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NCD Service Capacity and Disruptions due to COVID-19 According to a Country Capacity Analysis in the Americas Region

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3 **NCD Service Capacity and Disruptions due to COVID-19**
4 **According to a Country Capacity Analysis in the Americas Region**
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ABSTRACT

Objective: This article presents the Americas regional results of a World Health Organization NCD Country Capacity Survey from 2019-2021, on NCD service capacity and NCD service disruptions from the COVID-19 pandemic.

Setting: Information on public sector primary care services for NCDs, and related technical inputs from 35 countries in the Americas region are provided.

Participants: All Ministry of Health officials managing a national NCD program, from a WHO Member State in the Americas region, were included throughout this study. Government health officials from countries that are not WHO Member States were excluded.

Outcome measures: The availability of evidence based NCD guidelines, essential NCD medicines and basic technologies in primary care, cardiovascular disease risk stratification, cancer screening and palliative care services were measured in 2019, 2020 and 2021. NCD service interruptions, reassignments of NCD staff during the COVID-19 pandemic and mitigation strategies to reduce disruptions for NCD services were measured in 2020 and 2021.

Results: More than 50% of countries reporting a lack of comprehensive package of NCD guidelines, essential medicines, and related service inputs. Extensive disruptions in NCD services resulted from the pandemic, with only 12/35 countries (34%), reporting that outpatient NCD services were functioning normally. Ministry of Health staff were largely redirected to work on the COVID-19 response, either full-time or partially, reducing the human resources available for NCD services. Six of 24 countries (25%) reported stock out of essential NCD medicines and/or diagnostics at health facilities which affected service continuity. Mitigation strategies to ensure continuity of care for people with NCDs were deployed in many countries and included triaging patients, telemedicine and tele-consultations, and electronic prescriptions and other novel prescribing practices.

Conclusions: The findings from this regional survey suggest significant and sustained disruptions, affecting all countries regardless of the country's level of investments in health care or NCD burden.

Strengths and limitations of this study:

- This is the only region-wide analysis in the Americas, with data from 2019-2021, that has systematically measured the NCD service capacity, disruptions of NCD services due to the COVID-19 pandemic, as well as the mitigation strategies used to ensure continuity of services across 35 countries.
- It is based on validated government information from a global standardized methodology, applied by the World Health Organization since 2001 to monitor country capacity for NCD policies and services.
- The main limitation is that this study did not provide the specificity of information by health center level of NCD service capacity and disruptions during the COVID-19 pandemic. In addition, it did not provide information on the impact of these disruptions on people's health outcomes.

INTRODUCTION

People with noncommunicable diseases require timely diagnosis, continuous treatment and access to essential medicines, as well as ongoing monitoring of their conditions to prevent complications and premature death. Yet health systems in most low- and middle-income countries are not adequately equipped to meet the growing NCD health demands, which has led to global calls for universal health coverage and strengthening primary care services to improve NCD prevention and control.[1,2] The World Health Organization has established, and routinely monitors, targets to strengthen the health system response to NCDs, that cover NCD guidelines and access to essential medicines and technologies, for the four main NCDs (cardiovascular diseases, cancer, diabetes and chronic respiratory diseases), in addition to NCD risk factor targets.[3] To strengthen NCD services, the focus has been on increasing the use of evidence-based national guidelines/protocols/standards for the management of the four main NCDs through a primary care approach in the public sector; as well as provision of drug therapy, including glycaemic control, and counselling for eligible persons at high risk to prevent heart attacks and strokes, with emphasis on the primary care level. These interventions are based on a cost effectiveness analysis, that, together with risk factor reduction interventions, are expected to reduce premature NCD mortality.[4]

In the Americas region, where an estimated 240 million people are living with a chronic condition [5] health systems strengthening for NCDs has been a focus for PAHO Member States since the adoption of a regional NCD plan of action by the Ministries of Health in 2013.[6] Progress has been gradual and an assessment of the NCD plan of action, in 2020, noted that 17/35 countries (48.5%) had implemented a model of integrated management for NCDs, such as a chronic care model with evidence based guidelines, a clinical information system, self-care, community support, and multidisciplinary team-based care.[7] However, the COVID-19 pandemic subsequently has had a significant adverse impact on the Region, including a marked disruption of NCD services.

COVID-19 has been diagnosed in over 153 million people and led to more than 2.7 million deaths in the Region of the Americas, by the end of April 2022.[8] The importance of NCDs as factors leading to severe COVID-19 related illness or death is now well-documented, highlighting the importance of optimal NCD management.[9,10] However, the pandemic has negatively impacted NCD management, related to the extensive primary care disruptions. Two years into the pandemic, 93% (25/27 countries) of countries in the Americas have reported disruptions in their essential health services along the 66 tracer services in health systems.[11]

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3 So to what extent have these health system disruptions affected NCD services? This article
4 presents information on NCD service capacity and disruptions due to the COVID-19 pandemic,
5 from the perspective of the health authorities responsible for the national NCD programs and
6 services across the Region of the Americas.
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9 10 **METHODS**

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13 Information on NCD services and disruptions resulting from the COVID-19 pandemic was
14 extracted from the World Health Organization dataset on the NCD Country Capacity Surveys
15 (CCS) 2019-2021, from the 35 Member States of the Pan American Health Organization (list of
16 countries and selected characteristics provided in Appendix 1 in supplemental information). The
17 CCS is a standardized global methodology that collects information on, among other topics,
18 NCD services (module 4), and on NCD service disruptions (module 5). An NCD service was
19 described as health care encompassing front-line health service delivery (primary care) or higher-
20 level services for any of the main NCDs.
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26 Responses to the CCS were provided by the official Ministry of Health authorities responsible
27 for the national NCD program, and submitted directly, using their unique access to the WHO
28 CCS on-line tool. Data were then validated by PAHO/WHO, and in the event of any
29 discrepancies or unanswered questions, feedback was sought from the designated Ministry of
30 Health official.
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35 The CCS was administered in March to June 2019; and from May to June 2020 module 5 was
36 administered, with a response rate of 83% (29/35 countries). In 2021, the CCS was administered
37 again from May to September 2021, with a 100% (35/35 countries) response rate.
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40 Results presented are from all 35 countries from CCS 2021, and they are presented as a regional
41 evaluation showing number and proportion of countries, without identifying countries, due to
42 confidentiality agreements. A comparison of the impact of COVID-19 on NCD services in both
43 years are presented, in which case data from the same 29 countries that responded to module 5 in
44 both rounds (2020 and 2021) are presented.
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49 ***Patient and Public Involvement***

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51 There is no patient involvement in this analysis.
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RESULTS

Overall limited NCD service capacity in primary care

For NCD service capacity, the CCS assesses the availability of evidence-based guidelines, essential medicines and technologies in primary care, cardiovascular disease risk stratification in clinical practice, and cancer screening and palliative care. Overall, NCD service capacity is rather limited in the Americas. Evidence-based national guidelines/protocols/standards for the four principal NCDs are available in only 63% (22/35) of countries, a slight improvement from 54% (19/35) in 2019. The most frequently available guidelines utilized in at least 50% of public health-care facilities were on diabetes (74%), hypertension (69%), cancer (60%) and chronic respiratory diseases (51%) (Appendix 2 in supplemental information). Only 29% of countries (10/35) offered cardiovascular risk stratification in clinical practice for the management of patients at high risk for heart attack and stroke in half or more of the primary health care facilities in the public sector.

Essential technologies for cardiovascular diseases (blood pressure measurement devices, total cholesterol measurement, and urine strips for albumin assay) are available in at least half of the health care facilities of the public health sector in 51% (18/35) of countries; and only 34% (12/35) of countries reported having all technologies available for diabetes (blood glucose measurement, oral glucose test, HbA1c test, dilated fundus examination, foot vibration perception by tuning fork, and urine strips for glucose and ketone measurement). This situation has not changed since 2019 (Table 1).

Essential medicines for cardiovascular diseases (aspirin, thiazide diuretics, ACE inhibitors, angiotensin II receptor blockers (ARBs) calcium channel blockers, beta blockers, and statins) were generally available in pharmacies in all almost all countries, with the exception of ARBs which are available in only 74% of countries (26/35). For diabetes, the essential medicines (insulin, metformin, sulphonylureas) are reported as being generally available in almost all countries and this situation has not changed since 2019. Regarding chronic respiratory diseases, steroid inhalers and bronchodilators are available in 77% (27/35) and 89% (31/35) of countries, respectively. Nicotine replacement therapy for smoking cessation remains very limited in the region, with only 23% (8/35) of countries reporting availability. Oral morphine was also identified as an essential medicine which was not widely available in pharmacies, with around half of the countries (51%, 18/35 countries) reporting its availability (Table 1).

Table 1: Proportion of countries (%) with available basic NCD technologies and essential medicines in primary care facilities of the public health sector, Americas Region 2019-2021

	Countries (%)	
	2019	2021
All basic NCD technologies*	5	4
Measuring weight	100	97
Measuring height	100	100
Blood glucose measurement	94	94
Oral glucose tolerance test	63	69
HbA1c test	51	54
Dilated fundus examination	37	51
Foot vibration perception by tuning fork	43	51
Urine strips for glucose and ketone measurement	63	57
Blood pressure measurement	97	94
Total cholesterol measurement	77	71
Urine strips for albumin assay	60	54
Peak flow measurement spirometry	31	17
All essential NCD medicines**	17	20
Insulin	83	91
Aspirin (75/100 mg)	94	91
Metformin	94	100
Thiazide diuretics	91	89
ACE inhibitors	91	89
Angiotensin II receptor blockers (ARBs)	77	74
Calcium channel blockers	89	89
Beta blockers	86	91
Statins	83	86
Oral morphine	49	51
Steroid inhaler	77	77
Bronchodilator	91	89
Sulphonylurea(s)	91	97
Benzathine penicillin injection	89	89
Nicotin Replacement Therapy	23	23

Range distribution of countries (%)

- <25
- 25-49
- 50-74
- 75-99
- 100

Source: WHO NCD Country Capacity Survey, 2019-2021

Notes: *Available in 50 or more of the public health care facilities. ** Available in 50 or more pharmacies.

Cancer screening is offered in primary care in many countries in the Americas, with 63% (22/35 countries) reporting breast cancer screening; 83% (29/35) reporting cervical cancer screening; and 43% (15/35) of countries reporting colorectal cancer screening. Overall, only 43% of the countries (15/35) reported having a screening program for all three cancer types, and this situation had improved somewhat since 2019. Palliative care services to provide supportive and end-of-life care for people with cancer and other chronic conditions are offered in primary

health care facilities in only 37% of countries (13/35) or community and home-based care in 46% of countries (16/35) and is yet another NCD service that requires strengthening.

NCD service disruptions due to the Covid-19 pandemic

NCD services were identified as part of the government's core set of essential health services to be maintained during the pandemic in 21 of 26 countries (81%). Nine countries (26%) reported allocating additional funding to NCDs in the government budget for the COVID-19 response (Table 2). Despite this, only 12/35 countries (34%) reported that outpatient NCD services were functioning normally and only 11% of countries (4/35) reported that no activities for NCDs had been postponed due to the pandemic (Figure 1). In 2021, three more countries reported that NCD outpatient services were functioning normally compared to 2020; while 3 fewer countries reported that NCD inpatient services were functioning normally (Appendix 3 in supplementary information).

Ministry of Health staff designated to work on NCD services were largely redirected to work on the COVID-19 response, either full- or part-time, reducing the human resources available to provide care for people with NCDs. Only 2 countries (6%, 2/35 countries) reported that no NCD staff had been redirected to support the COVID-19 effort. By 2021, this situation had worsened, with 14 countries reporting NCD staff were re-assigned to the pandemic, up from 11 countries in 2020 (Table 2).

Table 2: NCD service disruptions during the COVID-19 pandemic, Americas Region, 2020-2021

	Countries (%)	Comparison of countries (%) in 2020 and in 2021	
		2021 (n=35 countries)	2020 (n=29 countries)
Redirected NCD resources			
Staff reassigned/deployed to COVID-19 response			
Some staff partially reassigned	40 (14/35)	38 (11/29)	48 (14/29)
Some staff fully reassigned	26 (9/35)	21 (6/29)	31 (9/29)
All staff partially reassigned	20 (7/35)	31 (9/29)	28 (8/29)
All staff fully reassigned	6 (2/35)	7 (2/29)	7 (2/29)
No staff reassigned	6 (2/35)	3 (1/29)	7 (2/29)
Don't know	3 (1/35)	0 (0/29)	3 (1/29)
Government NCD funds allocated to support COVID-19 response			
None or not yet	29 (10/35)	59 (17/29)	31 (9/29)
Don't know	49 (17/35)	34 (10/29)	48 (14/29)
1-25%	14 (5/35)	0 (0/29)	10 (3/29)
26-50%	3 (1/35)	0 (0/29)	3 (1/29)
51-75%	6 (2/35)	3 (1/29)	7 (2/29)
76-100%	0 (0/35)	3 (1/29)	0 (0/29)
NCD services included in COVID-19 response			

Table 2: NCD service disruptions during the COVID-19 pandemic, Americas Region, 2020-2021

	Countries (%)	Comparison of countries (%) in 2020 and in 2021	
	2021 (n=35 countries)	2020 (n=29 countries)	2021 (n=29 countries)
NCD services included as part of the list of essential health services in the COVID-19 plan			
Cardiovascular disease services	95 (20/21)	N/A	N/A
Cancer services	86 (18/21)	N/A	N/A
Diabetes services	100 (21/21)	N/A	N/A
Chronic respiratory disease services	86 (12/21)	N/A	N/A
Chronic kidney disease and dialysis services	0 (0/35)	N/A	N/A
Tobacco cessation services	48 (10/21)	N/A	N/A
Other	14 (3/21)	N/A	N/A
Additional funding allocated for NCDs	26 (9/35)	10 (3/29)	10 (3/29)
NCD activities postponed due to COVID-19 pandemic			
None	11 (4/35)	17 (5/29)	10 (3/29)
Implementation of NCD Surveys	40 (14/35)	55 (16/29)	45 (13/29)
Public screening programs for NCDs	51 (18/35)	45 (13/29)	48 (14/29)
WHO PEN package implementation	23 (8/35)	21 (6/29)	24 (7/29)
WHO HEARTS package implementation	29 (10/35)	31 (9/29)	31 (9/29)
Mass communication campaigns	34 (12/35)	24 (7/29)	34 (10/29)
Other	11 (4/35)	24 (7/29)	10 (3/29)

Source: WHO NCD Country Capacity Survey, 2019-2021
Note: Round 1 (R1) conducted in 2020 and Round 2 (R2) conducted in 2021.
N/A – not applicable, data for comparison not available between 2020 and 2021.

Regarding service disruptions, outpatient NCD services were suspended in 1 country, community NCD services were suspended in 4 countries and mobile NCD clinics were suspended in 6 countries. The majority of countries reported limited access to outpatient services (19/35 countries, 54%), and to inpatient NCD services (19/35 countries, 54%) (Figure 1).

The disruption in NCD services, either partially or completely, affected all types of care for people with NCDs, but more so for diabetes and hypertension services (Figure 2, and Appendix 4 in supplementary information). The main reasons cited for disruption of NCD services related to human resources, where 17 countries (74%, 17/24 countries) reported it was due to NCD staff deployed to the COVID response, or simply insufficient clinical staff to provide the service (46%, 11/24 countries). Two countries (8%, 2/24 countries) noted clinical staff did not have personal protective equipment which affected service provision. Six countries (25%, 6/24 countries) reported stock out of essential NCD medicines and or diagnostics at the health facility level which affected service continuity. Inpatient NCD services were mainly disrupted due to the cancellation of elective procedures (63%, 15/24 countries), and hospital beds or inpatient

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3 service were simply not available in 46% of countries (11/24 countries). The extent of
4 disruptions for NCD services worsened in 2021, as compared to the situation in 2020 for all
5 types of NCD services (Figure 2).
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9 Beyond service disruption, planned NCD activities have been suspended or postponed due to the
10 COVID-19 pandemic, and only small improvements over time were observed (Table 2). The
11 activities most commonly reported as suspended were screening people for cancer, diabetes and
12 other NCDs in 51% of the countries (18/35 countries), the implementation of NCD surveys,
13 where 14 countries (40%) report postponing surveys and the implementation of the Hearts
14 technical package was suspended or postponed in 10 countries.
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19 Perhaps the more influential driver of NCD service disruptions, however, is on the demand side,
20 where COVID-19 lock down measures and fear or mistrust with community transmission led to
21 many people not seeking care or patients not presenting for care, as reported in 18 countries and
22 17 countries, respectively (75%, 18/24 countries; 71% 17/24 countries). Financial difficulties
23 (46% 11/24 countries) and travel restrictions hindering people's access to health facilities (50%,
24 12/24 countries) were also cited as important causes of disrupted NCD services.
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29 ***Strategies and plans to mitigate NCD service disruptions***

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31 Many different approaches were employed to minimize the disruption in NCD services during
32 the pandemic which did not change over 2020-2021: home-based care, triage patients and
33 prioritize care based on severity of condition, and support for self-care were most commonly
34 reported (Figure 3). Telemedicine was employed to replace in person consultations (16/24
35 countries, 67%) and this was sustained over time (Appendix 5 in supplementary information).
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40 When prompted on plans to reinitiate disrupted NCD services, most respondents indicated that
41 the priority was to train health care professionals in NCD diagnosis and treatment, re-initiate
42 cancer screening services, continue use of recurring medicine prescription and continue the use
43 of telemedicine.
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47 Respondents also identified their immediate needs to assist with building stronger health services
48 for NCDs. The main needs identified were guidelines for NCD and COVID-19 clinical
49 management; guidance on promoting healthy lifestyles especially post COVID-19 to motivate
50 behaviour change; extension of telemedicine services to facilitate continuous communication
51 with patients especially those living in remote areas or large distances from health facilities;
52 systems for tracking patients with NCDs including Apps that can better support self-
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3 management; and rehabilitation services for those people suffering long term symptoms from
4 COVID-19 including respiratory symptoms.
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6 7 **DISCUSSION** 8 9

10 This is the only region-wide survey in the Americas, that has systematically measured the NCD
11 service capacity, the disruption of NCD services due to the COVID-19 pandemic, as well as the
12 mitigation strategies used to ensure continuity of services. More than half of the countries in the
13 region do not have the comprehensive package of guidelines, technologies and medicines for all
14 four major NCDs and there was little reported change between 2019 and 2021 on the NCD
15 service capacity. Nonetheless, the Americas region has been noted to have among the higher
16 levels of NCD service capacity as compared to the other World regions [12]; and a much greater
17 NCD service capacity than as reported in a similar survey conducted in primary care centers in
18 India.[13]
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24 The findings from this regional survey suggest significant and sustained disruptions, affecting all
25 countries regardless of the country's level of investments in health care or NCD burden. This
26 situation appears to be consistent with the situation reported in other regions of the
27 World.[12,14-16]
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31 To assist governments in maintaining essential NCD services at this time, PAHO/WHO has
32 published guidelines to assist with triaging patients, utilize telemedicine and multi-month
33 prescriptions more broadly, and reorganize oncology services.[17] The extent of use or
34 application of these guidelines is not known, although the results of this survey indicate that
35 many national NCD program managers had use for the guidance on maintaining essential NCD
36 services.
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41 More research is needed to document the extent, and consequences of NCD service disruption in
42 the Americas region. Further research is also needed to better understand how effective the
43 mitigation strategies of triaging patients, e-prescriptions and telemedicine, were as substitution
44 for face-to-face encounters; and whether inequities in access to primary NCD services were
45 further exacerbated by the NCD service disruptions.
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50 Some of this research has begun in the region. For example, a survey of NCD patient advocacy
51 organizations in Latin America, noted the dissatisfaction and poorer quality of care during 2020-
52 2021, where 52% of respondents experienced delays of 30 days or more for primary care;
53 telemedicine was reported as not accessible to patients by 37% of respondents and a majority
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3 (76%) of NCD patients faced challenges with refilling prescription medication.[18] In Mexico,
4 the social security system, IMSS, noted reduced screening for breast and cervical cancer (−79%
5 and −68%), diabetes and hypertension care (−32% in both), attributed to underfunding, shortages
6 in human resources and reallocation of health staff and infrastructure due to COVID-19.[19]
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10 Similarly in the USA, cancer screening declined sharply in 2020 compared with 2019, (breast,
11 −90.8%; colorectal, −79.3%; prostate, −63.4%) and breast cancer diagnosis has been observed
12 to decrease during the pandemic.[20-21] The USA has also been noted to have the highest
13 absolute number of excess deaths in 2020 (458,000) as compared to 29 other countries.[22] A
14 large excess death rate of 64% more deaths in 2020 than 2019 were also reported in Ecuador,
15 where it was found that indigenous populations had four times the excess death rate of the
16 majority mestizo group, indicating unequal impact of COVID on vulnerable populations.[23]
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22 Brazil has also reported significant declines in utilization of primary care services by people with
23 NCDs [24], and in one state almost a third of people living with NCDs reported impaired
24 management of their NCD as a result of the COVID-19 restrictions.[25] Brazil has also noted
25 excess deaths from cancer and cardiovascular diseases related to the COVID-19 pandemic.[26]
26 The full extent of foregone care, however are yet to be observed, and more research is needed
27 throughout countries in the Americas region, to determine the impact of NCD service disruptions
28 on diagnosis, treatment and health outcomes for people with NCDs. For example, in the USA,
29 cancer mortality is expected to increase due to reduced screening and early diagnosis [20], and in
30 the U.K., a substantial increase in cancer deaths and morbidity have been predicted due to
31 COVID-19 restrictions.[27-29]
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38 Improving NCD service capacity and NCD management is tied closely to universal health
39 coverage and primary care strengthening. As a way forward, the Americas region has charted a
40 path for creating more resilient health services, which includes strengthening primary care and
41 increasing financial investments in health systems.[30] And as COVID-19 cases continue to
42 decline and health services resume to capacity, the public health priority now needs to be on
43 improving the equitable access to NCD diagnosis and treatment in primary care, which includes
44 updating NCD guidelines, training multi-disciplinary health care teams, increasing access to
45 essential NCD medicines and technologies, improving self-management support, among
46 others.[31] With regards to NCD medicines and technologies, governments in the Americas
47 region can utilize the PAHO Strategic Fund which offers a useful mechanism for pooled
48 procurement of quality assured essential NCD medicines and technologies, and was successfully
49 deployed in government responses to COVID-19, and other health priorities.[32]
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CONCLUSIONS

This analysis documents the limitations in NCD service capacity in the Americas region, and the degree of disruptions in access to essential NCD services and medicines. While there is limited published data on the impact that these service disruptions will have on health outcomes, given the significant number of people with NCDs in the Americas, the limited NCD service capacity and extensive disruptions in NCD services from the COVID-19 pandemic, the priority must now be strengthening primary care services for NCDs and addressing the backlog and foregone care for NCD management.

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Ethics statement: This study does not involve human participants and ethical approval was not required.

Patient and public involvement statement: It was not appropriate or possible to involve patients or the public in the design, or conduct, or reporting, or dissemination plans of this analysis which involved data collection and analysis from information provided by the Ministry of Health national NCD program managers in the Americas region.

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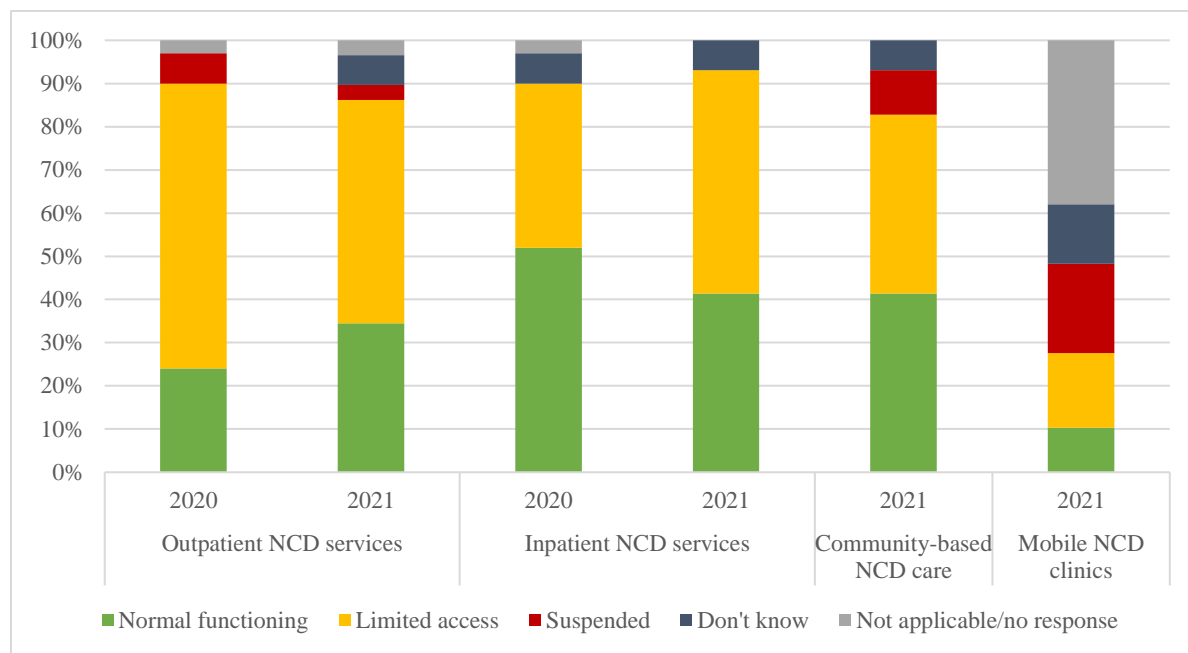


Figure 1. Proportion of countries (%) with disruptions in NCD services during the COVID-19 pandemic, Americas region, 2020-2021

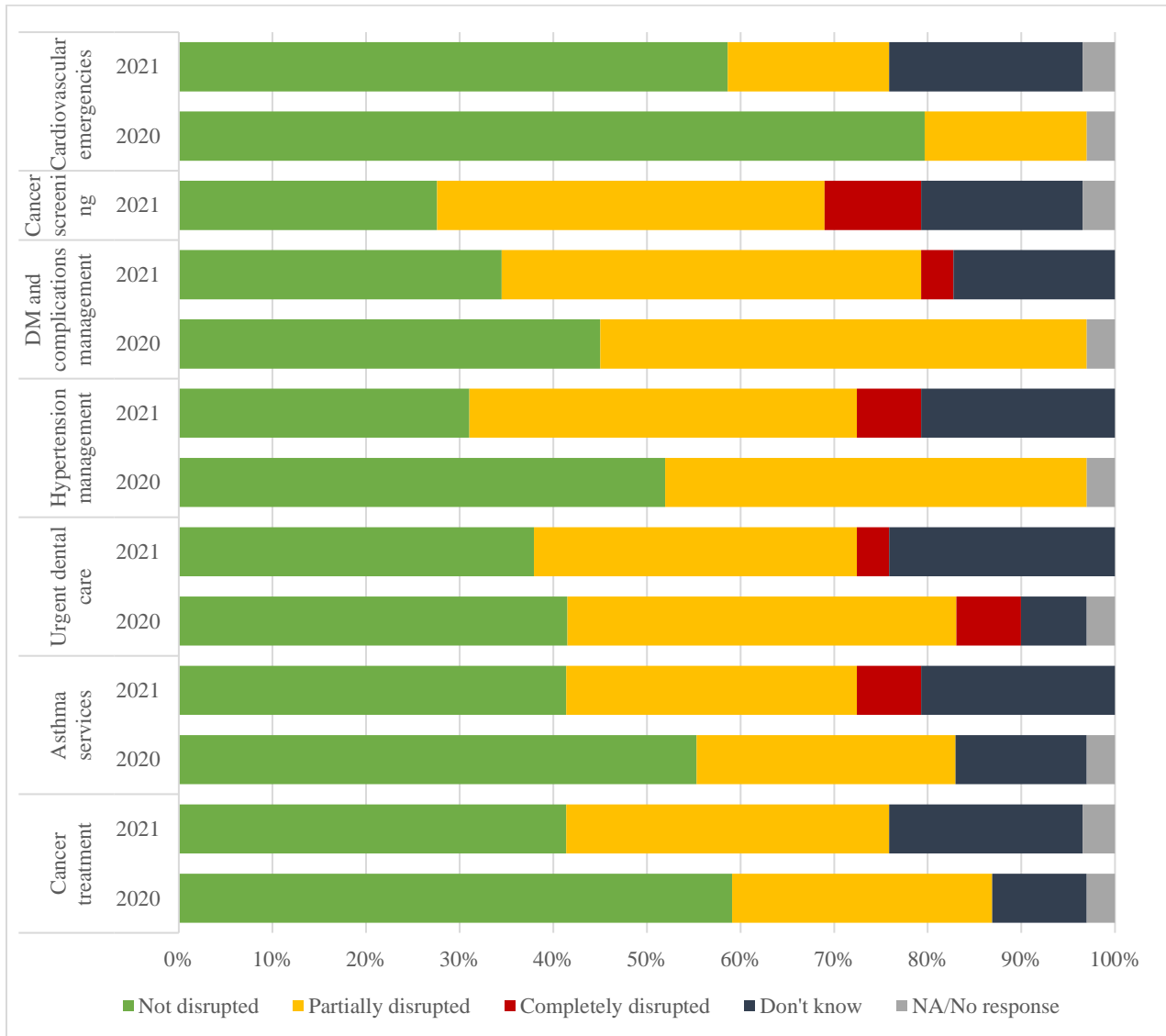


Figure 2: Proportion of countries (%) with NCD Service Disruptions by Service Type due to the COVID-19 pandemic, Americas Region, 2020-2021

Abbreviations: N/A: not applicable, country does not provide the service. DM: diabetes mellitus. Notes: cancer screening was not included in the 2020 survey. Cardiovascular emergencies include myocardial infarctions, stroke, and cardiac arrhythmias.

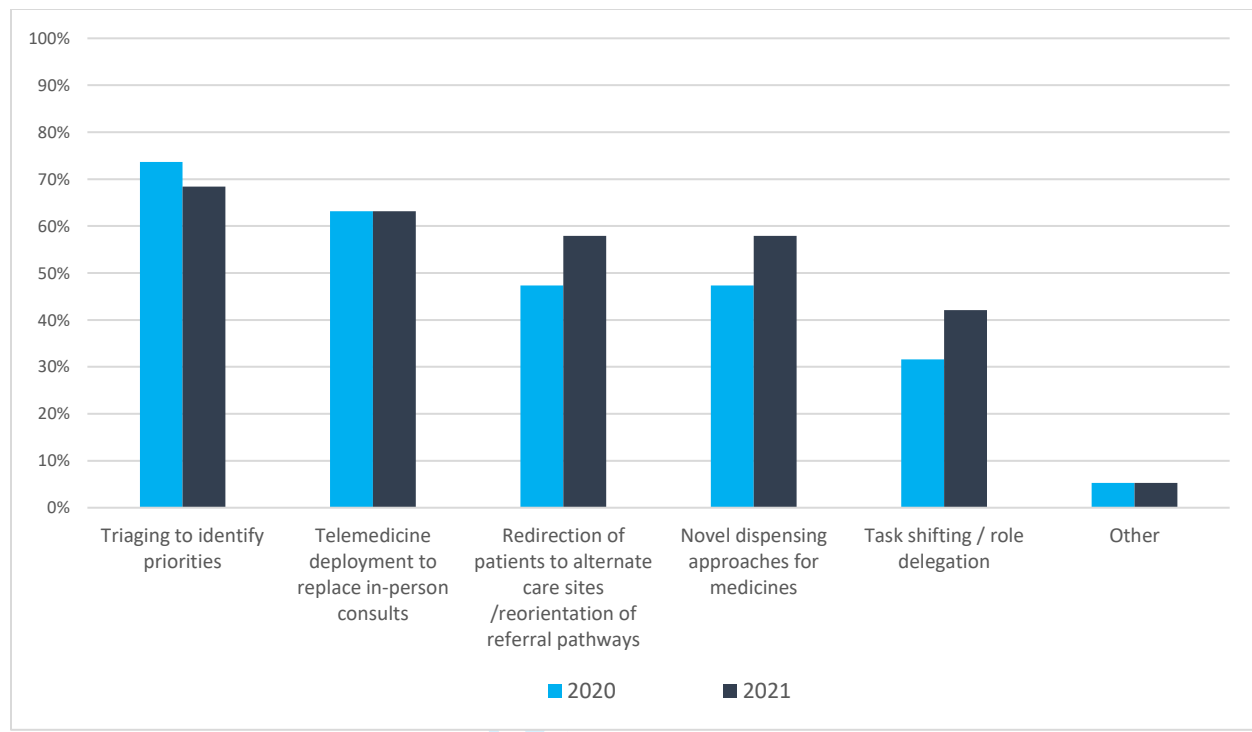


Figure 3: Proportion of countries (%) with approaches employed to overcome NCD service disruptions due to COVID-19 Pandemic, Americas Region, 2020-2021

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Appendix 1. Countries of the Americas region included in the analysis

Country	Population (thousands)	Public health expenditure as % of GDP	NCD Mortality Rate (age-adjusted per 100 000 pop)
Northern America			
Canada	38,067.90	7.9	302
United States of America	332,915.10	8.5	408
Mexico, Central America, and Latin Caribbean			
Belize	404.9	3.9	452
Costa Rica	5,139.10	5.5	310
Cuba	11,317.50	9.9	431
Dominican Republic	10,953.70	2.5	508
El Salvador	6,518.50	4.5	393
Guatemala	18,249.90	2.1	498
Honduras	10,063.00	2.8	615
Mexico	130,262.20	2.7	466
Nicaragua	6,702.40	5.1	548
Panama	4,381.60	4.6	335
South America			
Argentina	45,605.80	5.9	436
Bolivia	11,832.90	4.5	584
Brazil	213,993.40	4	425
Chile	19,212.40	4.6	329
Colombia	51,265.80	5.5	327
Ecuador	17,888.50	4.2	365
Peru	33,359.40	3.3	304
Paraguay	7,219.60	2.9	448
Uruguay	3,485.20	6.7	446
Venezuela	28,704.90	1.7	412
Non-Latin Caribbean			
Antigua and Barbuda	98.70	2.9	502
Bahamas	396.90	3.1	533
Barbados	287.70	2.9	477
Dominica	74.30	4.3	.
Grenada	113.00	1.7	619
Guyana	790.30	3.7	802
Haiti	11,541.70	0.9	839
Jamaica	2,973.50	3.9	455
Saint Kitts and Nevis	54.20	2.5	.
Saint Lucia	184.40	2.1	516
Saint Vincent and the Grenadines	111.30	3.1	537
Suriname	591.80	5.3	666
Trinidad and Tobago	1,403.40	3.4	439

Source: PAHO Core Indicators, 2022

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Appendix 2: Availability of guidelines/protocols for the management of NCDs, referred by national NCD programs. Region of the Americas, 20019-2021

NCD guidelines/protocols	Hypertension		Diabetes		Cancer		Chronic respiratory		NCD4 Guidelines/protocols	
	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
Availability	86%	89%	97%	97%	77%	89%	66%	71%	54%	63%
Utilized in at least 50% of health care facilities	73%	69%	74%	74%	70%	60%	74%	51%	34%	40%
Last time updated										
last 5 years	23%	46%	46%	63%	26%	31%	14%	17%	.	.
6 to 10 years	40%	26%	23%	11%	34%	29%	23%	23%	.	.
>10 years	20%	11%	23%	14%	14%	23%	20%	26%	.	.
Includes referral criteria	77%	77%	82%	89%	85%	80%	78%	60%	37%	49%

Source: WHO NCD Country Capacity Survey, 2019-2021.

Appendix 3. Access to NCD services during the COVID-19 pandemic. Americas region, 2020-2021

NCD services	Countries R2 (%)	Same countries R1 and R2 (%)	
	2021 (n=35 countries)	2020 (n=29 countries)	2021 (n=29 countries)
Outpatient NCD services			
Functioning as normal	34% (12/35)	24% (7/29)	34% (10/29)
Limited access	54% (19/35)	66% (19/29)	52% (15/29)
Suspended	3% (1/35)	7% (2/29)	3% (1/29)
Don't know	6% (2/35)	0% (2/29)	7% (2/29)
Not applicable/No response	3% (1/35)	3% (1/29)	3% (1/29)
Inpatient NCD services			
Functioning as normal	40% (14/35)	52% (15/29)	41% (12/29)
Limited access	54% (19/35)	38% (11/29)	52% (15/29)
Suspended	0% (2/35)	0% (0/29)	0% (0/29)
Don't know	6% (2/35)	7% (2/29)	7% (2/29)
Not applicable/No response	0% (2/35)	3% (1/29)	0% (2/29)
Community-based NCD care			
Functioning as normal	37% (13/35)	N/A	41% (12/29)
Limited access	43% (15/35)	N/A	41% (12/29)
Suspended	11% (4/35)	N/A	10% (3/29)
Don't know	6% (2/35)	N/A	7% (2/29)
Not applicable/No response	3% (1/35)	N/A	0% (2/29)
Mobile NCD clinics			
Functioning as normal	11% (4/35)	N/A	10% (3/29)
Limited access	23% (8/35)	N/A	17% (5/29)
Suspended	17% (6/35)	N/A	21% (6/29)
Don't know	14% (5/35)	N/A	14% (4/29)
Not applicable/No response	34% (12/35)	N/A	38% (11/29)

Source: WHO NCD Country Capacity Survey, 2019-2021

Note: Round 1 (R1) conducted in 2020 and Round 2 (R2) conducted in 2021.

N/A – not applicable, data for comparison not available between 2020 and 2021.

Appendix 4. NCD service disruption due to COVID-19. Region of the Americas, 2021 results.

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Disruption level	Hypertension management		Cardio-vascular emergencies		Cancer screening		Cancer treatment		Diabetes and complications		Asthma		Urgent dental care		Rehabilitation		Palliative care	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Not disrupted	52%	31%	79%	59%	N/A	28%	59%	41%	45%	34%	55%	41%	41%	38%	14%	N/A	24%	N/A
Partially disrupted	(15/29)	(9/29)	(23/29)	(17/29)	N/A	(8/29)	17/29)	(12/29)	(13/29)	(10/29)	(16/29)	(12/29)	(12/29)	(11/29)	(4/29)	N/A	(7/29)	N/A
Completely disrupted	45%	41%	17%	17%	N/A	41%	28%	34%	52%	45%	28%	31%	41%	34%	38%	N/A	34%	N/A
Don't know	(13/29)	(12/29)	(5/29)	(5/29)	N/A	(12/29)	(8/29)	(10/29)	(15/29)	(13/29)	(8/29)	(9/29)	(12/29)	(10/29)	(11/29)	N/A	(10/29)	N/A
NA/NR	0%	7%	0%	0%	N/A	10%	0%	0%	0%	3%	0%	7%	7%	3%	21%	N/A	7%	N/A
	(0/29)	(2/29)	(0/29)	(0/29)	N/A	(3/29)	(0/29)	(0/29)	(0/29)	(1/29)	(0/29)	(2/29)	(2/29)	(1/29)	(6/29)	N/A	(2/29)	N/A
	0%	21%	0%	21%	N/A	17%	10%	21%	0%	17%	14%	21%	7%	24%	24%	N/A	31%	N/A
	(0/29)	(6/29)	(0/29)	(6/29)	N/A	(5/29)	(3/29)	(6/29)	(0/29)	(5/29)	(4/29)	(6/29)	(2/29)	(7/29)	(7/29)	N/A	(9/29)	N/A
	3%	0%	3%	3%	N/A	3%	3%	3%	3%	0%	3%	0%	3%	0%	3%	N/A	3%	N/A
	(1/29)	(0/29)	(1/29)	(1/29)	N/A	(1/29)	(1/29)	(1/29)	(1/29)	(0/29)	(1/29)	(0/29)	(1/29)	(0/29)	(1/29)	N/A	(1/29)	N/A

¹⁹Source: WHO NCD Country Capacity Survey, 2019-2021
²⁰N/A – not applicable, data for comparison not available between 2020 and 2021.
²¹NR – no response

Appendix 5. Approaches employed to overcome NCD service disruptions due to COVID-19 Pandemic. Americas Region, 2020-2021.

Approaches to overcome NCD service disruption	Countries R2 (%)	Same countries R1 and R2 (%)	
	2021 (n=35 countries)	2020 (n=29 countries)	2021 (n=29 countries)
Triaging to identify priorities	75% (18/24)	74% (14/19)	68% (13/19)
Telemedicine deployment to replace in-person consults	67% (16/24)	63% (12/19)	63% (12/19)
Redirection of patients to alternate care sites /reorientation of referral pathways	67% (16/24)	47% (9/19)	58% (11/19)
Novel dispensing approaches for medicines	63% (15/24)	47% (9/19)	58% (11/19)
Task shifting / role delegation	38% (9/24)	32% (6/19)	42% (8/19)
Other	8% (2/24)	5% (1/19)	5% (1/19)
Integration of several services into single visit	38% (9/24)	N/A	N/A
Self-care interventions where appropriate	75% (18/24)	N/A	N/A
Provision of home-based care where appropriate	75% (18/24)	N/A	N/A
Catch-up campaigns for missed appointments	25% (6/24)	N/A	N/A
Recruitment of additional staff	67% (16/24)	N/A	N/A
Expanding facility hours	29% (7/24)	N/A	N/A
Novel supply chain management and logistics approaches	33% (8/24)	N/A	N/A
Novel prescribing approaches (e.g. tele-prescription, extended drug prescriptions)	63% (15/24)	N/A	N/A
Community communications	75% (18/24)	N/A	N/A
Government removal of user fees	0% (0/24)	N/A	N/A

Source: WHO NCD Country Capacity Survey, 2019-2021

N/A – not applicable, data for comparison not available between 2020 and 2021.

NR – no response.

BMJ Open

**What is the NCD Service Capacity and Disruptions due to COVID-19?
Results from the WHO Noncommunicable Disease Country Capacity Survey in the Americas Region**

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ABSTRACT

Objective: This article presents the Americas regional results of the World Health Organization Noncommunicable Diseases (NCD) Country Capacity Survey from 2019-2021, on NCD service capacity and disruptions from the COVID-19 pandemic.

Setting: Information on public sector primary care services for NCDs, and related technical inputs from 35 countries in the Americas region are provided.

Participants: All Ministry of Health officials managing a national NCD program, from a WHO Member State in the Americas region, were included throughout this study. Government health officials from countries that are not WHO Member States were excluded.

Outcome measures: The availability of evidence based NCD guidelines, essential NCD medicines and basic technologies in primary care, cardiovascular disease risk stratification, cancer screening and palliative care services were measured in 2019, 2020 and 2021. NCD service interruptions, reassignments of NCD staff during the COVID-19 pandemic and mitigation strategies to reduce disruptions for NCD services were measured in 2020 and 2021.

Results: More than 50% of countries reported a lack of comprehensive package of NCD guidelines, essential medicines, and related service inputs. Extensive disruptions in NCD services resulted from the pandemic, with only 12/35 countries (34%), reporting that outpatient NCD services were functioning normally. Ministry of Health staff were largely redirected to work on the COVID-19 response, either full-time or partially, reducing the human resources available for NCD services. Six of 24 countries (25%) reported stock out of essential NCD medicines and/or diagnostics at health facilities which affected service continuity. Mitigation strategies to ensure continuity of care for people with NCDs were deployed in many countries and included triaging patients, telemedicine and tele-consultations, and electronic prescriptions and other novel prescribing practices.

Conclusions: The findings from this regional survey suggest significant and sustained disruptions, affecting all countries regardless of the country's level of investments in health care or NCD burden.

Strengths and limitations of this study:

- This is the only region-wide analysis in the Americas, with data from 2019-2021, that has systematically measured the NCD service capacity, disruptions of NCD services due to the COVID-19 pandemic, as well as the mitigation strategies used to ensure continuity of services across 35 countries.
- It is based on validated government information from a global standardized methodology, applied by the World Health Organization (WHO) since 2001 to monitor country capacity for NCD policies and services.
- The main limitation is that this study did not provide the specificity of information by health center level of NCD service capacity and disruptions during the COVID-19 pandemic. In addition, it did not provide information on the impact of these disruptions on people's health outcomes.
- The methodological limitation of this study is that it uses a self-administered questionnaire, and the process for responding to the questions could have varied across countries, with little space for qualitative data collection that could contribute to better understand the reasons for service disruptions. Also, country names, for comparison purposes, was not possible due to agreements in this global WHO survey with Member States.

INTRODUCTION

People with noncommunicable diseases (NCDs) require timely diagnosis, continuous treatment and access to essential medicines, as well as ongoing monitoring of their conditions to prevent complications and premature death. Yet health systems in most low- and middle-income countries are not adequately equipped to meet the growing NCD health demands, which has led to global calls for universal health coverage and strengthening primary care services to improve NCD (cardiovascular diseases, cancer, diabetes, chronic respiratory diseases) prevention and control.[1,2] The World Health Organization has established, and routinely monitors, targets to strengthen the health system response to NCDs, that cover NCD guidelines and access to essential medicines and technologies, for the four main NCDs (cardiovascular diseases, cancer, diabetes and chronic respiratory diseases), in addition to NCD risk factor targets.[3] To strengthen NCD services, the focus has been on increasing the use of evidence-based national guidelines/protocols/standards for the management of the four main NCDs through a primary care approach in the public sector; as well as provision of drug therapy, including glycaemic control, and counselling for eligible persons at high risk to prevent heart attacks and strokes, with emphasis on the primary care level. These interventions are based on a cost effectiveness analysis, that, together with risk factor reduction interventions, are expected to reduce premature NCD mortality.[4]

In the Americas region, where an estimated 240 million people are living with a chronic condition [5] health systems strengthening for NCDs has been a focus for the Pan American Health Organization (PAHO) Member States since the adoption of a regional NCD plan of action by the Ministries of Health in 2013.[6] Progress has been gradual and an assessment of the NCD plan of action, in 2020, noted that 17/35 countries (48.5%) had implemented a model of integrated management for NCDs, such as a chronic care model with evidence based guidelines, a clinical information system, self-care, community support, and multidisciplinary team-based care.[7] However, the COVID-19 pandemic subsequently has had a significant adverse impact on the Region, including a marked disruption of NCD services.

COVID-19 has been diagnosed in over 153 million people and led to more than 2.7 million deaths in the Region of the Americas, by the end of April 2022.[8] The importance of NCDs as factors leading to severe COVID-19 related illness or death is now well-documented, highlighting the importance of optimal NCD management.[9,10] However, the pandemic has negatively impacted NCD management, related to the extensive primary care disruptions. Two years into the pandemic, 93% (25/27 countries) of countries in the Americas have reported

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3 disruptions in their essential primary care health services along the 66 tracer services in health
4 systems (eg. cancer screening, diabetes management, hypertension management) .[11]
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7 So to what extent have these health system disruptions affected NCD services? This article
8 presents information to respond to the research question on what is the NCD service capacity and
9 disruptions due to the COVID-19 pandemic, from the perspective of the health authorities
10 responsible for the national NCD programs and services across the Region of the Americas.
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14 **METHODS**

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17 This is a descriptive study, in which information on NCD services and disruptions resulting from
18 the COVID-19 pandemic was extracted from the World Health Organization dataset on the NCD
19 Country Capacity Surveys (CCS) 2019-2021, from the 35 Member States of the Pan American
20 Health Organization. These are a diverse range of countries and to provide context to help situate
21 the findings, the list of countries and selected characteristics are provided in Appendix 1 in
22 supplemental information. The CCS is a closed, non-randomized, web-based survey using a
23 standardized global methodology that collects information on, among other topics, NCD services
24 (module 4), and on NCD service disruptions (module 5). An NCD service was described as
25 health care encompassing front-line health service delivery (primary care) or higher-level
26 services for any of the main NCDs. All statistical analyses were carried out using STATA 17
27 software (Stata Corporation, 2017). P-values are not presented due to the descriptive
28 characteristics of the study.
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36 Responses to the CCS were provided by the official Ministry of Health authorities responsible
37 for the national NCD program, and submitted directly, using their unique access to the WHO
38 CCS on-line tool. Data were then validated by PAHO/WHO, and in the event of any
39 discrepancies or unanswered questions, feedback was sought from the designated Ministry of
40 Health official.
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45 The CCS was administered in March to June 2019; and from May to June 2020 module 5 was
46 administered, with a response rate of 83% (29/35 countries). In 2021, the CCS was administered
47 again from May to September 2021, with a 100% (35/35 countries) response rate.
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50 Results presented are from all 35 countries from CCS 2021, and they are presented as a regional
51 evaluation showing number and proportion of countries, without identifying countries, due to
52 confidentiality agreements. A comparison of the impact of COVID-19 on NCD services in both
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years are presented, in which case data from the same 29 countries that responded to module 5 in both rounds (2020 and 2021) are presented.

Patient and Public Involvement

There is no patient involvement in this analysis.

RESULTS

Overall limited NCD service capacity in primary care

For NCD service capacity, the CCS assesses the availability of evidence-based guidelines, essential medicines and technologies in primary care, cardiovascular disease risk stratification in clinical practice, and cancer screening and palliative care. Overall, NCD service capacity is rather limited in the Americas. Evidence-based national guidelines/protocols/standards for the four principal NCDs are available in only 63% (22/35) of countries, a slight improvement from 54% (19/35) in 2019. The most frequently available guidelines utilized in at least 50% of public health-care facilities were on diabetes (74%), hypertension (69%), cancer (60%) and chronic respiratory diseases (51%) (Appendix 2 in supplemental information). Only 29% of countries (10/35) offered cardiovascular risk stratification in clinical practice for the management of patients at high risk for heart attack and stroke in half or more of the primary health care facilities in the public sector.

Essential technologies for cardiovascular diseases (blood pressure measurement devices, total cholesterol measurement, and urine strips for albumin assay) are available in at least half of the health care facilities of the public health sector in 51% (18/35) of countries; and only 34% (12/35) of countries reported having all technologies available for diabetes (blood glucose measurement, oral glucose test, HbA1c test, dilated fundus examination, foot vibration perception by tuning fork, and urine strips for glucose and ketone measurement). This situation has not changed since 2019 (Table 1).

Essential medicines for cardiovascular diseases (aspirin, thiazide diuretics, ACE inhibitors, angiotensin II receptor blockers (ARBs) calcium channel blockers, beta blockers, and statins) were generally available in pharmacies in all almost all countries, with the exception of ARBs which are available in only 74% of countries (26/35). For diabetes, the essential medicines (insulin, metformin, sulphonylureas) are reported as being generally available in almost all countries and this situation has not changed since 2019. Regarding chronic respiratory diseases,

steroid inhalers and bronchodilators are available in 77% (27/35) and 89% (31/35) of countries, respectively. Nicotine replacement therapy for smoking cessation remains very limited in the region, with only 23% (8/35) of countries reporting availability. Oral morphine was also identified as an essential medicine which was not widely available in pharmacies, with around half of the countries (51%, 18/35 countries) reporting its availability (Table 1).

Table 1: Proportion of countries (%) with available basic NCD technologies and essential medicines in primary care facilities of the public health sector, Americas Region 2019-2021

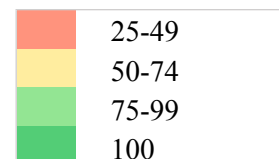
	Countries (%)	
	2019	2021
All basic NCD technologies*	5	4
Measuring weight	100	97
Measuring height	100	100
Blood glucose measurement	94	94
Oral glucose tolerance test	63	69
HbA1c test	51	54
Dilated fundus examination	37	51
Foot vibration perception by tuning fork	43	51
Urine strips for glucose and ketone measurement	63	57
Blood pressure measurement	97	94
Total cholesterol measurement	77	71
Urine strips for albumin assay	60	54
Peak flow measurement spirometry	31	17
All essential NCD medicines**	17	20
Insulin	83	91
Aspirin (75/100 mg)	94	91
Metformin	94	100
Thiazide diuretics	91	89
ACE inhibitors	91	89
Angiotensin II receptor blockers (ARBs)	77	74
Calcium channel blockers	89	89
Beta blockers	86	91
Statins	83	86
Oral morphine	49	51
Steroid inhaler	77	77
Bronchodilator	91	89
Sulphonylurea(s)	91	97
Benzathine penicillin injection	89	89
Nicotin Replacement Therapy	23	23

Range distribution of countries (%)

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Source: WHO NCD Country Capacity Survey, 2019-2021

Notes: *Available in 50 or more of the public health care facilities. ** Available in 50 or more pharmacies.



Cancer screening is offered in primary care in many countries in the Americas, with 63% (22/35 countries) reporting breast cancer screening; 83% (29/35) reporting cervical cancer screening; and 43% (15/35) of countries reporting colorectal cancer screening. Overall, only 43% of the countries (15/35) reported having a screening program for all three cancer types, and this situation had improved somewhat since 2019. Palliative care services to provide supportive and end-of-life care for people with cancer and other chronic conditions are offered in primary health care facilities in only 37% of countries (13/35) or community and home-based care in 46% of countries (16/35) and is yet another NCD service that requires strengthening.

NCD service disruptions due to the Covid-19 pandemic

NCD services were identified as part of the government's core set of essential health services to be maintained during the pandemic in 21 of 26 countries (81%). Nine countries (26%) reported allocating additional funding to NCDs in the government budget for the COVID-19 response (Table 2). Despite this, only 12/35 countries (34%) reported that outpatient NCD services were functioning normally and only 11% of countries (4/35) reported that no activities for NCDs had been postponed due to the pandemic (Figure 1). In 2021, three more countries reported that NCD outpatient services were functioning normally compared to 2020; while 3 fewer countries reported that NCD inpatient services were functioning normally (Appendix 3 in supplementary information).

Ministry of Health staff designated to work on NCD services were largely redirected to work on the COVID-19 response, either full- or part-time, reducing the human resources available to provide care for people with NCDs. Only 2 countries (6%, 2/35 countries) reported that no NCD staff had been redirected to support the COVID-19 effort. By 2021, this situation had worsened, with 14 countries reporting NCD staff were re-assigned to the pandemic, up from 11 countries in 2020 (Table 2).

Table 2: NCD service disruptions during the COVID-19 pandemic, Americas Region, 2020-2021

	Countries (%)		Comparison of countries (%) in 2020 and in 2021	
	2021 (n=35 countries)	2020 (n=29 countries)	2020 (n=29 countries)	2021 (n=29 countries)
Redirected NCD resources				
Staff reassigned/deployed to COVID-19 response				
Some staff partially reassigned	40 (14/35)	38 (11/29)	48 (14/29)	

Table 2: NCD service disruptions during the COVID-19 pandemic, Americas Region, 2020-2021

	Countries (%)	Comparison of countries (%) in 2020 and in 2021	
	2021 (n=35 countries)	2020 (n=29 countries)	2021 (n=29 countries)
	Some staff fully reassigned	26 (9/35)	21 (6/29)
All staff partially reassigned	20 (7/35)	31 (9/29)	28 (8/29)
All staff fully reassigned	6 (2/35)	7 (2/29)	7 (2/29)
No staff reassigned	6 (2/35)	3 (1/29)	7 (2/29)
Don't know	3 (1/35)	0 (0/29)	3 (1/29)
Government NCD funds allocated to support COVID-19 response			
None or not yet	29 (10/35)	59 (17/29)	31 (9/29)
Don't know	49 (17/35)	34 (10/29)	48 (14/29)
1-25%	14 (5/35)	0 (0/29)	10 (3/29)
26-50%	3 (1/35)	0 (0/29)	3 (1/29)
51-75%	6 (2/35)	3 (1/29)	7 (2/29)
76-100%	0 (0/35)	3 (1/29)	0 (0/29)
NCD services included in COVID-19 response			
NCD services included as part of the list of essential health services in the COVID-19 plan			
Cardiovascular disease services	95 (20/21)	N/A	N/A
Cancer services	86 (18/21)	N/A	N/A
Diabetes services	100 (21/21)	N/A	N/A
Chronic respiratory disease services	86 (12/21)	N/A	N/A
Chronic kidney disease and dialysis services	0 (0/35)	N/A	N/A
Tobacco cessation services	48 (10/21)	N/A	N/A
Other	14 (3/21)	N/A	N/A
Additional funding allocated for NCDs	26 (9/35)	10 (3/29)	10 (3/29)
NCD activities postponed due to COVID-19 pandemic			
None	11 (4/35)	17 (5/29)	10 (3/29)
Implementation of NCD Surveys	40 (14/35)	55 (16/29)	45 (13/29)
Public screening programs for NCDs	51 (18/35)	45 (13/29)	48 (14/29)
WHO PEN package implementation ¹	23 (8/35)	21 (6/29)	24 (7/29)
WHO HEARTS package ² implementation	29 (10/35)	31 (9/29)	31 (9/29)
Mass communication campaigns	34 (12/35)	24 (7/29)	34 (10/29)
Other	11 (4/35)	24 (7/29)	10 (3/29)

Source: WHO NCD Country Capacity Survey, 2019-2021

Note: Round 1 (R1) conducted in 2020 and Round 2 (R2) conducted in 2021.

N/A – not applicable, data for comparison not available between 2020 and 2021.

Regarding service disruptions, outpatient NCD services were suspended in 1 country, community NCD services were suspended in 4 countries and mobile NCD clinics were

¹ WHO PEN package is a set of essential primary care interventions for the main NCDs, and can be found here: <https://www.who.int/publications/i/item/9789240009226>

² WHO Hearts package is the primary care interventions to improve hypertension diagnosis, treatment and control and can be found here: <https://www.who.int/publications/i/item/9789240001367>

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3 suspended in 6 countries. The majority of countries reported limited access to outpatient
4 services (19/35 countries, 54%), and to inpatient NCD services (19/35 countries, 54%) (Figure
5 1).
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9 The disruption in NCD services, either partially or completely, affected all types of care for
10 people with NCDs, but more so for diabetes and hypertension services (Figure 2, and Appendix
11 4 in supplementary information). The main reasons cited for disruption of NCD services related
12 to human resources, where 17 countries (74%, 17/24 countries) reported it was due to NCD staff
13 deployed to the COVID response, or simply insufficient clinical staff to provide the service
14 (46%, 11/24 countries). Two countries (8%, 2/24 countries) noted clinical staff did not have
15 personal protective equipment which affected service provision. Six countries (25%, 6/24
16 countries) reported stock out of essential NCD medicines and or diagnostics at the health facility
17 level which affected service continuity. Inpatient NCD services were mainly disrupted due to
18 the cancellation of elective procedures (63%, 15/24 countries), and hospital beds or inpatient
19 service were simply not available in 46% of countries (11/24 countries). The extent of
20 disruptions for NCD services worsened in 2021, as compared to the situation in 2020 for all
21 types of NCD services (Figure 2).
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29 Beyond service disruption, planned NCD activities have been suspended or postponed due to the
30 COVID-19 pandemic, and only small improvements over time were observed (Table 2). The
31 activities most commonly reported as suspended were screening people for cancer, diabetes and
32 other NCDs in 51% of the countries (18/35 countries), the implementation of NCD surveys,
33 where 14 countries (40%) report postponing surveys and the implementation of the Hearts
34 technical package was suspended or postponed in 10 countries.
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39 Perhaps the more influential driver of NCD service disruptions, however, is on the demand side,
40 where COVID-19 lock down measures and fear or mistrust with community transmission led to
41 many people not seeking care or patients not presenting for care, as reported in 18 countries and
42 17 countries, respectively (75%, 18/24 countries; 71% 17/24 countries). Financial difficulties
43 (46% 11/24 countries) and travel restrictions hindering people's access to health facilities (50%,
44 12/24 countries) were also cited as important causes of disrupted NCD services.
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49 ***Strategies and plans to mitigate NCD service disruptions***

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52 Many different approaches were employed to minimize the disruption in NCD services during
53 the pandemic which did not change over 2020-2021: home-based care, triage patients and
54 prioritize care based on severity of condition, and support for self-care were most commonly
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3 reported (Figure 3). Telemedicine was employed to replace in person consultations (16/24
4 countries, 67%) and this was sustained over time (Appendix 5 in supplementary information).
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7 When prompted on plans to reinitiate disrupted NCD services, most respondents indicated that
8 the priority was to train health care professionals in NCD diagnosis and treatment, re-initiate
9 cancer screening services, continue use of recurring medicine prescription and continue the use
10 of telemedicine.
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14 Respondents also identified their immediate needs to assist with building stronger health services
15 for NCDs. The main needs identified were guidelines for NCD and COVID-19 clinical
16 management; guidance on promoting healthy lifestyles especially post COVID-19 to motivate
17 behaviour change; extension of telemedicine services to facilitate continuous communication
18 with patients especially those living in remote areas or large distances from health facilities;
19 systems for tracking patients with NCDs including Apps that can better support self-
20 management; and rehabilitation services for those people suffering long term symptoms from
21 COVID-19 including respiratory symptoms.
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27 **DISCUSSION**

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30 This is the only region-wide survey in the Americas, that has systematically measured the NCD
31 service capacity, the disruption of NCD services due to the COVID-19 pandemic, as well as the
32 mitigation strategies used to ensure continuity of services. More than half of the countries in the
33 region do not have the comprehensive package of guidelines, technologies and medicines for all
34 four major NCDs and there was little reported change between 2019 and 2021 on the NCD
35 service capacity. Nonetheless, the Americas region has been noted to have among the higher
36 levels of NCD service capacity as compared to the other World regions [12]; and a much greater
37 NCD service capacity than as reported in a similar survey conducted in primary care centers in
38 India.[13]
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45 The findings from this regional survey suggest significant and sustained disruptions, affecting all
46 countries regardless of the country's level of investments in health care or NCD burden. This
47 situation appears to be consistent with the situation reported in other regions of the
48 World.[12,14-16]
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52 To assist governments in maintaining essential NCD services at this time, PAHO/WHO has
53 published guidelines to assist with triaging patients, utilize telemedicine and multi-month
54 prescriptions more broadly, and reorganize oncology services.[17] The extent of use or
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3 application of these guidelines is not known, although the results of this survey indicate that
4 many national NCD program managers had use for the guidance on maintaining essential NCD
5 services.
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9 More research is needed to document the extent, and consequences of NCD service disruption in
10 the Americas region. Further research is also needed to better understand how effective the
11 mitigation strategies of triaging patients, e-prescriptions and telemedicine, were as substitution
12 for face-to-face encounters; and whether inequities in access to primary NCD services were
13 further exacerbated by the NCD service disruptions.
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17 Some of this research has begun in the region. For example, a survey of NCD patient advocacy
18 organizations in Latin America, noted the dissatisfaction and poorer quality of care during 2020-
19 2021, where 52% of respondents experienced delays of 30 days or more for primary care;
20 telemedicine was reported as not accessible to patients by 37% of respondents and a majority
21 (76%) of NCD patients faced challenges with refilling prescription medication.[18] In Mexico,
22 the social security system, IMSS, noted reduced screening for breast and cervical cancer (−79%
23 and −68%), diabetes and hypertension care (−32% in both), attributed to underfunding, shortages
24 in human resources and reallocation of health staff and infrastructure due to COVID-19.[19]
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31 Similarly in the USA, cancer screening declined sharply in 2020 compared with 2019, (breast,
32 −90.8%; colorectal, −79.3%; prostate, −63.4%) and breast cancer diagnosis has been observed
33 to decrease during the pandemic.[20-21] The USA has also been noted to have the highest
34 absolute number of excess deaths in 2020 (458,000) as compared to 29 other countries.[22] A
35 large excess death rate of 64% more deaths in 2020 than 2019 were also reported in Ecuador,
36 where it was found that indigenous populations had four times the excess death rate of the
37 majority mestizo group, indicating unequal impact of COVID on vulnerable populations.[23]
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42 Brazil has also reported significant declines in utilization of primary care services by people with
43 NCDs [24], and in one state almost a third of people living with NCDs reported impaired
44 management of their NCD as a result of the COVID-19 restrictions.[25] Brazil has also noted
45 excess deaths from cancer and cardiovascular diseases related to the COVID-19 pandemic.[26]
46 The full extent of foregone care, however are yet to be observed, and more research is needed
47 throughout countries in the Americas region, to determine the impact of NCD service disruptions
48 on diagnosis, treatment and health outcomes for people with NCDs. For example, in the USA,
49 cancer mortality is expected to increase due to reduced screening and early diagnosis [20], and in
50 the U.K., a substantial increase in cancer deaths and morbidity have been predicted due to
51 COVID-19 restrictions.[27-29]
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3 Improving NCD service capacity and NCD management is tied closely to universal health
4 coverage and primary care strengthening. As a way forward, the Americas region has charted a
5 path for creating more resilient health services, which includes strengthening primary care and
6 increasing financial investments in health systems.[30] And as COVID-19 cases continue to
7 decline and health services resume to capacity, the public health priority now needs to be on
8 improving the equitable access to NCD diagnosis and treatment in primary care, which includes
9 updating NCD guidelines, training multi-disciplinary health care teams, increasing access to
10 essential NCD medicines and technologies, improving self-management support, among
11 others.[31] With regards to NCD medicines and technologies, governments in the Americas
12 region can utilize the PAHO Strategic Fund which offers a useful mechanism for pooled
13 procurement of quality assured essential NCD medicines and technologies, and was successfully
14 deployed in government responses to COVID-19, and other health priorities.[32]

21 22 CONCLUSIONS

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25 This analysis documents the limitations in NCD service capacity in the Americas region, and the
26 degree of disruptions in access to essential NCD services and medicines. While there is limited
27 published data on the impact that these service disruptions will have on health outcomes, given
28 the significant number of people with NCDs in the Americas, the limited NCD service capacity
29 and extensive disruptions in NCD services from the COVID-19 pandemic, the priority must now
30 be strengthening primary care services for NCDs and addressing the backlog and foregone care
31 for NCD management.
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41 **Figure 1:** Proportion of countries (%) with disruptions in NCD services during the COVID-19
42 pandemic, Americas region, 2020-2021
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45 **Figure 2:** Proportion of countries (%) with NCD Service Disruptions by Service Type due to the
46 COVID-19 pandemic, Americas Region, 2020-2021
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49 **Figure 3:** Proportion of countries (%) with approaches employed to overcome NCD service
50 disruptions due to COVID-19 Pandemic, Americas Region, 2020-2021
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3 **Contributor statement:** SL and RC conceived the original idea. RC, CC, DO collected and
4 analyzed the data. SL, RC, CC, DO, AH interpreted the results. SL wrote the paper, RC, CC,
5 DO, AH reviewed and contributed to the paper. SL, RC, CC, DO, AH approved the final version.
6

7
8 **Competing interests:** None
9

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11

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13 Capacity Survey and available in the WHO Global Health Observatory. Data from the Americas
14 region are available upon reasonable request (deidentified data by country) from PAHO/WHO
15 per request at: nmhsurveillance@paho.org
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18 **Ethics statement:** This study does not involve human participants and ethical approval was not
19 required.
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22 **Patient and public involvement statement:** It was not appropriate or possible to involve
23 patients or the public in the design, or conduct, or reporting, or dissemination plans of this
24 analysis which involved data collection and analysis from information provided by the Ministry
25 of Health national NCD program managers in the Americas region.
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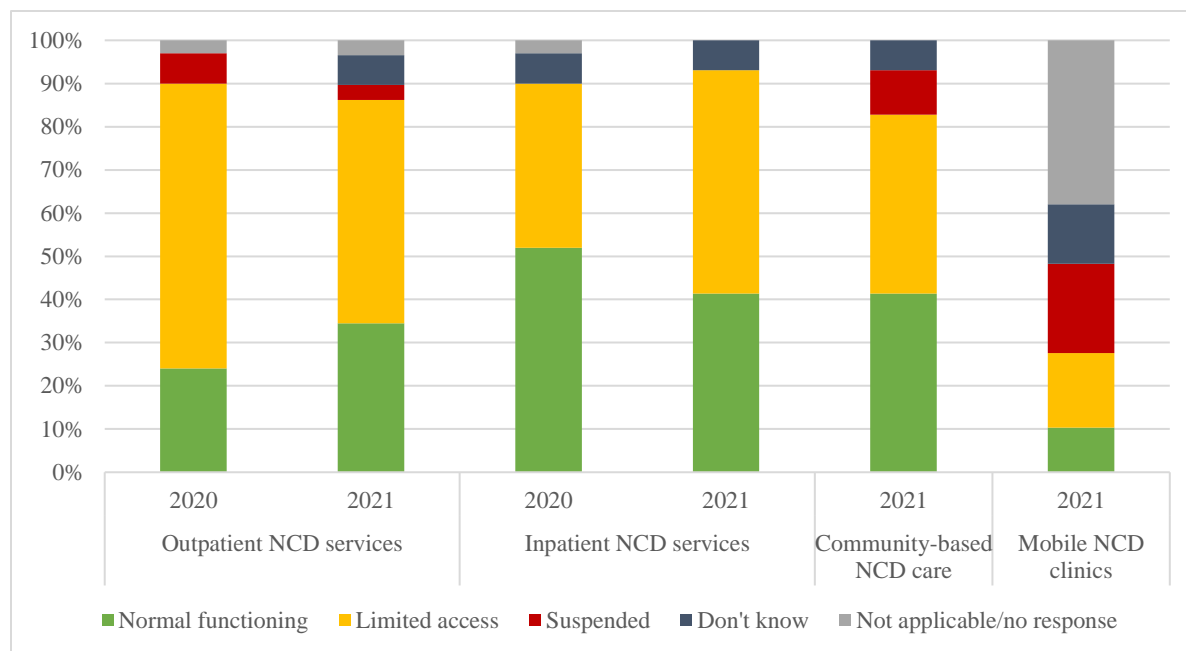


Figure 1: Proportion of countries (%) with disruptions in NCD services during the COVID-19 pandemic, Americas region, 2020-2021

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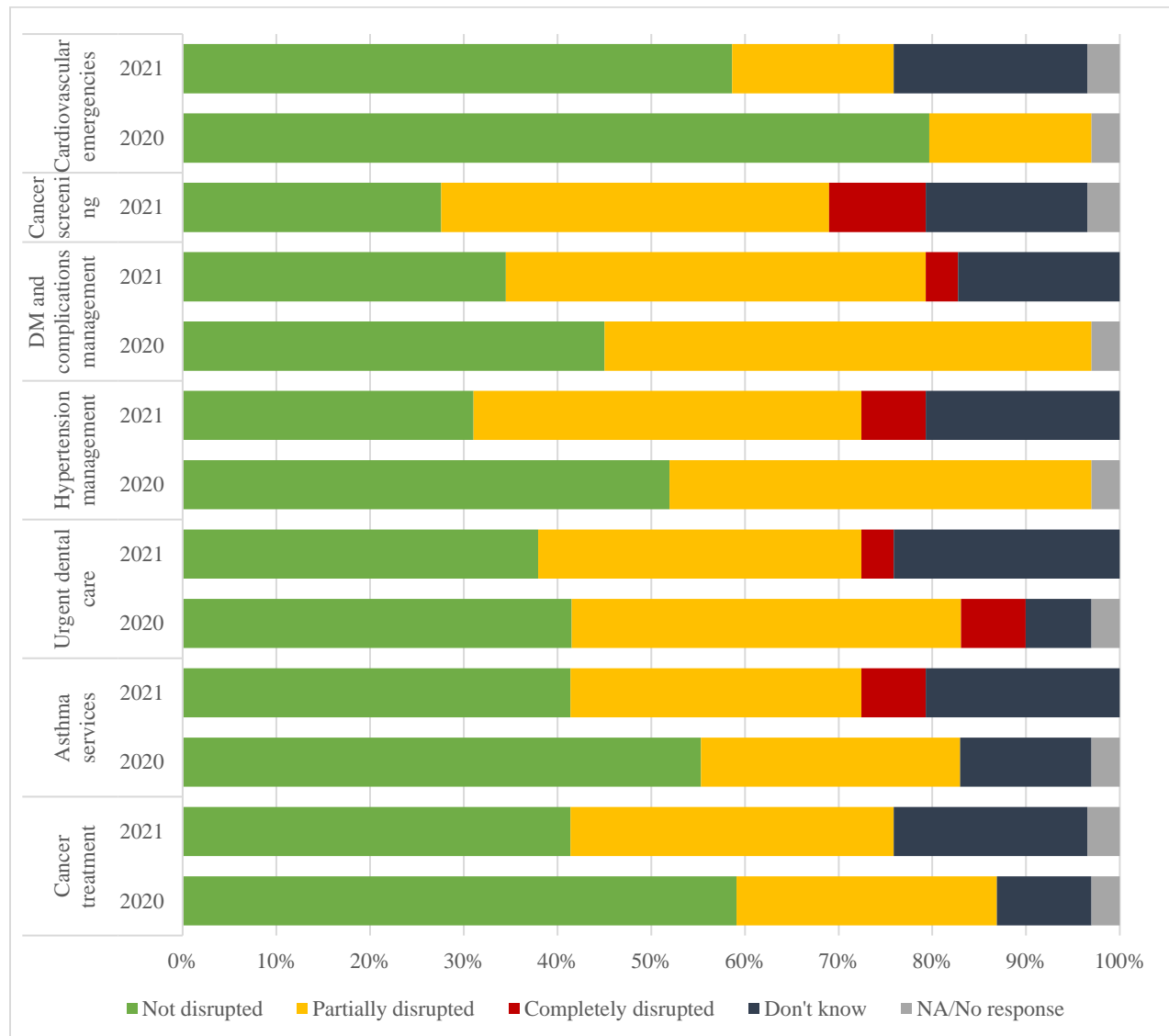


Figure 2: Proportion of countries (%) with NCD Service Disruptions by Service Type due to the COVID-19 pandemic, Americas Region, 2020-2021

Abbreviations: N/A: not applicable, country does not provide the service. DM: diabetes mellitus. Notes: cancer screening was not included in the 2020 survey. Cardiovascular emergencies include myocardial infarctions, stroke, and cardiac arrhythmias.

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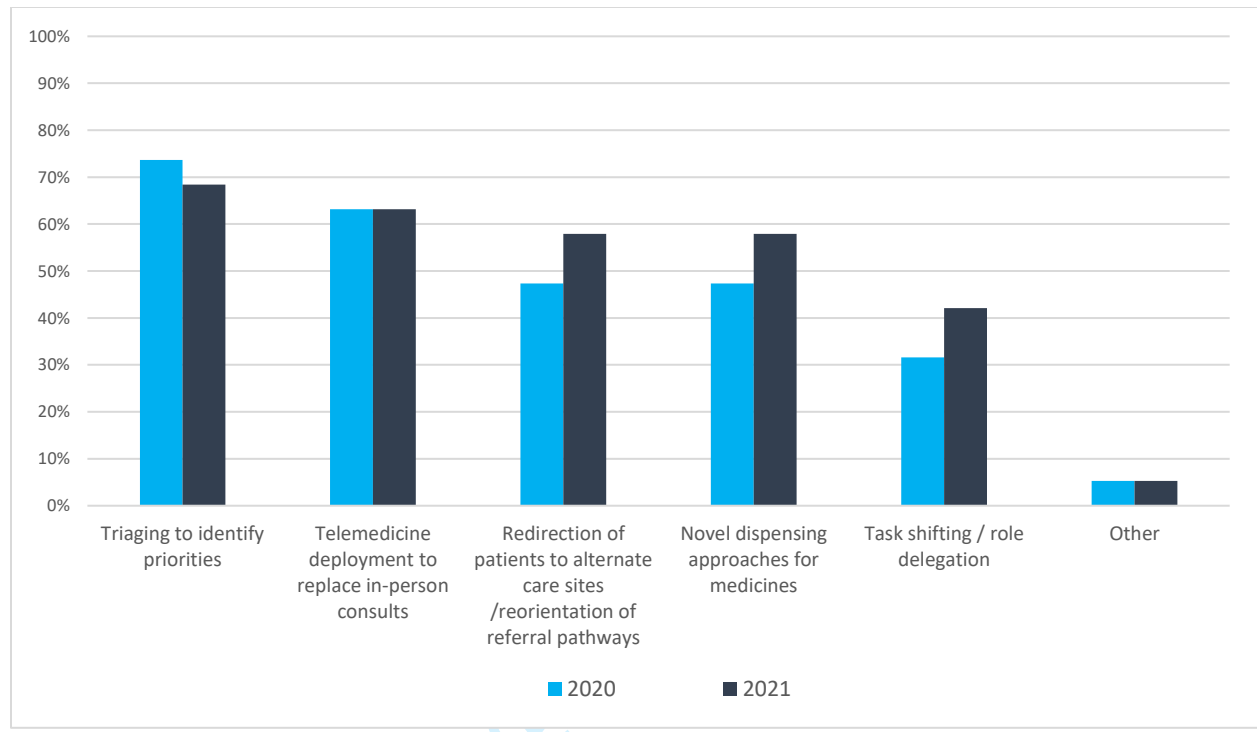


Figure 3: Proportion of countries (%) with approaches employed to overcome NCD service disruptions due to COVID-19 Pandemic, Americas Region, 2020-2021

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Appendix 1. Countries of the Americas region included in the analysis

Country	Population (thousands)	Public health expenditure as % of GDP	NCD Mortality Rate (age-adjusted per 100 000 pop)
Northern America			
Canada	38,067.90	7.9	302
United States of America	332,915.10	8.5	408
Mexico, Central America, and Latin Caribbean			
Belize	404.9	3.9	452
Costa Rica	5,139.10	5.5	310
Cuba	11,317.50	9.9	431
Dominican Republic	10,953.70	2.5	508
El Salvador	6,518.50	4.5	393
Guatemala	18,249.90	2.1	498
Honduras	10,063.00	2.8	615
Mexico	130,262.20	2.7	466
Nicaragua	6,702.40	5.1	548
Panama	4,381.60	4.6	335
South America			
Argentina	45,605.80	5.9	436
Bolivia	11,832.90	4.5	584
Brazil	213,993.40	4	425
Chile	19,212.40	4.6	329
Colombia	51,265.80	5.5	327
Ecuador	17,888.50	4.2	365
Peru	33,359.40	3.3	304
Paraguay	7,219.60	2.9	448
Uruguay	3,485.20	6.7	446
Venezuela	28,704.90	1.7	412
Non-Latin Caribbean			
Antigua and Barbuda	98.70	2.9	502
Bahamas	396.90	3.1	533
Barbados	287.70	2.9	477
Dominica	74.30	4.3	.
Grenada	113.00	1.7	619
Guyana	790.30	3.7	802
Haiti	11,541.70	0.9	839
Jamaica	2,973.50	3.9	455
Saint Kitts and Nevis	54.20	2.5	.
Saint Lucia	184.40	2.1	516
Saint Vincent and the Grenadines	111.30	3.1	537
Suriname	591.80	5.3	666
Trinidad and Tobago	1,403.40	3.4	439

Source: PAHO Core Indicators, 2022

Appendix 2: Availability of guidelines/protocols for the management of NCDs, referred by national NCD programs. Region of the Americas, 20019-2021

NCD guidelines/protocols	Hypertension		Diabetes		Cancer		Chronic respiratory		NCD4 Guidelines/protocols	
	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
Availability	86%	89%	97%	97%	77%	89%	66%	71%	54%	63%
Utilized in at least 50% of health care facilities	73%	69%	74%	74%	70%	60%	74%	51%	34%	40%
Last time updated										
last 5 years	23%	46%	46%	63%	26%	31%	14%	17%	.	.
6 to 10 years	40%	26%	23%	11%	34%	29%	23%	23%	.	.
>10 years	20%	11%	23%	14%	14%	23%	20%	26%	.	.
Includes referral criteria	77%	77%	82%	89%	85%	80%	78%	60%	37%	49%

Source: WHO NCD Country Capacity Survey, 2019-2021.

Appendix 3. Access to NCD services during the COVID-19 pandemic. Americas region, 2020-2021

NCD services	Countries R2 (%)	Same countries R1 and R2 (%)	
	2021 (n=35 countries)	2020 (n=29 countries)	2021 (n=29 countries)
Outpatient NCD services			
Functioning as normal	34% (12/35)	24% (7/29)	34% (10/29)
Limited access	54% (19/35)	66% (19/29)	52% (15/29)
Suspended	3% (1/35)	7% (2/29)	3% (1/29)
Don't know	6% (2/35)	0% (2/29)	7% (2/29)
Not applicable/No response	3% (1/35)	3% (1/29)	3% (1/29)
Inpatient NCD services			
Functioning as normal	40% (14/35)	52% (15/29)	41% (12/29)
Limited access	54% (19/35)	38% (11/29)	52% (15/29)
Suspended	0% (2/35)	0% (0/29)	0% (0/29)
Don't know	6% (2/35)	7% (2/29)	7% (2/29)
Not applicable/No response	0% (2/35)	3% (1/29)	0% (2/29)
Community-based NCD care			
Functioning as normal	37% (13/35)	N/A	41% (12/29)
Limited access	43% (15/35)	N/A	41% (12/29)
Suspended	11% (4/35)	N/A	10% (3/29)
Don't know	6% (2/35)	N/A	7% (2/29)
Not applicable/No response	3% (1/35)	N/A	0% (2/29)
Mobile NCD clinics			
Functioning as normal	11% (4/35)	N/A	10% (3/29)
Limited access	23% (8/35)	N/A	17% (5/29)
Suspended	17% (6/35)	N/A	21% (6/29)
Don't know	14% (5/35)	N/A	14% (4/29)
Not applicable/No response	34% (12/35)	N/A	38% (11/29)

Source: WHO NCD Country Capacity Survey, 2019-2021

Note: Round 1 (R1) conducted in 2020 and Round 2 (R2) conducted in 2021.

N/A – not applicable, data for comparison not available between 2020 and 2021.

Appendix 4. NCD service disruption due to COVID-19. Region of the Americas, 2021 results.

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Disruption level	Hypertension management		Cardio-vascular emergencies		Cancer screening		Cancer treatment		Diabetes and complications		Asthma		Urgent dental care		Rehabilitation		Palliative care	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
Not disrupted	52%	31%	79%	59%	N/A	28%	59%	41%	45%	34%	55%	41%	41%	38%	14%	N/A	24%	N/A
Partially disrupted	(15/29)	(9/29)	(23/29)	(17/29)	N/A	(8/29)	17/29)	(12/29)	(13/29)	(10/29)	(16/29)	(12/29)	(12/29)	(11/29)	(4/29)	N/A	(7/29)	N/A
Completely disrupted	45%	41%	17%	17%	N/A	41%	28%	34%	52%	45%	28%	31%	41%	34%	38%	N/A	34%	N/A
Don't know	(13/29)	(12/29)	(5/29)	(5/29)	N/A	(12/29)	(8/29)	(10/29)	(15/29)	(13/29)	(8/29)	(9/29)	(12/29)	(10/29)	(11/29)	N/A	(10/29)	N/A
NA/NR	0%	7%	0%	0%	N/A	10%	0%	0%	0%	3%	0%	7%	7%	3%	21%	N/A	7%	N/A
	(0/29)	(2/29)	(0/29)	(0/29)	N/A	(3/29)	(0/29)	(0/29)	(0/29)	(1/29)	(0/29)	(2/29)	(2/29)	(1/29)	(6/29)	N/A	(2/29)	N/A
	0%	21%	0%	21%	N/A	17%	10%	21%	0%	17%	14%	21%	7%	24%	24%	N/A	31%	N/A
	(0/29)	(6/29)	(0/29)	(6/29)	N/A	(5/29)	(3/29)	(6/29)	(0/29)	(5/29)	(4/29)	(6/29)	(2/29)	(7/29)	(7/29)	N/A	(9/29)	N/A
	3%	0%	3%	3%	N/A	3%	3%	3%	3%	0%	3%	0%	3%	0%	3%	N/A	3%	N/A
	(1/29)	(0/29)	(1/29)	(1/29)	N/A	(1/29)	(1/29)	(1/29)	(1/29)	(0/29)	(1/29)	(0/29)	(1/29)	(0/29)	(1/29)	N/A	(1/29)	N/A

¹⁹Source: WHO NCD Country Capacity Survey, 2019-2021
²⁰N/A – not applicable, data for comparison not available between 2020 and 2021.
²¹NR – no response

Appendix 5. Approaches employed to overcome NCD service disruptions due to COVID-19 Pandemic. Americas Region, 2020-2021.

Approaches to overcome NCD service disruption	Countries R2 (%)	Same countries R1 and R2 (%)	
	2021 (n=35 countries)	2020 (n=29 countries)	2021 (n=29 countries)
Triaging to identify priorities	75% (18/24)	74% (14/19)	68% (13/19)
Telemedicine deployment to replace in-person consults	67% (16/24)	63% (12/19)	63% (12/19)
Redirection of patients to alternate care sites /reorientation of referral pathways	67% (16/24)	47% (9/19)	58% (11/19)
Novel dispensing approaches for medicines	63% (15/24)	47% (9/19)	58% (11/19)
Task shifting / role delegation	38% (9/24)	32% (6/19)	42% (8/19)
Other	8% (2/24)	5% (1/19)	5% (1/19)
Integration of several services into single visit	38% (9/24)	N/A	N/A
Self-care interventions where appropriate	75% (18/24)	N/A	N/A
Provision of home-based care where appropriate	75% (18/24)	N/A	N/A
Catch-up campaigns for missed appointments	25% (6/24)	N/A	N/A
Recruitment of additional staff	67% (16/24)	N/A	N/A
Expanding facility hours	29% (7/24)	N/A	N/A
Novel supply chain management and logistics approaches	33% (8/24)	N/A	N/A
Novel prescribing approaches (e.g. tele-prescription, extended drug prescriptions)	63% (15/24)	N/A	N/A
Community communications	75% (18/24)	N/A	N/A
Government removal of user fees	0% (0/24)	N/A	N/A

Source: WHO NCD Country Capacity Survey, 2019-2021

N/A – not applicable, data for comparison not available between 2020 and 2021.

NR – no response.