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Abstract

Background: The COVID-19 pandemic has adversely affected the delivery of noncommunicable diseases (NCDs) services globally as health systems are overwhelmed by the response to the pandemic.

Aims: The World Health Organization (WHO) Regional Office for the Eastern Mediterranean conducted an assessment to evaluate the impact of COVID-19 on NCD-related services, programmes, funding and consideration of NCDs in COVID-19 response.

Methods: Data were collected from countries of the WHO Eastern Mediterranean Region (EMR) in mid-2020 through a web-based questionnaire on NCD services-related infrastructure, policies and plans, staffing, funding, NCD services disruptions and their causes, disruption mitigation strategies, data collection on comorbidity, surveillance, and suggestions for WHO technical guidance. The data were exported into Microsoft Excel and summarized. Countries were grouped according to socioeconomic level.

Results: Nineteen of the 22 countries in the EMR responded: 95% had NCD staff reallocated to support their COVID-19 response. Lower-income countries were less likely to include NCDs in their pandemic response plans and more likely to report disruption of services. The most commonly disrupted services were hypertension management (10 countries 53%), dental care (10 countries 53%), rehabilitation (9 countries 47%), palliative care (9 countries 47%) and asthma management (9 countries 47%).

Conclusion: The COVID-19 pandemic has disrupted the continuity of NCD-related services in EMR countries. The ability to mitigate service disruptions varied noticeably between countries. The mitigation measures implemented included triaging of patients, novel NCD medicines supply chains and dispensing interventions, and the use of digital health and telemedicine. Guidance and support for systems resilience, preparedness and response to crises are recommended.

Keywords: NCDs services, COVID-19 response, WHO Eastern Mediterranean Region

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Introduction

The ongoing COVID-19 pandemic is having a heavy toll on people living with noncommunicable diseases (NCDs) (1). From the early stages of the pandemic, it became evident that people living with NCDs are at higher risk of experiencing a severe impact from the disease caused by the novel coronavirus and that they are more likely to die from it (1,2). The burden of NCDs has been considered an indicator for country-level vulnerability to COVID-19 in addition to other vulnerability factors (3). Owing to these increased risks, people living with NCDs have been strongly advised to practise higher levels of vigilant preventive behaviours, including staying at home and maintaining physical distancing (4). Further, access to health care services for people living with NCDs in particular has been adversely affected by restrictions applied on population movements and lockdowns which were imposed in most countries to mitigate the effects of the pandemic on health systems and to “flatten the epidemic curve” (5).

Globally, health systems have been struggling with, and in some cases have been overwhelmed by, the dramatically increasing numbers of COVID-19 cases (6). In response, countries had to reorient services and to reallocate resources to defend against the pandemic, including reassignment of health care providers. In some countries, nonemergency health services were put on hold, with a complete shut-down of the health facilities providing these services (1). All these factors combined have disproportionately affected how the pandemic has jeopardized the sustainability of NCD services during the pandemic (7,8).

Therefore, amid mounting concerns that many people living with NCDs in the World Health Organization (WHO) Eastern Mediterranean Region (EMR) might not be receiving appropriate treatment or access to medicines during the pandemic, the Regional Office conducted a rapid assessment survey to get a snapshot of the situation. The survey was conducted to fully understand the impact of COVID-19 on NCD-related services and programmes as well as to evaluate the scale of consideration of NCDs in COVID-19 response plans in countries of the Region.

Methods

The EMR has an estimated population of about 679 million people (9) in 22 countries and territories which are classified into 3 groups by WHO to better account for the socioeconomic disparities in the Region. Group 1 countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) have the highest level of socioeconomic development. Group 2 countries (Egypt, the Islamic Republic of Iran, Iraq, Jordan, Lebanon, Libya, Morocco, the West Bank and Gaza Strip, the Syrian Arab Republic and Tunisia) are the next most developed and Group 3 countries (Afghanistan, Djibouti, Pakistan, Somalia, Sudan and Yemen) are at the lowest level of development (10).

The data collection for the assessment of service delivery for NCDs during the COVID-19 pandemic was conducted through a web-based questionnaire that was developed by WHO in the early phases of the pandemic to conduct a global rapid assessment of the disruption of NCD services (11). The questionnaire was shared with NCD focal points in ministries of health in all EMR countries in May 2020. The questionnaire was divided into 5 main sections to cover: infrastructure, policies and plans, NCD-related health services, surveillance, and suggestions. It was designed to assess the effects of the pandemic from different angles including: NCD staffing, services provision, funding of national COVID-19 response plans, levels and causes of service disruption, mitigation strategies implemented, data collection on comorbidity at the country level, and suggestions for WHO technical guidance.

The collected data were exported to Microsoft Excel workbooks and were checked for

completeness and validity. Data were summarized as percentages of either the total number of countries which responded to the survey or a of their corresponding country group as described above.

Results

Survey response

Nineteen of the 22 (86%) countries in the EMR responded to the survey: all 6 Group 1 countries, 9 countries (90%) in Group 2 (missing response from Egypt), and 4 countries (67%) in Group 3 (missing responses from Pakistan and Somalia).

Infrastructure

Regarding the shifting of NCD-allocated staff and funding to the COVID-19 response, 95% of countries in the Region had some or all NCD staff supporting COVID-19 response efforts, either full- or part-time. Regarding the reallocation of NCD funds by governments to non-NCD services, only the United Arab Emirates reported that some NCD funds had been reallocated to support COVID-19 response efforts. However, at the time of data collection, 8 countries (42%) reported that they did not know if NCD funds had been reallocated to support the pandemic efforts.

Policies and plans

On the inclusion of NCD services in countries' national COVID-19 preparedness and response plans, 12 of the EMR countries (63%) reported that they had included NCD services in their plans. Nevertheless, there were notable differences between country groups, with 6 of the 9 countries in Group 2 (67%) and 1 of the 4 countries in Group 3 (25%) being less likely to include NCDs in their COVID-19 response plans compared with 5 of the 6 countries in Group 1 (83%). The inclusion of NCD services in the list of essential health services during the pandemic was lowest in Group 3 countries; only a quarter of these countries reported implementing some services. Furthermore, at the regional level, countries reported diverse levels of consideration of specific NCD-related services in their plans. Services to address cardiovascular diseases, cancer, diabetes (13 countries, 68%) and chronic respiratory diseases (11 countries, 58%) were those most frequently included in the COVID-19 response plans in the EMR countries. However, dental services (8 countries, 42%), rehabilitation (6 countries, 32%) and tobacco cessation activities (8 countries, 42%) were not as widely included in the response plans as the 4 main NCDs (Figure 1). Furthermore, 2 countries (11%) in the Region reported the inclusion of additional services such as mental health and counselling services in their COVID-19 response plans. When restricting the analysis to countries that considered NCD services in their national COVID-19 response plans (n = 12), all of them included cardiovascular disease, cancer and diabetes services.

On the other hand, only 2 countries (11%) in the Region reported allocating additional funding for NCDs in the government budget for the COVID-19 response. Group 3 countries reported the highest proportion, with 1 out of 4 countries (25%) in the group allocating additional funding, followed by Group 1 with 1 out of 6 countries (17%). However, none of the countries in Group 2 reported allocation of additional funds for NCDs.

Postponement of NCD activities during the pandemic was reported by 80% of EMR countries (15 out of 19 countries). Over 60% of the countries (12 countries) reported postponing public screening programmes. Implementation of NCD surveys was postponed by 7 countries (37%) and mass communication campaigns by 8 countries (42%). Postponement of the WHO Package of Essential Noncommunicable Disease Interventions (WHO PEN) was reported by 3 of the Group 3 countries (75%), 4 of the Group 2 countries (42%) and none of the Group 1 countries. Five of the 19 countries reported disruption to additional services such as finalizing their multisectoral cancer strategies and holding conferences, workshops, campaigns and summits relevant to NCDs.

Noncommunicable disease-related health services

Regarding government policies on access to essential inpatient and outpatient NCD services during the pandemic, at the primary, secondary and tertiary care levels, 13 (68%) of the countries reported that NCD outpatient services had either been closed or were open but with limited access and/or staff, or in alternative locations with different modes. Three of the 4 Group 3 countries reported that outpatient services were open with limited access, and the same proportion reported that inpatient NCD management services were open for emergencies only. Additionally, 10 (53%) of the countries in the Region reported that inpatient NCD management services were open for emergencies only. At the time of data collection during the early stages of the pandemic, 3 out of 5 countries in the EMR with community transmission of the virus (60%) reported that outpatient services were either closed or restricted to some degree, and 10 of the 19 countries (53%) reported that inpatient NCD management services were open for emergencies only.

In addition to policies on access to inpatient and outpatient services, many countries reported more specifically on disruptions to a number of NCD-related services which had been partially or completely disrupted. Services were partially or completely disrupted in10 of the 19 countries surveyed for hypertension treatment and urgent dental care, in 9 countries for rehabilitation services, palliative care services and asthma services, and in 8 countries for treatment for diabetes and cancer management (Figure 2). The most commonly disrupted services in Group 3 were cancer services and asthma services (3 of the 4 countries), while diabetes services were the most commonly disrupted services (5 of the 9 countries) in Group 2 (Figure 3).

The reported disruption of NCD-related services in countries of EMR had many underlying causes. The most common causes were the closure of disease-specific outpatient consultation clinics and the decrease in inpatient volume due to the cancellation of elective care (both 47%, 9 countries). Staffing problems were also a common issue, with 5 countries listing the fact that staffing was not sufficient to provide services and 6 deploying NCD-related clinical staff to provide COVID-19 services. Insufficient supplies of personal protective equipment for health care providers was one of the main reasons for discontinuation of services, affecting Group 3 (2 of the 4 countries) and Group 2 (2 of the 9 countries) but none in Group 1.

In response to the pandemic control measures and disruption of services, countries have been putting in place a range of strategies to maintain health service delivery. The survey revealed that alternative strategies have been established in most countries to allow groups at higher risk, including people living with NCDs, to continue receiving treatment. Nine countries in the Region (47%) reported the implementation of triaging and prioritization of patients, 42% used novel supply chains and/or dispensing approaches for NCD medicines, and 6 countries (32%) redirected and referred patients with NCDs to alternative health care facilities (Figure 4). Furthermore, 5 countries were using telemedicine to replace in-person consultation. The most commonly used alternative strategies among Group 2 countries were triaging and redirecting patients to alternative facilities; the use of novel supply chains was reported by all countries in Group 3 (
Figure 4
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Noncommunicable disease surveillance

Data on NCD comorbidity among COVID-19 patients were collected in 15 (79%) of the EMR countries surveyed, including all countries in Group 1, 6 (67%) in Group 2 and 3 (75%) in Group 3.

Suggestions for technical support

Countries were invited to provide suggestions for NCD-related technical guidance which WHO might provide during the COVID-19 outbreak. This was an open-ended query, and responses were numerous and diverse, but a few themes for proposals emerged from the data:

prevention and management of COVID-19 in people living with NCDs and provision of ambulatory essential NCD services during a lockdown without jeopardizing the safety of patients or health care providers (cited 4 times);

technical guidance on the provision of services for people living with NCDs through mHealth, telemedicine and virtual consultations (cited 3 times);

promotion of mental health and provision of services for both the public and health care workers (cited 1 time);

modification of the HEARTS technical packages and the WHO PEN protocol for NCDs (cited 1 time);

integrating NCDs into public health emergencies, with a particular focus on mental illness (cited 1 time).

Discussion

This assessment was conducted during the early stages of the COVID-19 pandemic, hence, the responses and measures implemented by countries might have changed over the course of the pandemic and the rollout of vaccines (12,13). The findings on the different indicators from the EMR are comparable to those reported by WHO at the global level and from the other WHO regions (11); the service disruption experienced in the EMR was part of a global phenomenon. The most commonly disrupted services globally were for hypertension, diabetes and asthma, with values ranging from 48% to 53%. Disruption levels in the EMR were comparable to those occurring in the other regions.

On the reallocation of resources, NCD staff being reassigned/deployed to help with COVID-19 response was reported in most of EMR countries consistent with the rate reported at the global level. However, globally, 21% of countries reported that some NCD funds had been reallocated; compared with only one high-income country in the EMR (5%) has reallocated funds, which was the lowest compared with the other WHO regions (11). This is reflective of the limited and diverse availability of funds and prioritization of NCD prevention and management across the globe (14).

Implementation of the EMR policies and plans was fairly similar to those at global level, with 66% of countries reporting that they had included NCD services in their national COVID-19

preparedness and response plans (11); the European Region (74%) reported the highest level and the African Region the lowest (59%) (Table 1). However, the EMR reported a slightly lower level than the global average regarding the allocation of additional funding for NCDs (Table 1). With regard to the government policies on access to essential NCD services, the regional estimate on policies adversely affecting NCD services, was slightly higher than the global average (11). Besides, while just above a third of countries at the global level reported that inpatient NCD management services were open for emergencies only, this was reported for more than half the countries of the EMR. Staffing problems were a consistent issue at both global and regional levels with around a quarter of countries at both levels reporting insufficient staff to provide services (11). At the global level, 24% of the countries have reported that one of the main reasons for discontinuing services was insufficient supplies of personal protective equipment available for health care providers to deliver services which was slightly higher than the regional estimate of 21% (11).

In response to these disruptions, triaging of patients was the most common strategy used by almost half of countries to overcome service disruption at both global and regional levels followed by telemedicine and the use of novel supply chains and/or dispensing approaches for NCD medicines through other channels, at global and regional levels respectively (Table 1) (11). It is worth mentioning that countries of the EMR already had previous experiences in the use of technology and Digital Health Interventions (DHIs) for tackling NCDs and NCD risk factors to build on, including interventions for tobacco cessation and other behavioural change interventions (15). The Region was no exception from the global thrive in remote health service provision to bridge disruptions during the COVID-19 pandemic (16,17). Additionally, on NCD surveillance activities, 79% of countries reported collection of data on COVID-19 NCD-related comorbidity, which is just above the global level of 75%, with the highest level in the European Region and the Americas and lowest in South East Asia (Table 1) (11).

As previously described (7), this COVID-19 crisis is in fact a “syndemic” rather than a pandemic, where the effect of the pandemic is far beyond the transmission of the virus but is rather determined by interactions with deeply rooted inequalities, especially when it comes to people living with NCDs (4,7,18). This is also linked to the disparities observed in this assessment in the ways that countries have responded to COVID-19. COVID-19 and NCDs have synergistic effects on one another and disproportionately impact the poorest and the most vulnerable groups, exacerbating inequalities (19). At the regional level, it has been observed that Group 3 countries are less NCDs-responsive compared to Group 1 countries, with more disruption of services and less consideration to NCD services in COVID-19 response plans. Paradoxically, the response from most of the countries of EMR was that they did not know or have not reallocated funds from NCDs to other services at the time of the data collection, and this can be due to the limited resources for NCDs to begin with, especially in Group 3 countries, were major

disruptions of NCD services have taken place. This also can explain efforts of Group 3, compared to Group 2 and 1 countries, to allocate the already limited resources to NCDs during the pandemic to mitigate the extensive disruptions and the parallel crisis in NCD services provision. The United Arab Emirates, the only country that reported reallocation of funds while it is one of the Group 1 countries which also have reported no postponement of the WHO PEN and limited reallocation of staff. This may indicate that this re-allocation of funds had limited effect on the WHO PEN and NCD services in the country.

Emergency preparedness depends primarily on strong and resilient health systems and a qualified, well-resourced health workforce. Resilience is defined as “the ability to prepare for, manage (absorb, adapt and transform) and learn from shocks” (19), and it is significantly linked to the strength and the capacities of health systems and hence to income levels. The stronger the health systems in terms of all the building blocks: leadership/governance, financing, health workforce, service delivery, access to essential medicines, and the health information systems, the more able the country to absorb shocks and to maintain and secure essential services including NCD services during crises like the COVID-19 pandemic (6). This pandemic has also been described as a wake-up call for strengthening health systems as it has evidently exposed the fragility of health systems especially in low- and middle-income countries (8).

Recommendations

Countries of the EMR need to strengthen NCD prevention and control measures and to reinforce health systems resilience for NCDs during crises beyond the COVID-19 pandemic. The following policies, strategies and plans are recommended for the EMR countries:

Strengthening national governance to include NCDs in national emergency response plans for the ongoing COVID-19 and other challenging and disruptive crises, through the development and adoption of practical guidance on and monitoring of the continuity of essential services for NCDs especially during crises. This includes the use and mainstreaming of DHI innovations for remote NCD prevention, management, and self-care interventions.

Strengthening health system resilience especially in low-income countries, to help in coping with crises, through reinforcement of governance and leadership, sufficient flexible funding, human and physical resources, in addition to responsive service delivery using innovative approaches and DHIs.

Prioritization of NCDs care and access to NCDs service as a fundamental pillar to achieving

Universal Health Coverage and to combat inequities. In addition to addressing underlying inequalities through the adoption of the “build back better” strategy and plans for Disaster Risk Reduction.

Build bridges between national humanitarian emergency plans and national programmes, to develop comprehensive strategies on NCD responses including safeguarding continuity and resumption of NCD services.

Conclusion

COVID-19 pandemic has adversely affected the continuity of NCD services in countries of the EMR. Disruption of NCD services has occurred at all levels of care, primary secondary, and tertiary as part of a global occurrence. The ability of countries to respond to the disruption of services due to the implemented mitigation measures to contain the outbreak has varied notably between countries. Many implementations were put in place by countries of the EMR mainly triaging to identify priorities as an adopted strategy followed by the use of novel supply chains and/or dispensing approaches for NCD medicines. However, the use of DHIs stands out as the way to go to support the continuity of NCD services and other essential services during both crises and stability. More guidance and support for systems resilience, preparedness, and response to crises are certainly needed.

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L'impact de la pandémie de COVID-19 sur la prestation de service pour les maladies non transmissibles dans la Région de la Méditerranée orientale

Résumé

Contexte : La pandémie de COVID-19 a eu des répercussions négatives sur la prestation de service pour les maladies non transmissibles dans le monde entier, car les systèmes de santé ont été débordés par la riposte à la pandémie.

Objectifs : Le Bureau régional de l'OMS pour la Méditerranée orientale a évalué l'impact de la COVID-19 sur les services, les programmes et le financement liés aux maladies non

transmissibles, ainsi que la prise en compte de ces maladies dans la riposte à la COVID-19.

Méthodes : Des données ont été recueillies dans les pays de la Région de la Méditerranée orientale à la mi-2020 à l'aide d'un questionnaire en ligne sur les infrastructures, les politiques, les plans, la dotation en personnel, le financement, les perturbations des services et leurs causes, les stratégies d'atténuation des perturbations, la collecte de données sur les comorbidités et la surveillance, ainsi que les suggestions pour l'orientation technique de l'OMS. Les données ont été exportées dans Microsoft Excel et synthétisées. Les pays ont été regroupés en fonction de leur niveau socio-économique.

Résultats : Dix-neuf des 22 pays de la Région de la Méditerranée orientale ont répondu : 95 % des membres du personnel en charge des maladies non transmissibles ont été réaffectés pour soutenir la riposte à la COVID-19. Les pays à faible revenu étaient moins susceptibles d'inclure les maladies non transmissibles dans leurs plans de riposte à la pandémie et plus enclins à signaler une interruption des services. Les services les plus fréquemment interrompus correspondaient à la prise en charge de l'hypertension (10 pays, soit 53 %), aux soins dentaires (10 pays, soit 53 %), à la réadaptation (9 pays, soit 47 %), aux soins palliatifs (9 pays, soit 47 %) et à la prise en charge de l'asthme (9 pays, soit 47 %).

Conclusion : La pandémie de COVID-19 a perturbé la fourniture de services liés aux maladies non transmissibles dans les pays de la Région de la Méditerranée orientale et la capacité à atténuer les perturbations des services était variable d'un pays à l'autre. Les mesures d'atténuation comprenaient le triage des patients, les chaînes d'approvisionnement en médicaments nouveaux pour les maladies non transmissibles, les interventions de distribution et le recours à la santé numérique et à la télémédecine. Il est recommandé de fournir des orientations et un appui pour assurer la résilience des systèmes, la préparation et la réponse aux crises.

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References

1. Chang AY, Cullen MR, Harrington RA, Barry M. The impact of novel coronavirus COVID-19 on noncommunicable disease patients and health systems: a review. J Intern Med. 2021 Apr;289(4):450–62. doi: 10.1111/joim.13184

2. Information note on COVID-19 and NCDs. Geneva: World Health Organization; 2020 (https://www.who.int/publications/m/item/covid-19-and-ncds, accessed 14 June 2022).

3. NCD COVID-19 Vulnerability Dashboard. New York: United Nations Development Programme; 2020 (https://public.domo.com/embed/pages/aOV4p, accessed 14 June 2022).

4. Kluge HHP, Wickramasinghe K, Rippin HL, Mendes R, Peters DH, Kontsevaya A, et al. Prevention and control of non-communicable diseases in the COVID-19 response. Lancet. 2020;395(10238):1678–80. doi: 10.1016/S0140-6736(20)31067-9

5. Ferguson NM, Laydon D, Nedjati-Gilani G, Imai N, Ainslie K, Baguelin , et al. Impact of non-pharmaceutical interventions (NPIs) to reduce COVID- 19 mortality and healthcare demand. London: Imperial College London, Imperial College COVID-19 Response Team; 2020. doi:10.25561/77482

6. Maintaining essential health services: operational guidance for the COVID-19 context. Geneva: World Health Organization; 2020 (https://www.who.int/publications/i/item/WHO-2019-nCoV-essential_health_services-2020.2, accessed 14 June 2022).

7. Horton R. Offline: COVID-19 is not a pandemic. Lancet. 2020 Sep;396(10255):874. doi:https://doi.org/10.1016/S0140-6736(20)32000-6

8. Kraef C, Juma P, Kallestrup P, Mucumbitsi J, Ramaiya K, Yonga G. The COVID-19 pandemic and non-communicable diseases–a wake-up call for primary health care system strengthening in sub-Saharan Africa. J Prim Care Community Health. 2020;11. doi: 10.1177/2150132720946948

9. About us. Cairo: World Health Organization Regional Office for the Eastern Mediterranean; 2021 (http://www.emro.who.int/entity/about-us/index.html, accessed 13 March 2021).

10. Health systems strengthening in countries of the Eastern Mediterranean Region: challenges, priorities and options for future action. Cairo: World Health Organization Regional Office for the Eastern Mediterranean; 2013 (EM/RC59/R.3: https://apps.who.int/iris/handle/10665/123147, accessed 14 June 2022).

11. The impact of the COVID-19 pandemic on noncommunicable disease resources and services: results of a rapid assessment. Geneva: World Health Organization; 2020 (https://www.who.int/publications/i/item/9789240010291, accessed 30 June 2022).

12. COVID-19 vaccines. Geneva: World Health Organization; 2021 (https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines, accessed 14 June 2022).

13. COVID-19 vaccine tracker and landscape. Geneva: World Health Organization; 2021 (https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines, accessed 14 June 2022).

14. Jailobaeva K, Falconer J, Loffreda G, Arakelyan S, Witter S, Ager A. An analysis of policy and funding priorities of global actors regarding noncommunicable disease in low- and middle-income countries. Global Health. 2021;17(1):68. https://doi.org/10.1186/s12992-021-00713-4

15. Advancing be he@lthy, be mobile in the Eastern Mediterranean Region: combating noncommunicable diseases through mobile technology. Cairo: World Health Organization Regional Office for the Eastern Mediterranean; 2021 (https://apps.who.int/iris/handle/10665/348134, accessed 14 June 2022).

16. Digital innovation stories during COVID-19. Cairo: World Health Organization Regional Office for the Eastern Mediterranean; 2020 (http://www.emro.who.int/noncommunicable-diseases/publications/success-stories.html?format=html, accessed 14 June 2022).

17. Singer M, Bulled N, Ostrach B, Mendenhall E. Syndemics and the biosocial conception

of health. Lancet. 2017 Mar;389(10072):941–50. doi: 10.1016/S0140-6736(17)30003-X

18. Mitgang EA, Blaya JA, Chopra M. Digital Health in Response to COVID-19 in Low- and Middle-income Countries: Opportunities and Challenges. Glob policy. 2021 Mar 17:10.1111/1758-5899.12880. doi: 10.1111/1758-5899.12880

19. NCDs & COVID-19: learning lessons building back better for the future. Geneva: NCD Alliance; 2020 (https://ncdalliance.org/news-events/news/ncds-covid-19-learning-lessons-building-back-better-for-the-future, accessed 14 June 2022).

20. Thomas S, Sagan A, Larkin J, Cylus J, Figueras J, Karanikolos M. Strengthening health systems resilience, Key concepts and strategies. Copenhagen: European Observatory on Health Systems and Policies; 2020. PMID: 32716618

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