadays [fourth wave], as the number is too high, PCR-positive mild symptomatic patients are home-quarantined and treated. Only critical patients are admitted to the hospitals. But they [mild symptomatic patients] are closely monitored by us [PHIs] through frequent visits, and necessary actions are taken based on the patient's condition." (Respondent 01: Public Health Instructor/PHI)

Response 2: Quarantine procedures.

Quarantine procedures were introduced in January 2020, soon after a Chinese tourist tested positive in Sri Lanka. Quarantine guidelines were driven mainly by the national government through the involvement of intermediate bodies such as the Medical Officer of Health/MOH office and District Secretariat; local bodies such as the "Grama Niladhari" division adhered to the same procedure. The quarantine procedures introduced by the Sri Lankan government varied over the waves. During the first wave, individuals with or without COVID-19 symptoms (could be a foreign returnee or the first contact of a positive patient) were placed in a quarantine center, with a mandatory quarantine period of

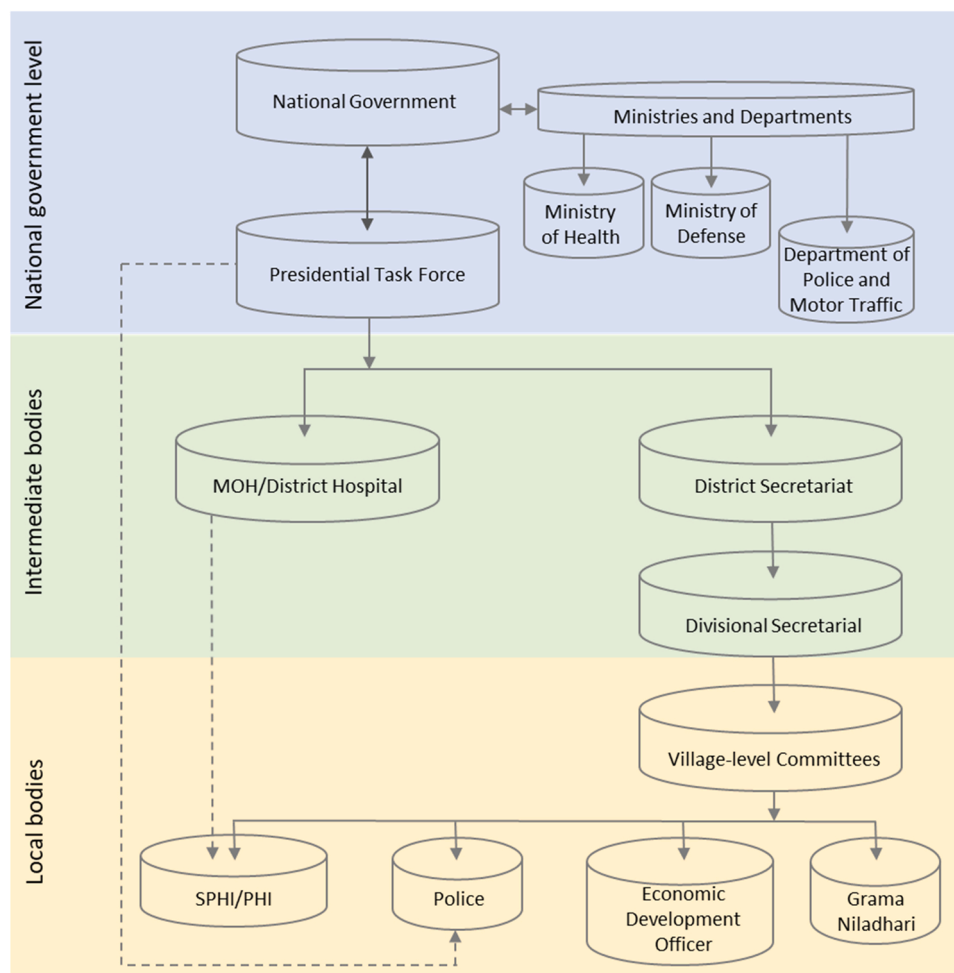


Fig. 2. Structure of the key institutions related to COVID-19 policy responses in Sri Lanka.

two weeks.

The home quarantine procedure was introduced in March 2020 and amended in April 2020 for individuals who had maintained close contact with a suspected or diagnosed case of COVID-19. According to the guidelines, a separate room with sufficient ventilation was required for home quarantine, and the patient was remotely monitored by the Public Health Inspector (PHI) and the Medical Officer of Health (MOH). In April 2020, cities and villages with the highest number of positive cases were quarantined until most of the patients had fully recovered. In June 2020, a special provision was given regarding the quarantining of medical staff; according to the new provision, positive-testing staff members had to undergo 14 days of quarantine and then obtain a negative PCR to exit quarantine procedures and return to work. Additionally, family members of COVID-19 patients were provided with a dry ration kit worth LKR 5000 (~USD 15) under the guidance of the District Secretariat.

"...establishment of village-level COVID-19 control committees, lockdowns, home-based quarantine centers, and intermediate quarantine centers helped prevent the spread. The quarantine curfew didn't work as it was not strict enough." (Respondent 11: Agriculture Research and Production Assistant)

During the second wave (November and December 2020), quarantine procedures were revised with the introduction of an extension period under three main categories: i) overseas returnees should undergo a mandatory 14 days of home quarantine after completing 14 days of quarantine at quarantine centers, ii) an individual who came in close contact with a positive patient must undergo an extended period of

quarantine, and iii) a COVID-19-confirmed patient discharged from the hospital or quarantine centers must undergo an additional 14 days of quarantine. During the second wave, only symptomatic individuals were sent to the quarantine centers to complete the two-week quarantine period. During the third and fourth waves, home quarantine was introduced to all COVID-19 patients; both symptomatic and mildly symptomatic patients were home-quarantined.

"The dry ration distribution was successful at first. It was given to all the families in every Grama Niladhari division who had at least one COVID-19 patient ... later on [wave], with the increment of patients, the number of dry ration kits provided by the government reduced. So only the selected low-income families in every division received these kits." (Respondent 03: Grama Niladhari Officer)

Response 3: Provisional clinical treatments.

The Sri Lankan government issued the Ministry Circular on COVID-19 Hospital Preparedness with a provisional (temporary) focus. This Ministry Circular was successful in providing anticipated outcomes because it helped control the spread of the disease and initiated vaccination programs. These responses regarding provisional clinical treatments were driven mainly by the national government; the intermediate bodies (Medical Officer of Health/MOH office) and local bodies ("Grama Niladhari" division/Rural Development Officer's Division) followed the same practice. These guidelines were amended several times during different phases/waves of the disease. During the first wave, special COVID-19 units were established in the main hospitals. Furthermore, IDH was involved mainly in the circulation of knowledge about clinical methods to be followed by health sector officials and in the provision of

Table 2
Key policy institutions and their roles in managing the spread of COVID-19 in Sri Lanka.

| Key institutions | Primary aim/role (in managing the spread of COVID-19) | Examples of implementation of policy responses |
|--|--|--|
| National government level | | |
| National Government | <ol style="list-style-type: none"> 1. Make key decisions and formulate policies to control the spread of COVID-19 2. Communicate key decisions and policies on COVID-19 to all intermediate and local bodies of the country through gazette notifications 3. Make necessary amendments to policy responses, publish amendments, and circulate them among intermediate and local bodies of the country | <ol style="list-style-type: none"> 1. Introduced and published the COVID-19 testing and identification guideline 2. Introduced and published the quarantine guideline 3. Issued the Ministry Circular on COVID-19 Hospital Preparedness 4. Initiated vaccination programs 5. Appointed the Ministry of Health as the main government body for handling and managing the spread of other diseases amid the spread of COVID-19 6. Provided authority to the Sri Lankan Police to announce police curfew whenever necessary 7. Introduced common norms and practices to which the public should adhere (e.g., wearing masks) |
| Ministry of Defense | <ol style="list-style-type: none"> 1. Provide administrative support to the COVID-19 special task force | <ol style="list-style-type: none"> 1. Appointed officers with specific responsibilities (e.g., appointed officers responsible for vaccination programs and quarantine centers) |
| Department of Police and Motor Traffic | <ol style="list-style-type: none"> 1. Provide administrative support to the regional police stations to manage the spread of COVID-19 2. Enforce police curfew | <ol style="list-style-type: none"> 1. Appointed police officers with specific responsibilities (e.g., appointed officers responsible for regional vaccination programs and regional quarantine centers) |
| Presidential Task Force | <ol style="list-style-type: none"> 1. Contribute to the formulation of national policy documents on COVID-19 2. Implement key policy responses as specified by the national government | <ol style="list-style-type: none"> 1. Supervised and managed all government quarantine centers in the country 2. Organized and conducted random PCR and RAT testing services at provincial borders 3. Conducted vaccination programs for selected Grama Niladhari divisions and people who needed vaccines for jobs requiring travel 4. Monitored island-wide vaccination programs and issued vaccination certificates |
| Intermediate bodies | | |
| MOH/ District Hospital | <ol style="list-style-type: none"> 1. Provide technical and subject-related (e.g., patient handling and treatment) support in formulating national policy responses to COVID-19 2. Identify, treat, and monitor COVID-infected patients 3. Create awareness among village communities 4. Treat patients with other severe diseases without interruptions | <ol style="list-style-type: none"> 1. Conducted PCR testing free of charge 2. Contributed to formulating national-level guidelines on COVID-19 (e.g., quarantine procedures) 3. Established special COVID-19 treating units 4. Conducted and monitored vaccination programs 5. Maintained close contact with the PHI in the area and disseminated knowledge through village-level meetings and leaflets to increase public awareness 6. Treated and conducted clinics for patients with chronic diseases, leptospirosis, and dengue 7. Maintaining an Infectious Diseases Announcement Book where all the COVID-19 patients and the first contacts of the COVID-19 patients are listed. |
| Private Hospitals | <ol style="list-style-type: none"> 1. Identify, treat, and monitor COVID-infected patients | <ol style="list-style-type: none"> 1. Conducted PCR testing (for a gazetted minimum charge) 2. Established special COVID-19 treating units |
| District Secretariat | <ol style="list-style-type: none"> 1. Implement national key policy responses at the district level 2. Oversee the implementation of government policy responses at the village level | <ol style="list-style-type: none"> 1. Monitored the distribution of dry ration kits in Grama Niladhari divisions 2. Monitored the vaccination programs at the district level |
| Divisional Secretariat | <ol style="list-style-type: none"> 1. Implement national key policy responses at the divisional level | <ol style="list-style-type: none"> 1. Monitored the vaccination programs at the divisional level |
| Local bodies/Village-level committees | | |
| SPL/PHI | <ol style="list-style-type: none"> 1. Implement government policy responses at the village level 2. Create awareness of COVID-19 prevention among village communities | <ol style="list-style-type: none"> 1. Remotely monitored home-quarantined patients 2. Maintained close contact with the public in the area and disseminated knowledge through village-level meetings and leaflets to increase public awareness 3. Distributed leaflets among villages 4. Displayed the quarantine notification where people were home quarantined |
| Regional-Level Police Stations | <ol style="list-style-type: none"> 1. Implement national key policy responses at the village level | <ol style="list-style-type: none"> 1. Monitored how well citizens of the country adhered to the police curfew 2. Assigned penalties for citizens who violated the travel restrictions 3. Issued travel passes under special considerations (e.g., in case of a health emergency, to attend exams, or to reach the airport) |
| Economic Development Officer | <ol style="list-style-type: none"> 1. Provide administrative support in implementing government policy responses at the village level | <ol style="list-style-type: none"> 1. Assisted Grama Niladhari in distributing dry ration kits among low-income families |
| Grama Niladhari | <ol style="list-style-type: none"> 1. Implement government policy responses at the village level 2. Create awareness of COVID-19 prevention among village communities | <ol style="list-style-type: none"> 1. Distributed dry ration kits worth LKR 5000 to selected low-income families in the village 2. Issued recommendation letters for villages to apply for travel passes from regional police stations under special circumstances (e.g., to attend exams, for migration purposes) |

resources (Personal Protective Equipment kits, masks, face shields) to health sector officials/hospitals. Intermediate- and local-level authorities like the MOH maintained close contact with the public in the area and disseminated knowledge through village-level meetings and leaflets to increase public awareness of COVID-19. During the second wave, COVID-19 treatment centers were established in different areas of the country. Wards in regional-level hospitals/general hospitals were converted to COVID-19 treatment units. During the third wave, vaccination against COVID-19 was initiated within the country. During the fourth wave, vaccination programs continued. Sri Lanka had administered

39,365,274 doses of COVID-19 vaccines by April 2022, covering 90.3% of the country's population (WHO 2022).

"This hospital I [nurse] work [at] was initially not used to treat COVID-19 patients. Back then, we [nurses] sent all the COVID-19 patients to the National Infectious Diseases Hospital (NIDH). Later, new hospitals were established to treat COVID-19 patients. Finally, the general/regional hospitals were converted to COVID-19 care hospitals due to the rapid increment of COVID-19 cases." (Respondent 17: Nurse)

Response 4: Handling other diseases during COVID-19.

| Policy response category | Identified policy responses | 2020 (Year 1) | | | | | | | | | | | | 2021 (Year 2) | | | | | | | | | | | |
|----------------------------------|---|--|----------|-------|-------|-----|------|---------|--------|-----------|---------|----------|----------|---------------|----------|-------|-------|-----|------|---------|--------|-----------|---------|----------|----------|
| | | Wave 01 | | | | | | Wave 02 | | | | | | Wave 03 | | | | | | Wave 04 | | | | | |
| | | January | February | March | April | May | June | July | August | September | October | November | December | January | February | March | April | May | June | July | August | September | October | November | December |
| Prioritize /key policy responses | Testing and identification of COVID | | | I | A | | | N | N | | | | | | | | | | | | | | | | |
| | Guidelines to be adhered to by the public (wearing masks) | | | | | | | I | | | | | | | | | | | | | | | | | |
| | Health and vaccination | | | | | | | | | | | | | I | | A | N | N | N | | | N | N | N | N |
| | Quarantine proceedings | | I | | N | N | | | | | | | | | | | | | | | | A | | | |
| | Clinical treatment provisional | | | | | | | | | | | | | | | | | | | | | | | | |
| | Handling other diseases during COVID 19 | | | | | | | | | | | | | | | | | | | | | | | | |
| | Movement | | | | | | | | | | | | | | | | | | | | | | | | |
| | Immigration and emigration | | I | N | | | | | | | | | | | | | | | | | | | | | |
| Non-prioritized policy responses | Clinical treatments (other than exit mechanism) | | | | | | | | | | | | | | | | | | | | | | | | |
| | Patient's well being | | | | | | | | | | | | | | | | | | | | | | | | |
| | Clinical Management | | I | A | | | | | | | | | | | | | | | | | | | | | |
| | Employment and workplace safety (non-health-related) | | | | | | | | | | | | | | | | | | | | | | | | |
| | Employment and workplace safety (health-related) | | | | | | | | | | | | | | | | | | | | | | | | |
| | Environment | | | | | | | | | | | | | | | | | | | | | | | | |
| | Clinical treatments and exit mechanisms | | | | | | | | | | | | | | | | | | | | | | | | |
| | Education | | | | | | | | | | | | | | | | | | | | | | | | |
| | Avoid Gatherings | | | | | | | | | | | | | | | | | | | | | | | | |
| | Religious Activities | | | | | | | | | | | | | | | | | | | | | | | | |
| | Deaths and autopsy practices | | | | | | | | | | | | | | | | | | | | | | | | |
| | Deaths and repatriation | | | | | | | | | | | | | | | | | | | | | | | | |
| | I | The initial policy response of the respective category | A | | | | | | | | | | | | | | | | | | | | | | |
| | Amendments of the previous response | | | | | | | | | | | | | | | | | | | | | | | | |
| | N | | | | | | | | | | | | | | | | | | | | | | | | |
| | New policy responses other than the initial response | | | | | | | | | | | | | | | | | | | | | | | | |
| | Lags in between the prioritize dresponses | | | | | | | | | | | | | | | | | | | | | | | | |
| | Lags in between the non-prioritized responses | | | | | | | | | | | | | | | | | | | | | | | | |
| | Lag phase in between waves | | | | | | | | | | | | | | | | | | | | | | | | |

Fig. 3. How policy responses progressed over different COVID-19 waves in Sri Lanka.

The national government initiated several plans to control the spread of other diseases during COVID-19. The Ministry of Health was charged with this response. It was the main governing body, while all the District General Hospitals (DGHS) and regional-level hospitals followed the guidelines provided by the Ministry of Health. The actions taken to handle the spread of other diseases during COVID-19 were slightly amended with the spread of the disease. During the first wave, the hospitals were instructed to continue treating chronic diseases. All service providers prioritized patients with chronic diseases when treating them for COVID-19, as they faced a higher risk than patients with no history of chronic disease. COVID-19 hit the country when dengue was spreading rapidly. Therefore, the dengue prevention program was conducted as planned, without interruptions.

"Now [first wave], the priority is given to the COVID-19 patients. Before COVID-19, we [PHIs] gave priority to the dengue control programs. But still, even during the COVID-19 period, we [PHIs] continued the dengue programs." (Respondent 01: Public Health Instructor)

During the second wave, authorities were keen on sustaining leptospirosis control activities. A higher number of leptospirosis cases was reported in agricultural communities. In response, the government distributed medicines to those at high risk, and area medical officers conducted educational programs on leptospirosis. In May 2020, the Ministry of Health Sri Lanka issued special instructions for all hospitals regarding the handling of leptospirosis during COVID-19.

During the third wave, authorities guided the diagnosis and management of thrombocytopenia syndrome (TTS) in people who received COVID-19 vaccinations. When providing services during the pandemic, hospitals, the MOH office, and village-level COVID-19 committees prioritized pregnant mothers and individuals

with chronic diseases.

Response 5: Movement.

The government enforced inter-district, inter-provincial, or island-wide travel restrictions considering the spread of the disease in each wave. The President of Sri Lanka established a special task force for COVID-19 control, comprising military and police personnel, medical officers, scientists, scholars, engineers, monks/priests, and welfare organization leaders. The presidential task force implemented this response. Intermediate (Ministry of Defense, Department of Police and Motor Traffic) and local (regional-level police stations, PHIs, village-level COVID-19 committees) governing bodies adhered to the exact mechanism that the national government introduced and implemented. The government response varied based on the wave. During the first wave, the police curfew was enforced across the country. During the second wave, the police curfew was enforced at night in areas reporting the highest number of patients. Movement restrictions were enforced on district borders, and no one was allowed to cross the borders without special permission from the police. As such, individuals with travel passes were allowed to cross the district borders, and Sri Lankan police issued travel passes under special circumstances (e.g., for essential services and to visit hospitals).

During the third wave, the police curfew was enforced at night as usual and travel restrictions were introduced between the district boundaries. The travel restrictions between boundaries continued during the fourth wave. During these periods of travel restrictions, only individuals with travel passes were allowed to travel between provinces. The police issued travel passes to individuals who provided essential services. This helped control the spread of the disease from high-risk to low-risk areas in the country.

"It was important to restrict the movement of people and encourage them to maintain distance. We [police officers] followed many methods to ensure that, including the implementation of travel restrictions between provinces, isolating villages/areas with a high risk of spreading COVID-19, and issuing curfew pass to the essential service providers." (Respondent 18: Police Officer)

Response 6: Guidelines to be adhered to by the general public.

The guidelines to be adhered to by the general public were common norms and practices that the government introduced to control the disease spread. These responses were introduced mainly by the national government. The intermediate bodies (Medical Officer of Health/MOH office, District Secretariat) and local bodies ("Grama Niladhari" division) adhered to the same procedure. The policymakers raised awareness of these guidelines among the Indigenous Peoples in their native language through meetings and leaflets. However, on some occasions, Indigenous Peoples did not adhere to these general guidelines; [Section 3.2](#) will elaborate on this. These responses generated the anticipated outcomes because the minor steps taken by the general public helped reduce the spread of COVID-19. The reason for proper adherence to these guidelines by the public should be the effective and consistent awareness campaigns conducted by the local/regional-level officers. The guidelines changed slightly throughout the spread of COVID-19. During the first wave, wearing a mask was not a legal mandate.

"At the beginning [first wave], we [Rural Development Officers] distributed leaflets in our divisions to create an awareness among people on COVID to stay safe by following everyday practices like wearing masks, washing hands, and maintaining distance." (Respondent 02: Grama Niladhari Officer)

During the second wave, wearing masks in the community/public places was mandatory, while wearing gloves was voluntary. People were also encouraged to use sanitizer, wash their hands before entering public institutes, and maintain a one- or two-meter distance when using public transportation and in crowded places. The same practices adopted in the first and second waves were continued through the third and fourth waves.

Response 7: Health and vaccination.

Sri Lanka started its COVID-19 vaccination program between the second and third waves of COVID-19. The program was conducted in different stages (e.g., vaccination for medical staff, vaccination for people above 60, vaccination for people 30–60, vaccination for people 18–30, and vaccination for children with medical complications). It was driven mainly by the national government with the support of the presidential task force on COVID-19 control, the Ministry of Health, and the Sri Lankan Army. Intermediate bodies (Medical Officer of Health/MOH office, district hospitals) and local bodies ("Grama Niladhari" division, village-level COVID-19 control committee) adhered to the same procedure. The Ministry of Health provided vaccines to every Grama Niladhari division/administrative unit in the country. The Sri Lankan Army provided vaccines in several Grama Niladhari divisions and to people who needed vaccines for travel and jobs. PHIs, Grama Niladhari officers, and police officers offered significant support in conducting vaccination camps in every Grama Niladhari division by preparing vaccination-eligible lists and locations/sites and creating public awareness of vaccination.

"As the members of the village-level COVID-19 control committee, we [village-level COVID control committee] had to sort out the people based on their age at the beginning of the vaccine program. The classifications were above 60, 59–50, 49–30, 29–20, and below 20. After preparing these lists, we [village-level COVID-19 control committee] sent them to the Divisional Secretariat. They [Divisional Secretariat] organized the vaccination program/camp based on the lists provided by us [village-level COVID-19 control committee]." (Respondent 03: Rural Development Officer/GS Officer)

During the vaccination process, priority was given to citizens above 60, pregnant mothers, and individuals with chronic diseases. Health sector officials, members of the Sri Lankan Parliament, and essential service providers (e.g., food distributors, grocery store workers, and health care personnel) were also prioritized during vaccination. Furthermore, the leading figures of the country were encouraged to get vaccinated early to set an example for the general public to follow. The vaccination program underwent several changes depending on the availability of vaccines as well as the requirement of the public. No vaccinations occurred during the first wave. The AstraZeneca vaccine was the first one introduced to health sector employees and citizens above 60 during the second wave of COVID. During the third wave, several other vaccines (Sinopharm, Pfizer, and Moderna were available within the country) and the second dose of the AstraZeneca vaccine was available only for individuals above 30. By the end of June 2021, vaccination centers had been established in all divisional, provincial, and national hospitals and selected public places under the management of medical staff and Sri Lankan forces.

During the fourth wave (August 2021), the authorities started giving booster doses to the elderly (above 60), and vaccination commenced for those below 30 and schoolchildren. The Sinopharm vaccine was specially arranged for university students, given the government's decision to allow students to return to their universities to begin on-ground teaching activities. The Pfizer vaccine was given as the booster dose; it was first administered in November 2021 in eight selected districts of Sri Lanka, namely, Colombo, Gampaha, Kalutara, Galle, Matara, Hambantota, Anuradhapura, and Ampara. The Pfizer vaccine was arranged for students and foreign employment seekers who were leaving the country to study abroad, as Pfizer was accepted by many countries. Parallel to that was a vaccination program for individuals aged 18 or 19. Children with specific health conditions (e.g., immune deficiency disorders, chronic respiratory or heart diseases) were given the vaccination simultaneously. In December 2021, a special policy response was noticed, and the government provided instructions to offer a second or booster dose of vaccine to individuals with foreign vaccination certificates.

3.2. Inclusion of Indigenous Peoples in COVID-19 policy responses

The prioritized responses did not explicitly mention Indigenous Peoples as direct beneficiaries of government action. Rarely were Indigenous Peoples involved in implementing policy responses such as COVID-19 testing and identification, quarantine procedures, provisional clinical treatments, handling other diseases during COVID-19, guidelines to be adhered to by the public, movement, and health and vaccination. There is little evidence that Indigenous leaders/representatives got involved and asked the members of their tribes to follow specific COVID-19 prevention measures (e.g., social distancing, testing, and vaccination).

"I [Rural Development Officer] can remember seeing the chief, 'Uruwarige Wannila-aththo,' getting involved with the government authorities in conducting a COVID testing camp in the Mahiyanganaya area." (Respondent 12: Grama Niladhari Officer)

There is more and strong evidence of the exclusion of Indigenous Peoples in the policymaking process and limited policies targeting Indigenous Peoples. According to the policy interviewees, none of their organizations had information about how COVID-19 affected rural Indigenous communities differently from non-Indigenous Peoples. The interviewees also identified barriers to facilitating Indigenous Peoples' participation in COVID-19-related decision-making and policy responses. Most policymaking organizations do not pay attention to minority/marginalized populations. The remoteness and limited access to Indigenous Peoples' communities, limited understanding of Indigenous language and culture, financial constraints, and limited interest based on population size (for electoral votes) are some identified barriers.

Thus, Indigenous Peoples have not been consulted regarding COVID-19 control or preventive strategies, and nor have their representatives been involved in decision-making processes.

"Authorities do not have a clear idea of Indigenous Peoples and how to make them [Indigenous Peoples] involved in policymaking and implementation ... they [Indigenous Peoples] have needs like proper health care and sanitary facilities, education and technical support, decent income ... they [Indigenous Peoples] belong to the Ministry of National Heritage from which they do not support their livelihoods." (Respondent 5: Medical Laboratory Scientist)

Based on the Vedda community observatories, barriers prevent Indigenous Peoples from following some government policy responses. Limited knowledge about the highly contagious nature of COVID-19 was evident in Vedda communities. During the first wave, Indigenous Peoples thought it was simply a regular virus. (They assumed it would not spread one-to-one.)

"During the first time [wave] we heard about COVID, we thought and took it as a normal virus and thought it won't spread one to one. Also, we never thought it goes a wide spread in the community. A few months later, it started to spread to Batticaloa. One person tested positive, then it spread to our nearest city, Valiachena."—community diary (January 2021)

There were no proper information channels to inform Indigenous Peoples about COVID-19. Communities do not have the internet, so they cannot access websites (i.e., Sri Lanka health ministry, WHO) to get the most updated information on COVID-19 prevention. Until the second and third waves, Vedda used their traditional knowledge about previously experienced, less contagious diseases to face the COVID-19 pandemic.

"We mainly get information from television and radio ... There are [a] few Tamil radio stations and TV stations we usually use. However, these channels deliver different news information, so it's very confusing which news can be trusted. The information shown on the television and radio [is] related to Colombo but information especially on our related region."—community diary (December 2020)

Additionally, there are various barriers to adapting government-issued policy responses, including language and cultural barriers, poor living standards, lack of political power, opposition to historical experience with the government, and difficulties in accessing health facilities due to remoteness.

"...during the second wave, ten people got positive in our nearest city Valaichenai and some other cities ... like Batticaloa, Eravur, Oddamavadi ... then only [did] we [feel] the gravity of the disease [COVID-19] and that made us feel scared and panic [about the condition]."—community diary (December 2020)

"Nearest hospital is in Vaharai, which wanted to travel around 20kms from the village. For major illnesses treated in Vaharai hospital, if [there is] a need for more treatment which [can't be] handled by Vaharai hospital, they shifted to Valanichenai hospital, which is situated around 30 km away from the village. If emergency and further treatment needed, the patient wanted to go to Batticaloa based hospital which [is] 50 km far."—community diary (January 2021)

"The government does not pay enough attention to Indigenous Peoples or provide them with much-needed facilities. The government should know the importance of protecting the Indigenous Peoples ..." (Respondent 16: Economic Development Officer)

"They [Indigenous Peoples] do not respect the decisions of the PHIs. They [Indigenous Peoples] do not like to obey them [decisions of PHIs] or to follow them [decisions of PHIs]." (Respondent 14: Supervising PHI)

All the policy interviewees agreed that Indigenous Peoples have special needs that the government and policymakers should address

while answering an open-ended question (Table S3). To boost the inclusion of Indigenous Peoples in policy, some suggestions from policy interviewees are: developing a special healthcare system focused on Indigenous Peoples, improving Indigenous Peoples' awareness of COVID-19 and related infectious diseases, improving Indigenous Peoples' living conditions, and improving access to markets to strengthen Indigenous Peoples' livelihoods (e.g., fish, bee honey). Interview participants commonly expressed these suggestions for open-ended questions related to the COVID response in Sri Lanka (Table S3).

"They [Indigenous Peoples] need to be made aware of not to follow myths and to get proper medical support in need." (Respondent 14: Supervising PHI)

"They [Indigenous Peoples] have much less sanitary facilities than the general public. They [Indigenous Peoples] need more advisory services to create awareness among them on COVID-19." (Respondent 17: Nurse)

4. Discussion

This paper documents and assesses COVID-19 policy responses in Sri Lanka. It illustrates three main areas of COVID-19 responses: i) prioritizing key policy responses for COVID-19, ii) studying how these responses changed over different waves, and iii) examining the inclusion of Indigenous Peoples in COVID-19 policy responses.

Sri Lanka initiated rapid policy responses while following the health guidelines issued by the World Health Organization (WHO), partly because of limited knowledge and experience in facing global pandemics such as COVID-19. Our data collection methods (policy interviews and coding of policy documents) initially identified 20 main policy responses. Out of these 20 policy responses, we prioritized seven: i) testing and identification of COVID-19, ii) quarantine procedures, iii) provisional clinical treatments, iv) handling other diseases during COVID-19, v) movement, vi) guidelines to be adhered to by the general public, and vii) health and vaccination. These prioritized policy responses are also recorded in other countries. Testing and identification of COVID-19 were highly prioritized in China, Ireland, and Canada (Ingram et al., 2022; Pueyo, 2020). For example, patients in Ireland received an appointment at the nearest testing center on their mobile within 24 h. The test results were sent electronically to the patient and the governing authorities (Pueyo, 2020). Many countries, including Australia, Belgium, Brazil, Canada, Germany, and Italy, prioritized the restriction of movement; for example, lockdowns were commonly implemented to restrict the unnecessary movement of the public (Meijer and Webster, 2020). Japan used mobile applications to create public awareness and communicate the guidelines to be adhered to by the public such as wearing face masks and maintaining a distance in crowded places (Tashiro and Shaw, 2020).

Policy responses were not consistent across the pandemic. The government changed its policy responses based on the nature and severity of the spread of COVID-19 (Fig. 3). These responses affected (positively and negatively) the spread of COVID-19 and were important to ensure the food security, economy, justice, and health of vulnerable minorities (Amaratunga et al., 2020). During the period of self-isolation, Indigenous Peoples in Sri Lanka relied on domestic food sources from home gardening. Similar behavioral responses were reported in the Peruvian Amazon, where Shawi Indigenous communities relied on traditional diets and Indigenous knowledge. Food distribution to Arctic Inuit communities and Batwa communities in Uganda was disrupted during the pandemic (Zavaleta-Cortijo et al., 2020). Furthermore, Indigenous communities in Canada and Russia dealt with the COVID-19 virus themselves by creating their own public health orders, restricting travel through their territories, adapting their ceremonies, and intensifying public health campaigns due to inadequate health policy responses (Bogdanova et al., 2022; Hillier et al., 2020).

We identified five key changes related to COVID-19 policy responses

over the four waves. First was a change in the COVID-19 identification method from PCR testing to rapid antigen tests (RATs) during the second wave of COVID-19 in Sri Lanka. Shifting to RATs facilitated the identification of many positive patients, as these tests were comparatively fast, cost-effective, and easy to conduct (Polechová et al., 2022). Similar changes were noticed in Germany and the United Kingdom (Yoo et al., 2020). Further, RAT kits were more accessible through supermarkets, and people started testing on their own (e.g., in Australia, the United Kingdom, and Cambodia) (Qc, 2020; Yoo et al., 2020). Second, the mandatory quarantine period of 14 days was reduced to seven days during the fourth COVID-19 wave in Sri Lanka. As explained by Yoo et al. (2020), the United States, China, South Korea, the United Kingdom, Brazil, and Haiti also announced an initial 14-day mandatory quarantine period, but this was lifted during later waves of COVID-19.

Third, we documented several changes in provisional clinical treatments following the WHO guidelines. For example, emergency radiology services were available for all patients during the first wave, while in later waves, these were available only for critical patients. Fourth, the Sri Lankan government supports the idea of trying alternative medicinal practices instead of western medicine. For instance, Sri Lanka produced several ayurvedic immunity boosters aimed at COVID-19 (e.g., Suwardarani); some of these products are accessible to the public at affordable prices. Similar changes were recorded in China and India regarding the application of traditional knowledge in treating COVID-19 (Girija and Sivan, 2020; Shirkande and Shirkande, 2021). Finally, Sri Lanka handled three main health-related stressors while facing COVID-19: i) leptospirosis, ii) thrombosis with thrombocytopenia syndrome (TTS), and iii) dengue. In controlling these diseases, the government conducted awareness programs and telecasted advertisements educating people on avoiding leptospirosis and dengue. Weekly clinics were held in government hospitals to treat people who had thrombosis with thrombocytopenia syndrome (TTS). Using a similar approach, Bangladesh handled other health-related stressors such as dengue, during COVID-19. In contrast, El Salvador reported a higher number of dengue patients during the first wave of COVID-19, as the nation had to pay more attention to COVID-19 (Hasan et al., 2022; WHO, 2020).

We used the justice-based conceptual framework to understand that no, or very little, consideration was given to Indigenous Peoples in formulating the Sri Lankan policy responses. During the first wave of COVID-19, the government gave LKR 5000 (~USD 15) to low-income families, including Indigenous Peoples. This financial support did not continue throughout the waves, and Indigenous Peoples experienced several challenges. For example, Coastal-Vedda's ability to continue selling honey and fishing products was limited due to lockdown and travel restrictions. Yet, we found evidence (four interviewees out of 20 made supportive comments on this) of the collaborative efforts of Indigenous Peoples' community leaders and observed that they worked with government officials (e.g., medical health officers, public health instructors) on policy implementation during wave two and afterward. Overall, Indigenous Peoples were not consulted or included in the policymaking process. Instead, they were passive recipients of the government's actions. Identification of the lack of inclusion and representation in policy will address the weaknesses of the government policymaking structures (Devakumar et al., 2020). This includes increasing the awareness of cultural safety within the health sector or health educational system (Curtis et al., 2019).

The assessment of COVID-19 policy responses aimed at Indigenous Peoples is by no means perfect. We recognize various challenges that the research team faced and that could affect the outcome of this study. We could not conduct in-person interviews or field visits due to the pandemic condition; instead, we conducted remote interviews and established COVID-19 observatories building on our ongoing research capacities with Indigenous communities. In terms of the justice-based conceptual framework, we could only test its validity in the study itself. We created the framework and used it as a conceptual lens to assess data, but we have yet to develop a method of testing how relevant it is

outside our analysis. Given the limited availability of studies and conceptual tools with which to assess the inclusion of Indigenous Peoples in policy response settings, we have developed this framework by building on readily available peer-reviewed literature (Byskov et al., 2021; David-Chavez and Gavin, 2018).

The study is significant for several reasons. The paper highlights the lack of attention paid to marginalized populations such as Indigenous communities, and their knowledge, beliefs, and practices in formulating policy responses. Identification of weaknesses in policymaking structure and processes can allow these weaknesses to be addressed, thereby improving representational, distributive, and procedural justice in policies. Our results focus mainly on Indigenous Peoples in Sri Lanka. Therefore, the results can bring more value to the local level, but Global Indigenous research can benefit from the broader insight that this study creates. Second, we are introducing a methodology to prioritize policy responses considering two main criteria: i) relevance to Indigenous Peoples and ii) evidence of implementation. These criteria can contribute to existing approaches such as the analytical hierarchy tool (AHP) commonly used in prioritizing COVID-19 policy responses (Soni et al., 2022; Tatapudi et al., 2021). Third, we investigate the COVID-19 policy responses over two years across different waves. This broadens our understanding of ways to deal with multiple stressors under a high level of uncertainty and complexity. We suggest more inclusive and participatory approaches for policymaking toward Indigenous Peoples, considering multiple knowledge systems (e.g., Indigenous and local knowledge). Overall, the paper helps generate broader insights into timely and adaptive policy responses toward changing pandemic conditions that are significant in securing public health.

Funding

'The COVID Observatories' project (EP/V043102/1) is funded by a Collective Fund Award: UKRI GCRF/Newton Fund. CZ-C was supported by the National Institute for Health Research (NIHR) (using the UK's Official Development Assistance (ODA) Funding) and Wellcome 218743_Z_19_Z under the NIHR-Wellcome Partnership for Global Health Research.

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.

Data Availability

Much of the data is available as a supplementary file. We have not included any sensitive data related to Indigenous peoples to protect privacy, confidentiality, and anonymity.

Acknowledgements

We sincerely appreciate the support of all research participants from Sri Lanka, including key informants and Coastal-Vedda community members. We are also grateful for the administrative support of Cecilia Anza-Ramírez. 'The COVID Observatories' project (EP/V043102/1) is funded by a Collective Fund Award: UKRI GCRF/Newton Fund.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.envsci.2023.03.008](https://doi.org/10.1016/j.envsci.2023.03.008).

References

- Amaratunga, D., Fernando, N., Haigh, R., Jayasinghe, N., 2020. The COVID-19 outbreak in Sri Lanka: a synoptic analysis focusing on trends, impacts, risks and science-policy interaction processes. *Prog. Disaster Sci.* 8, 100–133. <https://doi.org/10.1016/j.pdisas.2020.100133>.
- Attanapola, C.T., Lund, R., 2013. Contested identities of indigenous people: Indigenization or integration of the Veddas in Sri Lanka. *Singap. J. Trop. Geogr.* 34, 172–187. <https://doi.org/10.1111/sjtg.12022>.
- Beaule, F. (2020). First Nations Community Guide on Accessing Additional Supports (pp. 1–9). Indigenous Services Canada. (<https://www.afn.ca/wp-content/uploads/2020/03/COVID-19-Community-Guide.pdf>).
- Bélisle, A.C., Gauthier, S., Asselin, H., 2022. Integrating Indigenous and scientific perspectives on environmental changes: Insights from boreal landscapes. *People and Nature*, 4 (6), 1513–1535. <https://doi.org/10.1002/pan3.10399>.
- Best, O., 2018. *The cultural safety journey: an Aboriginal Australian nursing and midwifery context*. Yajdjaligin aboriginal and Torres Strait Islander nursing and midwifery care. Cambridge University Press, United Kingdom, pp. 46–64.
- Bogdanova, E., Finland, K., Ivanova, M., Romanenko, T., Voronina, L., Hossain, K., Lobanov, A., 2022. Strengthening collaboration of the indigenous peoples in the Russian Arctic: adaptation in the COVID-19 pandemic times. *Sustainability* 14 (6), 3225. <https://doi.org/10.3390/su14063225>.
- Boraluwa, B.R.L.S., Dissanayake, D.M.N.S., & Ranaweera, R.M.M.Y. (2021). Development and Rights of Indigenous Communities: A comparative Analyses of Sri Lankan Law and International Standards. International Research Conference, Faculty of Law, General Sir John Kotalawala Defense University, Sri Lanka. <https://doi.org/10.3390/su14063225>.
- Bouman, T., Steg, L., Dietz, T., 2021. Insights from early COVID-19 responses about promoting sustainable action. *Nat. Sustain.* 4, 194–200. <https://doi.org/10.1038/s41893-020-00626-x>.
- Byskov, M.F., Hyams, K., Oyebo, O., 2021. Introducing the Multi-Dimensional Injustice Framework: a case study in climate-related health risks. *J. Br. Acad.* 9, 63–84. <https://doi.org/10.5871/jba/009s7.063>.
- Carr, A., 2020. COVID-19, indigenous peoples and tourism: a view from New Zealand. *Tour. Geogr.* 22 (3), 491–502. <https://doi.org/10.1080/14616688.2020.1768433>.
- Coggins, S., Berrang-Ford, L., Hyams, K., Satyal, P., Ford, J., Paavola, J., Arotoma-Rojas, I., Harper, S., 2021. Empirical assessment of equity and justice in climate adaptation literature: a systematic map. *Environ. Res. Lett.* 16, 073003 <https://doi.org/10.1088/1748-9326/ac0663>.
- Crooks, K., Casey, D., Ward, J., 2020. First Nations people leading the way in COVID-19 pandemic planning, response, and management. *Med. J. Aust.* 213, 151–152. <https://doi.org/10.5694/mja2.50704>.
- Curtice, K., Choo, E., 2020. Indigenous populations: left behind in the COVID-19 response. *Lancet* 395 (10239), 1753. [https://doi.org/10.1016/S0140-6736\(20\)31242-3](https://doi.org/10.1016/S0140-6736(20)31242-3).
- Curtis, E., Jones, R., Tipene-Leach, D., Walker, C., Loring, B., Paine, S.J., Reid, P., 2019. Why cultural safety rather than cultural competency is required to achieve health equity: a literature review and recommended definition. *Int. J. Equity Health* 18 (1), 1–17. <https://doi.org/10.1186/s12939-019-1082-3>.
- David-Chavez, D.M., Gavin, M.C., 2018. A global assessment of Indigenous community engagement in climate research. *Environ. Res. Lett.* 13, 123005 <https://doi.org/10.1088/1748-9326/aaf300>.
- De Silva, P., & Punchihewa, A. (2011). Socio-anthropological research project on Veddha community in Sri Lanka. Department of Sociology, University of Colombo. (http://www.researchgate.net/publication/235335142Socio_Anthropological_Research_Project_on_Vedda_Community_in_Sri_Lanka).
- Devakumar, D., Shannon, G., Abubakar, I., 2020. Racism and discrimination in COVID-19 responses. *Lancet* 395, 1194. [https://doi.org/10.1016/S0140-6736\(20\)30792-3](https://doi.org/10.1016/S0140-6736(20)30792-3).
- Dewi, A., Nurmandi, A., Rochmawati, E., Purnomo, E.P., Rizqi, M.D., Azzahra, A., Benedictos, S., Suardi, W., Dewi, D.T.K., 2020. Global policy responses to the COVID-19 pandemic: Proportionate adaptation and policy experimentation: a study of country policy response variation to the COVID-19 pandemic. *Health Promot. Perspect.* 10, 359–365. <https://doi.org/10.34172/hpp.2020.54>.
- Dorlach, T., 2022. Social policy responses to Covid-19 in the global south: evidence from 36 countries. *Soc. Policy Soc.* 1, 1–12. <https://doi.org/10.1017/S1474746422000264>.
- Epidemiology Unit (Weekly Epidemiological Report). (2020). Epidemiology Unit, Sri Lanka. (<https://www.epid.gov.lk/>).
- Erandi, K.K.W.H., Mahasinghe, A.C., Perera, S., Jayasinghe, S., 2020. Effectiveness of the strategies implemented in Sri Lanka for controlling the COVID-19 outbreak. *J. Appl. Math.* 1–10. <https://doi.org/10.1155/2020/2954519>.
- FAO. (2018). Indigenous Peoples in the Asia-Pacific Region. (<https://www.fao.org/home/en>).
- Ford, J.D., Zavaleta-Cortijo, C., Ainembabazi, T., Anza-Ramirez, C., Arotoma-Rojas, I., Bezerra, J., Chicmana Zapata, V., Galappaththi, E.K., Hangula, M., Kazana, C., Lwasa, S., Namanya, D., Nkwinti, N., Nuwagira, R., Okware, S., Osipova, M., Pickering, K., Singh, C., Ford, L.B., Wright, C., 2022. Interactions between climate and COVID-19. *Lancet Planet. Health* 6 (10), 825–833. [https://doi.org/10.1016/S2542-5196\(22\)00174-7](https://doi.org/10.1016/S2542-5196(22)00174-7).
- Gabriela Soto-Cabezas, M., Reyes, M.F., Soriano, A.N., Rodríguez, J.P.V.R., Ibargüen, L. O., Martel, K., S., Jaime, N., M., Munayco, C., V., 2022. COVID-19 among Amazonian indigenous in Peru: Mortality, incidence, and clinical characteristics. *J. Public Health* 44 (3), 359–365. <https://doi.org/10.1093/pubmed/fdac058>.
- Galappaththi, E.K., Ford, J.D., Bennett, E.M., 2020. Climate change and adaptation to social-ecological change: The case of indigenous people and culture-based fisheries in Sri Lanka. *Clim. Change Clim. Change* 162, 279–300. <https://doi.org/10.1007/s10584-020-02716-3>.
- Galappaththi, E.K., Ford, D.J., Bennett, E.M., Berkes, F., 2021. Adapting to climate change in small-scale fisheries: Insights from Indigenous communities in the global north and south. *Environ. Sci. Policy* 116, 160–170. <https://doi.org/10.1016/j.envsci.2020.11.009>.
- Girija, P., Sivan, N., 2020. Ayurvedic treatment of COVID-19/SARS-CoV-2: a case report. *J. Ayurveda Integr. Med.* 13 (1), 100329 <https://doi.org/10.1016/j.jaim.2020.06.001>.
- Hasan, M., Sahito, A., Muzzamil, M., Mohanan, P., Islam, Z., Billah, M., Islam, M., Essar, M., 2022. Devastating dengue outbreak amidst COVID-19 pandemic in Bangladesh: an alarming situation. *Trop. Med. Health* 50 (1), 1–5. <https://doi.org/10.1186/s41182-022-00401-y>.
- Health Promotion Bureau. (2023). Health Promotion Bureau, Sri Lanka. (<https://www.hpb.health.gov.lk/en>).
- Henriquez-Trujillo, A., Ortiz-Prado, E., Rivera-Olivero, I., Nenquimo, N., Tapia, A., Anderson, M., Lozada, T., Garcia-Bereguai, M., 2021. COVID-19 outbreaks among isolated Amazonian indigenous people, Ecuador. *Bull. World Health Organ* 99 (7), 478–479. <https://doi.org/10.2471/BLT.20.283028>.
- Hillier, S., Chaccour, E., Al-Shammaa, H., Vorstermans, J., 2020. Canada's response to COVID-19 for Indigenous Peoples: a way forward? *Can. J. Public Health* 111, 1000–1001. <https://doi.org/10.17269/s41997-020-00444-w>.
- Horn, P., 2016. Indigenous peoples, the city and inclusive urban development policies in Latin America: lessons from Bolivia and Ecuador. *Dev. Policy Rev.* 36 (4), 483–501. <https://doi.org/10.1111/dpr.12234>.
- Hung, N.T., Trang, V.T., Ly, D.K.K., Hanh, L.H., Long, N.X., Nam, P.T., 2021. Policy response for disadvantaged groups during the COVID-19 pandemic: Vietnam experiences. *Int. Soc. Work* 64 (5), 750–755. <https://doi.org/10.1177/00208728211017975>.
- IAHA. (2020). Indigenous Allied Health Australia Welcomes Funding for Mental Health during COVID-19. (<https://iaha.com.au/>).
- Ingram, C., Chen, Y., Buggy, C., Downey, V., Archibald, M., Rachwal, N., Roe, M., Drummond, A., Perrotta, C., 2022. Development and validation of a multi-lingual online questionnaire for surveying the COVID-19 prevention and control measures used in global workplaces. *BMC Public Health* 22, 1–15. <https://doi.org/10.1186/s12889-022-12500-w>.
- Islam, M.M., Jannat, A., Al Rafi, D.A., Aruga, K., 2020. Potential economic impacts of the COVID-19 pandemic on south asian economies: a review. *World* 1 (3), 283–299. <https://doi.org/10.3390/world1030020>.
- Islamaj, E., Kim, E., K., & Le, D.T. (2021). The Spread of COVID-19 and Policy Responses. Research & Policy Briefs from the World Bank Malaysia Hub, 40, 1–5. (<https://openknowledge.worldbank.org/>).
- Jayashantha, P., Johnson, N.W., 2016. Oral Health Status of the Veddas—Sri Lankan Indigenous People. *J. Health Care Poor Under* 27, 139–147. <https://doi.org/10.1353/hpu.2016.0039>.
- Jayathilaka, A.K., 2021. COVID-19 in Sri Lanka and Work Setting Changes. *Open Access Libr. J.* 8, e7008 <https://doi.org/10.4236/oalib.1107008>.
- Mao, Y., 2020. Combating COVID-19 through collaborative governance: lessons from East Asia. *Chin. Public Adm. Rev.* 11 (2), 132–141. <https://doi.org/10.22140/cpar.v11i2.255>.
- Meijer, A., Webster, C.W.R., 2020. The COVID-19-crisis and the information polity: An overview of responses and discussions in twenty-one countries from six continents. *Inf. Polity* 25, 243–274. <https://doi.org/10.3233/IP-200006>.
- Polechová, J., Johnson, K., Payne, P., Crozier, A., Beiglöck, M., Plevka, P., Schernhammer, E., 2022. SARS-CoV-2 rapid antigen tests provide benefits for epidemic control – observations from Austrian schools. *J. Clin. Epidemiol.* 145, 14–19. <https://doi.org/10.1016/j.jclinepi.2022.01.002>.
- Power, T., Wilson, D., Best, O., Brockie, T., Bearskin, L.B., Millender, E., Lowe, J., 2020. COVID-19 and Indigenous peoples: an imperative for action. *J. Clin. Nurs.* 29, 2737–2741. <https://doi.org/10.1111/jocn.15320>.
- Pradhan, N.S., Su, Y., Fu, Y., Zhang, L., Yang, Y., 2017. Analyzing the effectiveness of policy implementation at the local level: A case study of management of the 2009–2010 Drought in Yunnan Province, China. *Int. J. Disaster Risk Sci.* 8, 64–77. <https://doi.org/10.1007/s13753-017-0118-9>.
- President Secretariat, 2022. President Secretariat, Sri., Lanka. (<https://www.presidentsoffice.gov.lk/>).
- Presidential Secretariat, 2023. Presidential Secretariat, Sri., Lanka. (<https://www.presidentsoffice.gov.lk/>).
- Pueyo, T. (2020). Coronavirus: The Hammer and the Dance. What the Next 18 Months Can Look Like, If Leaders Buy Us Time. (<https://tomaspueyo.medium.com/>).
- Qc, I.F., 2020. COVID-19: fear, quackery, false representations and the law. *Int. J. Law Psychiatry* 72, 101611. <https://doi.org/10.1016/j.ijlp.2020.101611>.
- Rajapaksa, L.C., de Silva, P., & Abeykoon, P. (2022). Asia Pacific Observatory on Health Systems and Policies (COVID-19 Health System Response Monitor- Sri Lanka). (<https://apo.who.int/>).
- Robinson, J., Kengatharan, N., 2020. Exploring the effect of Covid-19 on small and medium enterprises: early evidence from Sri Lanka. *J. Appl. Econ. Bus. Res.* 10, 115–124 <https://doi.org/covidwho-665263>.
- Sadai, S., Spector, R.A., DeConto, R., Gomez, N., 2022. The Paris agreement and climate justice: inequitable impacts of sea level rise associated with temperature targets. *Earth's Future* 10 (12), 1–29. <https://doi.org/10.1029/2022EF002940>.
- Satyal, P., Byskov, M.F., Hyams, K., 2021. Addressing multi-dimensional injustice in indigenous adaptation: the case of Uganda's Batwa community. *Clim. Dev.* 13, 529–542. <https://doi.org/10.1080/17565529.2020.1824888>.

- Seligmann, C.G., Seligmann, B.Z., 1911. *The Veddas*, Vol. 1. Cambridge University Press, United Kingdom, pp. 325–360. (<https://wellcomecollection.org/works/c64wtterr/items>).
- Senevirathna, A., 2020. Sri Lanka and the Covid 19 crisis: strategies and future challenges. *Tribhuvan Univ. J.* 34, 147–158. <https://doi.org/10.3126/tuj.v34i0.31546>.
- Serván-Mori, E., Seiglie, J., Gómez-Dantés, O., Wirtz, V., 2022. Hospitalization and mortality from COVID 19 IN Mexican indigenous peoples: a cross sectional observational study. *J. Epidermology Community Health* 76 (1), 16–23. <https://doi.org/10.1136/jech-2020-216129>.
- Shaffril, H.A.M., Ahmad, N., Samsuddin, S.F., Samah, A.A., Hamdan, M.E., 2020. Systematic literature review on adaptation towards climate change impacts among indigenous people in the Asia Pacific regions. *J. Clean. Prod.* 258, 120595 <https://doi.org/10.1016/j.jclepro.2020.120595>.
- Shirkande, A., Shirkande, A., 2021. Ayurvedic evaluation and treatment of Covid 19: a case report. *J. Ayurveda Integr. Med.* 13 (1), 100489 <https://doi.org/10.1016/j.jaim.2021.07.005>.
- Soni, P., Gupta, I., Singh, P., Porte, D., Kumar, D., 2022. GIS-based AHP analysis to recognize the COVID-19 concern zone in India. *GeoJournal* 546, 1–13. <https://doi.org/10.1007/s10708-022-10605-8>.
- Tashiro, A., Shaw, R., 2020. COVID-19 pandemic response in Japan: what is behind the initial flattening of the curve? *Sustainability* 12 (13), 5250. <https://doi.org/10.3390/su12135250>.
- Tatapudi, H., Das, R., Das, T., 2021. Impact of vaccine prioritization strategies on mitigating COVID-19: an agent-based simulation study using an urban region in the United States. *BMC Med. Res. Methodol.* 21 (1), 1–14. <https://doi.org/10.1186/s12874-021-01458-9>.
- The Road Development Authority. (2017). *Indigenous Peoples Planning Framework*. Ministry of Higher Education and Highways, Sri Lanka. (<https://www.adb.org/sites/default/files/project-documents/50301/50301-001-ippf-en.pdf>).
- The World Bank Statistics. (2019). *Indigenous Peoples*. (<https://data.worldbank.org/>).
- WHO (2020). August Feature Countries: A Monthly Selection of Case Studies, pp. 76–88. World Health Organization. (<https://cdn.who.int/>).
- Wickramaarachchi, W., Perera, S., Jayasinghe, S., 2020. COVID-19 epidemic in Sri Lanka: A mathematical and computational modelling approach to control. *Comput. Math. Methods Med.* 16, 4045064 <https://doi.org/10.1155/2020/4045064>.
- World Bank. (2020). In The COVID-19 pandemic: Shocks to education and policy responses. World Bank. (<https://openknowledge.worldbank.org/>).
- Wyatt, K. (2020). \$123 million boost to indigenous response to COVID 19. \$123 Million Boost to Indigenous. (<https://parlinfo.aph.gov.au/>).
- Yoo, J., Dutra, S., Fanfan, D., Sniffen, S., Wang, H., Siddiqui, J., Song, H., Bang, S., Kim, D., Kim, S., Groer, M., 2020. Comparative analysis of COVID-19 guidelines from six countries: a qualitative study on the US, China, South Korea, the UK, Brazil, and Haiti. *BMC Public Health* 20 (1), 1883. <https://doi.org/10.1186/s12889-020-09924-7>.
- Zavaleta-Cortijo, C., Ford, J.D., Arotoma-Rojas, I., Lwasa, S., Lancha-Rucoba, G., García, P.J., Miranda, J.J., Namanya, D.B., New, M., Wright, C.J., 2020. Climate change and COVID-19: reinforcing Indigenous food systems. *Lancet Planet. Health* 4 (9), e381–e382. [https://doi.org/10.1016/S2542-5196\(20\)30173-X](https://doi.org/10.1016/S2542-5196(20)30173-X).