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Readiness of health facilities to provide services related to non-communicable diseases in Nepal: evidence from nationally representative Nepal Health Facility Survey 2021

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ABSTRACT

Objective To assess the readiness of public and private health facilities (HFs) in delivering services related to non-communicable diseases (NCDs) in Nepal.

Methods We analysed data from nationally representative Nepal Health Facility Survey 2021 to determine the readiness of HFs for cardiovascular diseases (CVDs), diabetes mellitus (DM), chronic respiratory diseases (CRDs) and mental health (MH)-related services using Service Availability and Readiness Assessment Manual of the WHO. Readiness score was measured as the average availability of tracer items in per cent, and HFs were considered 'ready' for NCDs management if they scored ≥70 (out of 100). We performed weighted univariate and multivariable logistic regression to determine the association of HFs readiness with province, type of HFs, ecological region, quality assurance activities, external supervision, client's opinion review and frequency of meetings in HFs.

Results The overall mean readiness score of HFs offering CRDs, CVDs, DM and MH-related services was 32.6, 38.0, 38.4 and 24.0, respectively. Guidelines and staff training domain had the lowest readiness score, whereas essential equipment and supplies domain had the highest readiness score for each of the NCD-related services. A total of 2.3%, 3.8%, 3.6% and 3.3% HFs were ready to deliver CRDs, CVDs, DM and MH-related services, respectively. HFs managed by local level were less likely to be ready to provide all NCD-related services compared with federal/provincial hospitals. HFs with external supervision were more likely to be ready to provide CRDs and DM-related services and HFs reviewing client's opinions were more likely to be ready to provide CRDs, CVDs and DM-related services.

Conclusion Readiness of the HFs managed by local level to provide CVDs, DM, CRDs and MH-related services was relatively poor compared with federal/provincial hospitals. Prioritisation of policies to reduce the gaps in readiness and capacity strengthening of the local HFs is essential for improving their overall readiness to provide NCD-related services.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Nationally representative sample of health facilities (HFs) in Nepal, with coverage of all seven provinces and 77 districts.
⇒ The survey has adopted a highly standardised survey tool with the globally accepted research protocol.
⇒ Variables for readiness analysis are based on standardised WHO's Service Availability and Readiness Assessment guidelines and thus, findings are comparable to findings from other countries.
⇒ Weighted analysis has been performed to account for the complex sampling procedures and adjusts for non-response and disproportionate sampling.
⇒ The limitations of the study are that this study does not determine the readiness of HFs for cancer and chronic kidney diseases, and this study does not account for flow rate of non-communicable disease patients in the HFs.

INTRODUCTION

Globally, non-communicable diseases (NCDs) are one of the major public health and development challenges. According to World Health Organization (WHO), NCDs are the leading cause of death worldwide killing 41 million people each year equivalent to 71% of all deaths globally. By 2030, the projected number is expected to increase to 52 million.[1] Approximately, 80% of NCD-related deaths occur in low/middle-income countries (LMICs).[2] In Southeast Asia, NCDs account for 9 million deaths (62% of all deaths) each year.[3]

In Nepal, NCDs have emerged as the leading cause of premature mortality and Disability Adjusted Life Years. In 2019, NCDs were responsible for 71.1% of deaths,[4] and are projected to attribute to 78.6% of total

deaths by 2040.[4] In 2019, cardiovascular diseases (CVDs), chronic respiratory diseases (CRDs) and cancer were the top three leading causes of death, attributing to approximately 24.0%, 21.1% and 11.2% of total deaths, respectively. Together, these three conditions are responsible for more than half of the total deaths in Nepal.[5]

Sustainable Development Goal (SDG) 3.4 targets to reduce the premature mortality from NCDs by two-thirds by 2030 through prevention and treatment.[6] To achieve SDG, Nepal adopted, contextualised and implemented the Package of Essential Non-Communicable Diseases (PEN) to screen, diagnose, treat and refer major NCDs such as CVDs, diabetes mellitus (DM), CRDs, cancer and mental health (MH) at health posts (HPs), primary healthcare centres (PHCCs) and district hospitals.[7] The PEN package has now been expanded to all 77 districts of Nepal.[8] Moving a step further, the PEN Implementation Plan (2016–2020) was developed in accordance with the Multi-sectoral Action Plan for NCDs Prevention and Control (2014–2020).[8] Nepal Multi-Sectoral Action Plan for NCDs (2021–2025) focuses on creating high impact, politically and socially acceptable, and potentially implementable interventions. The plan aims to reduce the burden of NCDs through the whole-of-government and whole-of-society approach. The action plan has an overarching target of reducing premature mortality from NCDs by 25% by 2025 and by one-third by 2030, aligning to global SDG.[8 9] The NCD action plan envisions to achieve 80% availability of low cost basic technologies and necessary medications, including generics, needed to treat major NCDs in both public and private health facilities (HFs). The multisectoral action plan involves medication therapy and counselling (including glycaemic management) for 50% of eligible persons (defined as those aged 40 and older with a 10-year cardiovascular risk of more than 30%, including those with established CVDs).[9]

NCD services have been included in basic healthcare in Nepal although the service availability and preparedness remain very limited.[10] Apart from disease-specific interventions, Nepal Lancet Non Communicable Diseases and Injuries (NCDI) poverty commission has pointed out the need for improving governance, strengthening health systems and monitoring of priority NCDs such as CVDs, CRDs, DM and cancer by provincial and local government.[11] The commission also recommended that structured capacity-building programmes for health service providers; promoting care packages, such as the PEN interventions for primary healthcare; increasing the availability of specialty services and personnel; and expanding progressive vertical programmes providing free care for disease-specific areas could be useful in improving service availability and preparedness for NCDs.[11]

The increasing burden of NCDs in Nepal is often not matched with the sufficient healthcare response. There is a need to generate evidence to uncover gaps in NCDs' service readiness to facilitate evidence-informed policy-making to improve the service availability and uptake.[10 12] Thus, we aim to determine readiness of public and private HFs of Nepal to provide CRDs, CVDs, DM and MH-related services using nationally representative data from Nepal Health Facility Survey (NHFS) 2021.

METHODS

Study design

We analysed secondary data[13] from the nationally representative cross-sectional survey, NHFS 2021, carried out by New Era with technical support of ICF International, to assess the availability and readiness of HFs to provide services related to NCDs namely, CVDs, CRDs, DM and MH. The detailed information on objectives and methodology of NHFS 2021 is published elsewhere.[14]

NHFS 2021 was carried out among both public HFs and private hospitals of Nepal. In Nepal, health services are delivered by public HFs, private HFs and other community-based or non-governmental organization-run clinics, medical centres, mission hospitals, teaching hospitals. The public HFs deliver health services in three levels: federal, provincial and local levels. The local health system includes primary hospitals, Primary Health Care Centres (PHCCs), HP, basic health service centres (BHSCs), urban health clinics (UHCs), community health units (CHUs) and community-level HFs (Primary Healthcare Outreach clinics and Expanded Programme on Immunisation clinics). HPs or BHSCs are the first institutional contact point for basic health services. The provincial and federal level health system includes provincial-level and central-level hospitals, respectively, providing secondary-level to tertiary-level care. Each level above the HPs or BHSCs is a referral point in the network ranging from PHCCs, basic hospitals and secondary-level hospitals and finally to tertiary-level hospitals. The private HFs, including private hospitals, clinics and pharmacies, deliver basic health services to tertiary-level care.[14–16]

Sample and sampling

A stratified random sample of 1633 HFs out of 5681 eligible HFs was selected in NHFS 2021. The effective sample size of NHFS 2021 was 1526 after excluding seven duplicated HFs. The flowchart showing details of sample and sampling is present in online supplemental figure 1. The process of sample size estimation and sampling procedures are explained in detail elsewhere.[14] We analysed data of 1480 HFs offering any NCDs (CRD, CVD, DM or MH) related services. Of total 1480 HFs, 1470 HFs were offering CRD services, 1381 HFs were offering CVDs services, 1159 were offering DM services and 556 HFs were offering MH services.

Data collection

Data collection for NHFS 2021 took place between 27 January 2021 and 28 September 2021, with a break for 3 months from May through July, due to the COVID-19 imposed lockdowns beginning on 29 April 2021. The NHFS 2021 included the use of four types of survey instruments: (a) Facility Inventory Questionnaire, (b) Health Provider Questionnaire, (c) Exit Interview Questionnaires and (d) Observation protocols for antenatal care, family planning services, care for sick children,

and labour and delivery. For this study, we have used the data from 'Facility Inventory Questionnaire' and 'Health Provider Questionnaire'.

Patient and public involvement

This article is prepared analysing secondary data sources. There was no patient and public involvement in the design, conduct and reporting of our research.

Outcome variables and measurement

The variables for services availability and readiness of HFs to provide NCD-related facilities were selected based on the WHO Service Availability and Readiness Assessment (SARA) manual.[17]

Services readiness

The service readiness of HFs was measured based on the availability and functioning of items categorised under three domains—staff and guidelines, essential equipment, and supplies, medicine and commodities and diagnostics. The list of tracer items of each domain for CRDs, CVDs, DM and MH and process of calculation of readiness score are presented in online supplemental table 1. The readiness score of HFs to provide services on CVDs, CRDs, DM and MH was calculated using the SARA manual of the WHO.[17] The availability of tracer items is measured based on observation of each tracer items by interviewer. The items in each domain were re-coded as binary variables, taking the value '1' for the presence of the item and '0' for the absence of the item in the facility. To compute the mean score for each domain, the sum of the scores for each item was divided by the number of items, and the result was multiplied by 100. Each domain included in score calculation contributes equally to the overall readiness score. The average score from the three domains was the readiness score. A cut-off of 70 was considered on the overall score to classify the readiness of the facilities towards NCD-related services. A facility with an overall score of more than or equal to 70 was considered 'ready' to manage NCDs.[18–20]

Independent variables

The independent variables included setting (rural/urban), ecological region (Hill/Mountain/Terai), province (Koshi/Madhesh/Bagmati/Gandaki/Lumbini/Karnali/Sudurpaschim), type of facility (federal or provincial hospital/local HFs/private hospital), presence of external supervision in the past 4 months (present/absent), quality assurance activities (performed/not performed), the frequency of HF meeting (none/sometimes/monthly), and review of clients' opinion (reviewed/not reviewed).

The classification of setting into rural and urban was based on the type of municipalities in which HFs are located.[14] The type of HFs was classified into federal or provincial hospital, local HFs and private hospitals, where local HFs comprised of basic (local level) hospitals, HPs and PHCCs. The facility was considered to have external supervision if facility staff or members reported receiving any external supervision/monitoring from the federal, provincial or municipal level in the past 4 months prior to survey and interviewer observed associated documentation.[14] Facilities were considered to have performed quality assurance activities if staff or members from HF reported carrying out quality assurance activities routinely and the interviewer observed documentation of a recent quality assurance activity including report or minutes of a quality assurance meeting, a supervisory checklist, a mortality review, or an audit of records or registers.[14] For the frequency of HF meeting, the HFs stating 'no' for routine management/administrative meetings were classified as 'None', those stating 'monthly or more often' were classified as 'Monthly' and those stating 'irregular or every 2–6 months' were classified as 'Sometimes'.[14] HFs were considered to have system of reviewing client's opinion if staff or members of HF reported presence of the system for determining client opinion, procedure for reviewing client opinion and interviewer observed report of a recent review of client opinion.[14]

Statistical analysis

We used R (V.4.2.0)[21] and RStudio (V.2023.03.1 build 446)[22] for statistical analysis. We used 'survey' package[23] and performed weighted analysis to account for the complex survey design of NHFS 2021. We summarised continuous variables with mean, standard deviation (SD), median and interquartile range (IQR) whereas categorical variables were summarised with frequency, percent (%) and 95% CI around the percent. We created the maps using Quantum Geographic Information System (QGIS) V.3.22.7-Białowieża,[24] with publicly available districtwise shape file taken from the official website of Survey Department of Ministry of Land Management, Cooperatives and Poverty Alleviation, Government of Nepal and Global Positioning System dataset of the HFs. We employed univariate and multivariate weighted logistic regression analysis to determine the association of the readiness of HFs to CRDs, CVDs, DM and MH-related services with independent variables including setting, ecological region, province, type of facility, external supervision, quality assurance activities, review of client opinion and HFs meeting. The results of regression analysis are presented as crude odds ratio (COR) and adjusted odds ratio (AOR) with 95% CI and p value. A p value of less than 0.05 is considered statistically significant.

RESULTS

Of the total facilities offering any NCDs (CRDs, CVDs, DM or MH)-related services, 46.7% were from rural areas. Half of the HFs offering any NCD-related services were from the hill region (52.7%) followed by the terai region (34.4%). HFs providing NCD-related services were highest in Bagmati accounting for 20.5% followed by Madhesh (16.1%), Koshi (15.7%) and Lumbini (15.7%). The quality assurance activities were performed in 23.9%, external supervision in the past 4 months was present in

Table 1 Characteristics of the HFs offering any of the four NCD-related services

Characteristics	Unweighted (n=1480) n (%)	Weighted (n=1516) n	% (95% CI)
Location			
Urban	946 (63.9)	808	53.3 (49.5 to 57.1)
Rural	534 (36.1)	708	46.7 (42.9 to 50.4)
Ecological region			
Hill	794 (53.6)	800	52.7 (48.9 to 56.5)
Mountain	178 (12.0)	196	12.9 (10.7 to 15.5)
Terai	508 (34.4)	521	34.4 (30.8 to 38.2)
Province			
Koshi	227 (15.3)	238	15.7 (13.0 to 18.8)
Madhesh	169 (11.4)	245	16.1 (13.1 to 19.7)
Bagmati	294 (19.9)	311	20.5 (17.6 to 23.7)
Gandaki	219 (14.8)	197	13.0 (10.8 to 15.5)
Lumbini	235 (15.9)	238	15.7 (13.2 to 18.5)
Karnali	143 (9.7)	119	7.9 (6.4 to 9.7)
Sudurpaschim	193 (13.0)	169	11.1 (9.3 to 13.2)
Type of facility			
Federal/provincial hospital	97 (6.6)	27	1.8 (1.5 to 2.2)
Local HFs †	1128 (76.2)	1376	90.7 (89.2 to 92.0)
Private hospital	255 (17.2)	113	7.5 (6.3 to 8.9)
Quality assurance activities			
Not performed	1182 (79.9)	1153	76.1 (72.6 to 79.2)
Performed	298 (20.1)	363	23.9 (20.8 to 27.4)
External supervision			
Absent	561 (37.9)	509	33.6 (30.2 to 37.2)
Present	919 (62.1)	1007	66.4 (62.8 to 69.8)
Review client's opinion			
Not reviewed	1394 (94.2)	1459	96.2 (94.7 to 97.3)
Reviewed	86 (5.8)	58	3.8 (2.7 to 5.3)
Frequency of health facility meeting			
None	264 (17.8)	225	14.8 (12.5 to 17.5)
Sometimes	302 (20.4)	306	20.2 (17.4 to 23.3)
Monthly	914 (61.8)	985	65.0 (61.4 to 68.4)
Total health workforce*	41.0 (123.1); 7.0 (3.0, 20.2)	18.7±73.5; 6.0 (5.0, 9.0)	
Services availability			
CRDs	1470 (99.3)	1507	99.3 (98.3 to 99.7)
CVDs	1381 (93.3)	1411	93.1 (90.9 to 94.7)
DM	1159 (78.3)	1149	75.8 (72.4 to 78.8)
MH	556 (37.6)	394	26.0 (23.0 to 29.2)

*Mean±SD; median (IQR).
† Local HFs include basic (local level) hospital, PHCCs, HPs and BHSCs
%, percent; CRD, chronic respiratory disease; CVD, cardiovascular disease; DM, diabetes mellitus; HFs, health facilities; IQR, interquartile range; MH, mental health; n, frequency; NCD, non-communicable disease.

66.4%, review of client's opinion in 3.8% and monthly HF meeting was carried out in 65.0% of the HFs offering any NCD-related services (table 1).

Table 2 presents the overall readiness score of HFs offering CRDs, CVDs, DM and MH-related services (mean±SD) which were 32.6±14.7, 38.0±15.5, 38.4±16.7

Table 2 Readiness of HFs for services related to NCDs

	Total facilities		Federal or provincial hospitals		Local HFs†		Private hospitals	
Tracer items	**% (95% CI)**	**Score***	**% (95% CI)**	**Score***	**% (95% CI)**	**Score***	**% (95% CI)**	**Score***
Chronic respiratory diseases (CRDs)								
Guidelines and training								
Guidelines	11.0 (8.9 to 13.6)	12.4±26.4; 0.0 (0.0, 0.0)	15.3 (9.4 to 24.1)	20.1±31.1; 0.0 (0.0, 50.0)	11.1 (8.8 to 13.8)	12.7±26.8; 0.0 (0.0, 0.0)	9.7 (5.3 to 17.2)	6.7±17.9; 0.0 (0.0, 0.0)
Staff training	13.7 (11.3 to 16.5)		24.8 (17.1 to 34.6)		14.3 (11.7 to 17.4)		3.7 (2.0 to 6.6)	
Essential equipment and supplies								
Stethoscope	98.4 (97.1 to 99.2)	49.1±17.8; 40.0 (40.0, 60.0)	98.0 (92.0 to 99.5)	72.4±22.8; 80.0 (45.5, 80.0)	98.5 (96.9 to 99.2)	46.4±14.8; 40.0 (40.0, 40.0)	98.2 (96.0 to 99.2)	76.7±21.0; 80.0 (60.0, 100.0)
Oxygen flow metre	16.7 (14.3 to 19.4)		59.9 (49.7 to 69.3)		11.7 (9.4 to 14.5)		66.6 (58.5 to 73.9)	
Oxygen	26.2 (23.1 to 29.5)		74.2 (64.4 to 82.1)		20.8 (17.6 to 24.3)		80.1 (72.8 to 85.8)	
Spacers	6.8 (5.3 to 8.6)		32.0 (23.3 to 42.1)		3.5 (2.3 to 5.3)		39.6 (31.2 to 48.8)	
Essential medicines								
Salbutamol	90.8 (88.6 to 92.7)	36.5±22.3; 40.0 (20.0, 40.0)	90.7 (83.0 to 95.2)	75.4±21.3; 80.0 (60.0, 80.0)	92.3 (89.8 to 94.2)	33.3±18.5; 20.0 (20.0, 40.0)	73.5 (65.5 to 80.2)	65.4±32.3; 80.0 (40.0, 100.0)
Beclomethasone	3.9 (3.0 to 5.1)		27.8 (19.7 to 37.7)		1.1 (0.6 to 2.1)		32.7 (25.1 to 41.5)	
Prednisolone	13.1 (11.2 to 15.3)		80.3 (71.0 to 87.2)		7.3 (5.6 to 9.5)		67.5 (58.7 to 75.2)	
Hydrocortisone	36.6 (33.1 to 40.2)		92.6 (85.2 to 96.5)		31.6 (27.9 to 35.5)		83.6 (76.3 to 89.0)	
Epinephrine	37.9 (34.3 to 41.6)		85.5 (76.8 to 91.3)		34.3 (30.5 to 38.3)		69.8 (61.7 to 76.9)	
Overall readiness score*	32.6±14.7; 26.7 (20.0, 40.0)		56.0±14.3; 53.3 (46.7 to 65.6)		30.8±13.2; 26.7 (20.0, 36.7)		49.6±15.9; 46.7 (40.0, 60.0)	
HFs with readiness score >70, % (95% CI)	2.3 (1.6 to 3.3)	–	19.5 (12.7 to 28.7)		1.5 (0.9 to 2.4)		7.9 (3.8 to 15.7)	
Cardiovascular diseases (CVDs)								
Guidelines and training								
Guidelines	11.2 (9.1 to 13.8)	12.1±25.6; 0.0 (0.0, 0.0)	17.4 (11.0 to 26.4)	19.0±30.9; 0.0 (0.0, 50.0)	11.2 (8.9 to 14.1)	12.3±26.0; 0.0 (0.0, 0.0)	9.8 (5.3 to 17.4)	7.7±18.8; 0.0 (0.0, 0.0)
Staff training	12.9 (10.5 to 15.8)		20.7 (13.6 to 30.1)		13.4 (10.8 to 16.5)		5.6 (3.5 to 8.9)	
Essential equipment and supplies								
BP apparatus	96.2 (94.2 to 97.5)	72.4±17.9; 60.0 (60.0, 80.0)	95.9 (89.3 to 98.5)	89.9±18.5; 100.0 (80.0, 100.0)	96.1 (93.8 to 97.5)	70.2±16.8; 60.0 (60.0, 80.0)	97.2 (94.7 to 98.5)	92.5±14.8; 100.0 (80.0, 100.0)
Stethoscope	98.4 (96.9 to 99.2)		98.0 (92.0 to 99.5)		98.4 (96.8 to 99.2)		98.2 (95.9 to 99.2)	
Weighing scale	95.1 (93.2 to 96.5)		95.9 (89.3 to 98.5)		95.2 (93.0 to 96.7)		94.1 (90.7 to 96.3)	
Pulse oximeter	44.5 (40.7 to 48.4)		85.6 (76.9 to 91.3)		39.4 (35.4 to 43.7)		92.5 (86.6 to 96.0)	
Oxygen	27.6 (24.4 to 31.1)		74.2 (64.4 to 82.1)		22.0 (18.6 to 25.7)		80.5 (73.2 to 86.2)	
Essential medicines								

Continued

Table 2 Continued

Tracer items	Total facilities		Federal or provincial hospitals		Local HFs†		Private hospitals	
	% (95% CI)	Score*	% (95% CI)	Score*	% (95% CI)	Score*	% (95% CI)	Score*
Thiazide	6.7 (5.5 to 8.3)	29.6±26.2; 25.0 (0.0, 50.0)	45.2 (35.5 to 55.4)	71.1±28.1; 75.0 (50.0, 100.0)	2.9 (1.9 to 4.2)	25.9±21.8; 25.0 (0.0, 45.0)	41.3 (33.0 to 50.1)	62.3±37.8; 75.0 (25.0, 100.0)
Atenolol	32.4 (28.9 to 36.1)		68 (57.9 to 76.6)		29.3 (25.5 to 33.4)		58.7 (49.9 to 67.1)	
Aspirin	17.7 (15.3 to 20.4)		80.3 (71.0 to 87.2)		11.7 (9.4 to 14.5)		69.9 (61.3 to 77.2)	
Amlodipin	61.6 (57.7 to 65.4)		90.7 (83.0 to 95.2)		59.5 (55.2 to 63.6)		79.1 (71.7 to 85.0)	
Overall readiness score*	38.0±15.5; 35.0 (28.3, 45.0)		60.0±14.6; 59.1 (50.0, 66.7)		36.1±14.2; 35.0 (28.3, 43.3)		54.2±16.1; 58.3 (41.7, 66.7)	
HFs with readiness score >70, % (95% CI)	3.8 (2.8 to 5.3)	–	16.4 (10.2 to 25.3)		2.9 (1.9 to 4.4)		11.1 (6.4 to 18.5)	
Diabetes mellitus (DM)								
Guidelines and training								
Guidelines	14.1 (11.4 to 17.3)	14.2±27.5; 0.0 (0.0, 0.0)	19.4 (12.7 to 28.7)	20.1±31.1; 0.0 (0.0, 50.0)	14.4 (11.5 to 18.0)	14.9±28.1; 0.0 (0.0, 0.0)	9.4 (5.1 to 17.0)	6.8±18.1; 0.0 (0.0, 0.0)
Staff training	14.3 (11.6 to 17.5)		20.7 (13.6 to 30.1)		15.3 (12.2 to 18.9)		4.2 (2.4 to 7.0)	
Essential equipment and supplies								
BP apparatus	96.8 (94.7 to 98.1)	76.0±19.3; 66.7 (66.7, 100.0)	95.9 (89.3 to 98.5)	81.8±21.0; 100.0 (66.7, 100.0)	96.8 (94.3 to 98.2)	75.6±19.1; 66.7 (66.7, 100.0)	97.2 (94.8 to 98.6)	77.9±20.1; 66.7 (66.7, 100.0)
Height board	36.2 (32.2 to 40.5)		53.6 (43.5 to 63.5)		35 (30.5 to 39.8)		42.6 (34.0 to 51.7)	
Weighing scale	95.0 (92.6 to 96.6)		95.9 (89.3 to 98.5)		95.1 (92.3 to 96.8)		93.9 (90.5 to 96.2)	
Essential medicines								
Metformin	65.6 (61.2 to 69.7)	34.1±22.6; 25.0 (25.0, 50.0)	91.8 (84.2 to 95.9)	65.9±23.1; 75.0 (50.0, 75.0)	63.8 (58.9 to 68.4)	30.8±19.2; 25.0 (25.0, 50.0)	75.4 (67.3 to 81.9)	56.7±30.1; 50.0 (50.0, 75.0)
Glibenclamide	4.4 (3.2 to 5.8)		26.7 (18.7 to 36.5)		2.2 (1.2 to 3.8)		18.5 (13.0 to 25.7)	
Injectable insulin	7.5 (6.1 to 9.1)		49.4 (39.4 to 59.4)		1.5 (0.8 to 2.6)		50.9 (42.2 to 59.5)	
Injectable glucose	59.2 (54.8 to 63.4)		95.9 (89.4 to 98.5)		55.6 (50.7 to 60.3)		82.2 (74.9 to 87.8)	
Diagnostics								
Test: blood: glucose	23.3 (20.0 to 27.0)	29.2±37.8; 0.0 (0.0, 66.7)	43.2 (33.6 to 53.4)	76.6±24.1; 66.7 (66.7, 100.0)	20.3 (16.7 to 24.3)	23.2±34.7; 0.0 (0.0, 33.3)	45.7 (37.2 to 54.4)	71.8±31.1; 66.7 (66.7, 100.0)
Test: urine glucose	32.6 (28.9 to 36.6)		92.8 (85.5 to 96.6)		25.1 (21.2 to 29.4)		84.9 (78.6 to 89.5)	
Test: urine glucose	31.8 (28.1 to 35.7)		93.8 (86.7 to 97.2)		24.2 (20.4 to 28.4)		84.9 (78.6 to 89.5)	
Overall readiness score*	38.4±16.7; 35.4 (22.9, 52.1)		61.3±13.3; 60.4 (52.1, 68.8)		36.1±15.5; 33.3 (22.9, 45.8)		53.3±15.7; 54.2 (45.8, 66.7)	
HFs with readiness score >70, % (95% CI)	3.6 (2.6 to 5.1)		22.6 (15.3 to 32.2)		2.4 (1.5 to 3.9)		10.2 (5.5 to 17.4)	
Mental health (MH)								
Guidelines and training								

Continued

Table 2 Continued

Tracer items	Total facilities		Federal or provincial hospitals		Local HFs†		Private hospitals	
	% (95% CI)	Score*	% (95% CI)	Score*	% (95% CI)	Score*	% (95% CI)	Score*
Guidelines	11.9 (8.0 to 17.4)	17.6±28.3; 0.0 (0.0, 50.0)	10.0 (5.2 to 18.4)	23.0±30.2; 0.0 (0.0, 50.0)	12.6 (7.8 to 19.9)	20.1±29.8; 0.0 (0.0, 50.0)	9.7 (4.3 to 20.6)	7.1±18.0; 0.0 (0.0, 0.0)
Staff training	23.4 (18.2 to 29.7)		35.9 (26.5 to 46.5)		27.5 (20.5 to 35.8)		4.6 (2.5 to 8.2)	
Essential medicines								
Amitriptyline	49.5 (42.8 to 56.3)	30.3±32.2; 12.5 (0.0, 62.5)	80.8 (71.1 to 87.8)	66.2±29.9; 62.5 (37.5, 96.2)	41.6 (33.4 to 50.2)	20.8±25.8; 12.5 (0.0, 25.0)	68.4 (57.6 to 77.6)	53.4±34.0; 55.3 (25.0, 87.5)
Fluoxetine	23.6 (18.9 to 29.0)		58.4 (47.8 to 68.4)		15.6 (10.5 to 22.5)		41.6 (32.1 to 51.8)	
Carbamazepine	26.7 (21.5 to 32.6)		55.0 (44.4 to 65.1)		20.0 (14.0 to 27.7)		42.0 (32.3 to 52.4)	
Phenobarbitone	22.1 (17.7 to 27.2)		57.1 (46.5 to 67.2)		14.2 (9.6 to 20.6)		39.7 (30.4 to 49.9)	
Sodium valproate	32.1 (26.5 to 38.2)		65.2 (54.5 to 74.5)		21.4 (15.3 to 29.0)		60.5 (50.3 to 69.9)	
Risperidone	20.9 (16.4 to 26.2)		55.0 (44.4 to 65.1)		13.6 (8.9 to 20.3)		36.7 (27.3 to 47.2)	
Alprazolam	29.4 (24.3 to 35.0)		68.5 (57.9 to 77.4)		16.3 (11.5 to 22.7)		64.6 (54.3 to 73.6)	
Diazepam	37.9 (32.0 to 44.1)		90.0 (81.6 to 94.8)		23.5 (17.4 to 30.9)		73.6 (63.9 to 81.4)	
Overall readiness score*	24.0±23.1; 18.8 (0.0, 37.5)		44.6±23.0; 43.8 (25.0 to 56.2)		20.4±22.3; 12.5 (0.0 to 37.5)		30.3±21.3; 31.2 (12.5 to 43.8)	
HFs with readiness score >70, % (95% CI)	3.3 (1.8 to 6.1)		13.4 (7.7 to 22.3)		2.5 (0.9 to 7.1)	0.9, 7.1	3.1 (1.5 to 6.3)	

*Mean±SD; median (IQR).
† Local HFs include basic (local level) hospital, PHCCs HPs and BHSCs
%, percent; BP, blood pressure; CI, confidence interval; HFs, health facilities; IQR, interquartile range; n, frequency; NCD, non-communicable disease; PHCC, primary healthcare centre.

and 24.0±23.1, respectively. The overall readiness score for each NCD-related service was higher in federal or provincial hospitals followed by private hospital and lowest in the local HFs.

The median readiness score for guidelines and staff training domain was zero for all NCD-related services. The mean readiness score for essential equipment and supplies domain for CRDs, CVDs and DM-related services were 49.1±17.8, 72.4±17.9 and 76.4±18.8, respectively, and was highest in three sets of facilities offering CRDs, CVDs and DM-related services. Similarly, the median readiness score for medicine and supplies domain among facilities offering CRDs, CVDs, DM and MH-related services was 40.0 (IQR: 20.0, 40.0), 25.0 (IQR: 0.0, 50.0), 25.0 (IQR: 25.0, 50.0) and 12.5 (IQR: 0.0, 62.5), respectively. The median readiness score for diagnostic domain among facilities offering DM-related services was zero (IQR: 0.0, 66.7).

Among HFs offering CRDs, CVDs, DM and MH-related services, 2.3% (95% CI: 1.6% to 3.3%), 3.8% (95% CI: 2.8% to 5.3%), 3.6% (95% CI: 2.6% to 5.1%) and 3.3% (95% CI: 1.8% to 6.1%) were ready to deliver respective services. Among federal or provincial hospitals, 19.5%, 16.4%, 22.6% and 13.4% were ready to provide CRDs, CVDs, DM and MH-related services, respectively.

Among private hospitals, 7.9%, 11.1%, 10.2% and 3.1% were ready to deliver CRDs, CVDs, DM and MH-related services, respectively. Among local HFs, 1.5%, 2.9%, 2.4% and 2.5% were ready to provide CRDs, CVDs, DM and MH-related services, respectively, which was relatively lower compared with federal or provincial hospitals.

Figure 1 shows the readiness of facilities to provide services related to different NCDs grouped by district. Facilities are represented by dark red points for readiness scores ranging from 0 to 20 and white points for readiness scores ranging from 80 to 100, while districts with readiness scores from 0 to 20 are represented by yellow colour and those with readiness scores from 80 to 100 in blue. These legends are consistent across all the sub-figures A through D.

Gardner-Altman estimation plot to compare the readiness score of HFs for providing different NCD-related

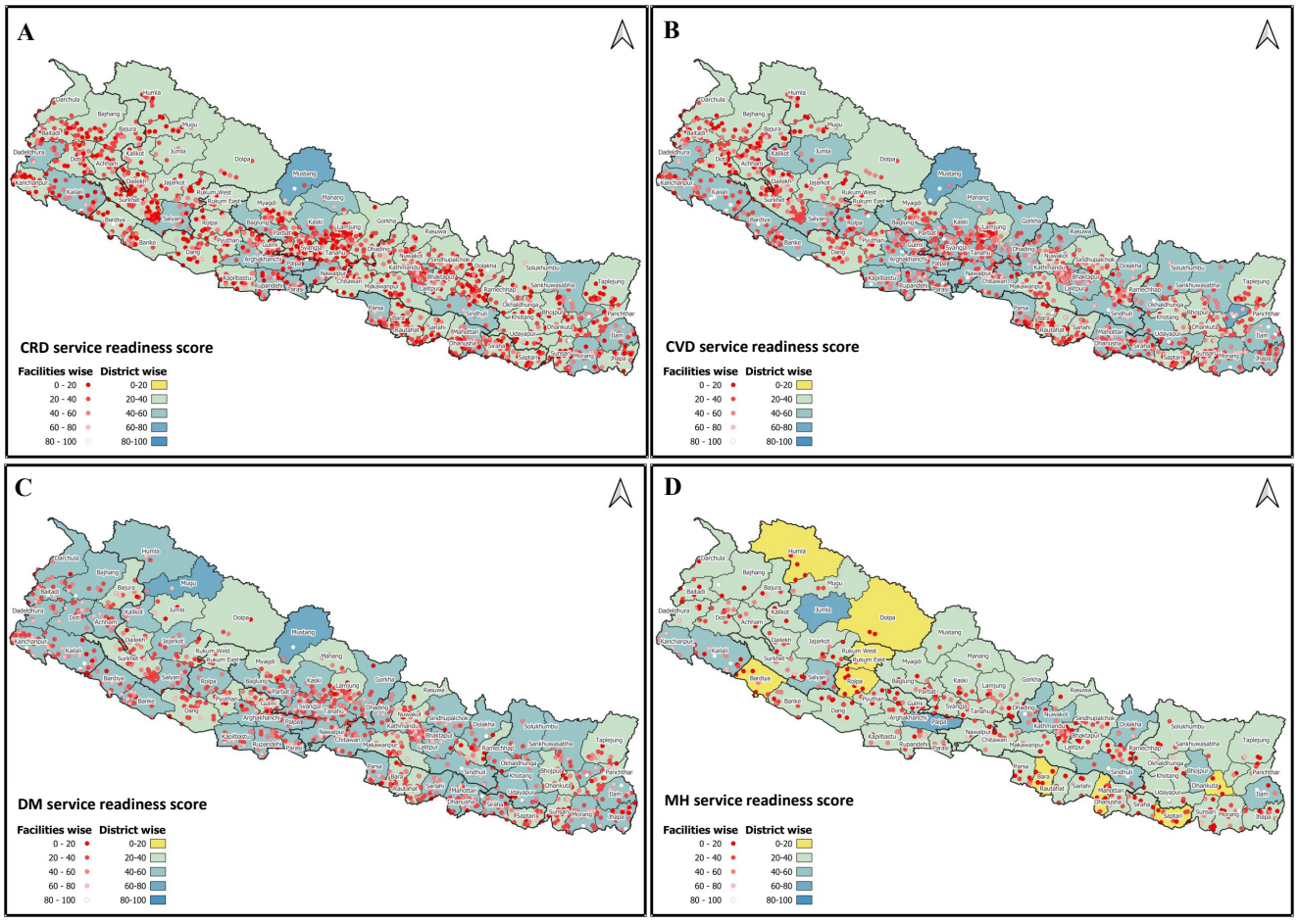

Figure 1 Facility and district-wise readiness score to provide services related to NCDs. (A) Readiness of facilities to provide CRD-related services; (B) readiness of facilities to provide CVD-related services; (C) readiness of facilities to provide DM-related services; (D) and readiness of facilities to provide MH-related services.

CRD, chronic respiratory disease; CVD, cardiovascular disease; DM, diabetes mellitus; MH, mental health; NCD, non-communicable disease.

services by province showed the readiness score of HFs vary by province (online supplemental figure 2).

Tables 3 and 4 present the factors associated with services readiness of HFs to provide NCD-related services. In univariate analysis, service readiness of HFs to provide CRD-related services was significantly associated with the type of facility and presence of external supervision and revision of client opinion. Similarly, the readiness of HFs for CVD-related services was significantly associated with the revision of client opinion and type of HF. The readiness of HFs for DM was significantly associated with the type of facility, presence of quality assurance activities performed at least once a year, presence of external supervision and revision of client opinion. The readiness of HFs for MH-related services was associated with the type of facility.

In the adjusted multivariable analysis, the odds of being ready for CRD-related services were 0.04 (95% CI: 0.02 to 0.09) times in the local HFs and 0.37 (95% CI: 0.16 to 0.87) times in private hospitals compared with federal/provincial hospitals and 3.43 (1.64 to 7.20) times in HFs with external supervision compared with HFs without external supervision in the past 4 months after adjusting for other variables. The odds of being ready for CVD-related services were 2.04 (95% CI: 1.02 to 4.09) times in rural areas compared with urban, 0.24 (95% CI: 0.09 to 0.65) times in mountain compared with the hill, 0.24 (95% CI: 0.07 to 0.78) in Madhesh compared with Koshi, 0.12 (95% CI: 0.05 to 0.28) times in local HFs compared with federal/provincial hospital and 2.68 (95% CI: 1.26 to 5.70) times in HFs reviewing client's opinions compared with those HFs that did not review client's opinions. The odds of being ready towards DM-related services were 3.29 (95% CI: 1.23 to 8.80) times in Sudurpaschim compared with Koshi, 0.08 (95% CI: 0.04 to 0.18)] times in local HFs compared with federal/provincial hospitals and 2.51 (95% CI: 1.26 to 4.99) times in HFs with external supervision. Similarly, the odds of being ready for MH-related

Table 3 Factors associated with readiness of HFs to provide NCD-related services (unadjusted)

Characteristics	CRD-related services		CVD-related services		DM-related services		MH-related services	
	COR (95% CI)	P value	COR (95% CI)	P value	COR (95% CI)	P value	COR (95% CI)	P value
Location								
Urban	Ref		Ref		Ref		Ref	
Rural	0.70 (0.31 to 1.57)	0.39	1.03 (0.52 to 2.03)	0.93	0.49 (0.22 to 1.12)	0.09	0.83 (0.16 to 4.17)	0.80
Ecological region								
Hill	Ref		Ref		Ref		Ref	
Mountain	0.99 (0.29 to 3.33)	0.98	**0.22 (0.09 to 0.57)**	**<0.001**	0.75 (0.32 to 1.77)	0.52	1.18 (0.13 to 10.78)	0.90
Terai	0.78 (0.37 to 1.64)	0.51	0.80 (0.40 to 1.60)	0.52	1.44 (0.69 to 3.01)	0.33	0.79 (0.26 to 2.41)	0.70
Province								
Koshi	Ref		Ref		Ref		Ref	
Madhesh	0.50 (0.19 to 1.33)	0.17	**0.25 (0.09 to 0.73)**	**0.01**	0.56 (0.23 to 1.37)	0.21	0.61 (0.11 to 3.53)	0.60
Bagmati	1.65 (0.64 to 4.26)	0.30	0.97 (0.33 to 2.89)	0.96	2.09 (0.81 to 5.39)	0.13	2.24 (0.46 to 10.76)	0.30
Gandaki	2.46 (0.84 to 7.16)	0.10	1.15 (0.38 to 3.43)	0.80	1.42 (0.47 to 4.30)	0.53	0.48 (0.09 to 2.72)	0.40
Lumbini	1.51 (0.47 to 4.79)	0.49	1.04 (0.34 to 3.15)	0.95	1.36 (0.48 to 3.87)	0.56	0.43 (0.09 to 2.00)	0.30
Karnali	0.26 (0.06 to 1.19)	0.08	0.49 (0.10 to 2.42)	0.38	0.46 (0.13 to 1.64)	0.23	0.59 (0.10 to 3.38)	0.60
Sudurpaschim	1.50 (0.68 to 3.31)	0.31	0.79 (0.27 to 2.36)	0.68	**2.49 (0.97 to 6.38)**	**0.06**	2.98 (0.61 to 14.59)	0.20
Type of HFs								
Federal/provincial hospitals	Ref		Ref		Ref		Ref	
Local HFs*	**0.06 (0.03 to 0.13)**	**<0.001**	**0.15 (0.08 to 0.31)**	**<0.001**	**0.08 (0.04 to 0.17)**	**<0.001**	**0.17 (0.05 to 0.58)**	**0.01**
Private hospital	**0.36 (0.14 to 0.89)**	**0.03**	0.64 (0.29 to 1.42)	0.30	**0.38 (0.17 to 0.84)**	**0.02**	**0.21 (0.08 to 0.54)**	**<0.001**
Quality assurance activities								
Not performed	Ref		Ref		Ref		Ref	
Performed	1.03 (0.56 to 1.88)	0.93	0.81 (0.44 to 1.49)	0.50	**2.21 (1.09 to 4.48)**	**0.03**	0.56 (0.20 to 1.57)	0.30
External supervision								
Absent	Ref		Ref		Ref		Ref	
Present	**2.68 (1.43 to 5.04)**	**0.00**	1.57 (0.76 to 3.22)	0.22	**2.23 (1.22 to 4.07)**	**0.01**	0.83 (0.23 to 2.96)	0.80
Frequency of health facility meeting								
None	Ref		Ref		Ref		Ref	
Sometimes	**0.29 (0.10 to 0.85)**	**0.02**	0.84 (0.17 to 4.10)	o0.83	**3.53 (1.13 to 11.03)**	**0.03**	0.94 (0.17 to 5.21)	0.94
Monthly	0.45 (0.16 to 1.25)	0.13	2.01 (0.54 to 7.44)	0.30	**3.52 (1.38 to 8.97)**	**0.01**	2.25 (0.43 to 11.87)	0.34
Review of client's opinionB								
Not reviewed	Ref		Ref		Ref		Ref	
Reviewed	**5.05 (1.79 to 14.28)**	**0.002**	**4.87 (2.14 to 11.06)**	**<0.001**	**4.88 (2.11 to 11.32)**	**<0.001**	**2.88 (0.92 to 9.02)**	**0.07**

Bold value represents significance at the level of 0.05
* Local HFs include basic (local level) hospital, PHCCs, HPs and BHSCs.
CI, confidence interval; COR, crude OR; CRD, chronic respiratory disease; CVD, cardiovascular disease; DM, diabetes mellitus; HFs, health facilities; MH, mental health; NCD, non-communicable disease; PHCC, primary healthcare centre; Ref, reference group.

services were 83.0% lower in local HFs (AOR=0.17 (95% CI: 0.03 to 0.95)) and 86.0% lower in private hospitals (AOR=0.14 (95% CI: 0.04 to 0.55)) compared with federal/provincial hospitals.

DISCUSSION

This study aimed to determine the readiness of the HFs to provide services related to NCDs including CVDs, CRDs, DM, MH in Nepal from a nationally representative sample of HFs from the NHFS 2021. The overall median HFs readiness score to provide CRDs, CVDs, DM and MH-related services was 26.7, 35.0, 35.4 and 18.8, respectively with the readiness score for guidelines and training domain being the lowest and the readiness score for essential equipment and supplies being the highest for each disease. The proportion of HFs with more than

Table 4 Factors associated with readiness of HFs to provide NCD-related services (adjusted)

	CRD-related services		CVD-related services		DM-related services		MH-related services	
Characteristics	AOR (95% CI)	P value	AOR (95% CI)	P value	AOR (95% CI)	P value	AOR (95% CI)	P value
Location								
Urban	Ref		Ref		Ref		Ref	
Rural	1.55 (0.74 to 3.21)	0.24	**2.04 (1.02 to 4.09)**	**0.04**	1.29 (0.51 to 3.25)	0.60	1.66 (0.12 to 23.80)	0.71
Ecological region								
Hill	Ref		Ref		Ref		Ref	
Mountain	1.45 (0.39 to 5.47)	0.58	**0.24 (0.09 to 0.65)**	**0.01**	0.82 (0.34 to 1.97)	0.66	1.11 (0.08 to 15.24)	0.94
Terai	1.15 (0.39 to 3.37)	0.80	1.18 (0.38 to 3.70)	0.78	2.79 (0.93 to 8.39)	0.07	1.45 (0.47 to 4.46)	0.52
Province								
Koshi	Ref		Ref		Ref		Ref	
Madhesh	0.63 (0.19 to 2.09)	0.45	**0.24 (0.07 to 0.78)**	**0.018**	0.43 (0.16 to 1.17)	0.10	0.71 (0.10 to 5.20)	0.74
Bagmati	1.58 (0.59 to 4.21)	0.36	0.9 (0.23 to 3.45)	0.87	2.42 (0.72 to 8.16)	0.15	2.94 (0.41 to 20.95)	0.28
Gandaki	2.81 (0.83 to 9.53)	0.10	1.28 (0.36 to 4.54)	0.70	2.61 (0.76 to 8.97)	0.13	0.57 (0.10 to 3.23)	0.52
Lumbini	1.66 (0.44 to 6.17)	0.45	0.89 (0.27 to 2.99)	0.86	1.21 (0.43 to 3.42)	0.71	0.43 (0.07 to 2.70)	0.36
Karnali	0.32 (0.07 to 1.51)	0.15	0.76 (0.13 to 4.46)	0.76	0.89 (0.21 to 3.82)	0.87	0.78 (0.11 to 5.38)	0.80
Sudurpaschim	2.25 (0.97 to 5.20)	0.06	1.05 (0.32 to 3.42)	0.94	**3.29 (1.23 to 8.80)**	**0.02**	3.71 (0.80 to 17.08)	0.09
Type of HFs								
Federal/provincial hospital	Ref		Ref		Ref		Ref	
Local HFs *	**0.04 (0.02 to 0.09)**	**<0.001**	**0.12 (0.05 to 0.28)**	**<0.001**	**0.08 (0.04 to 0.18)**	**<0.001**	**0.17 (0.03 to 0.95)**	**0.04**
Private hospitals	**0.37 (0.16 to 0.87)**	**0.02**	0.56 (0.24 to 1.31)	0.18	0.41 (0.15 to 1.07)	0.08	**0.14 (0.04 to 0.55)**	**0.01**
Quality assurance activities								
Not performed	Ref		Ref		Ref		Ref	
Performed	0.86 (0.45 to 1.64)	0.66	0.64 (0.33 to 1.25)	0.19	2.08 (0.99 to 4.39)	0.05	0.45 (0.16 to 1.29)	0.14
External supervision								
Absent	Ref		Ref		Ref		Ref	
Present	**3.43 (1.64 to 7.20)**	**<0.001**	1.59 (0.69 to 3.66)	0.27	**2.51 (1.26 to 4.99)**	**0.01**	0.85 (0.19 to 3.87)	0.83
Frequency of health facility meeting								
None	Ref		Ref		Ref		Ref	
Sometimes	**0.27 (0.10 to 0.76)**	**0.01**	0.78 (0.15 to 3.99)	0.76	2.72 (0.75 to 9.87)	0.13	0.76 (0.13 to 4.54)	0.76
Monthly	**0.25 (0.09 to 0.65)**	**<0.001**	1.51 (0.38 to 5.90)	0.56	1.81 (0.68 to 4.82)	0.24	1.84 (0.29 to 11.83)	0.52
Review of client's opinion								
Not reviewed	Ref		Ref		Ref		Ref	
Reviewed	2.60 (0.91 to 7.44)	0.07	**2.68 (1.26 to 5.70)**	**0.01**	2.03 (0.78 to 5.25)	0.15	3.15 (0.97 to 10.19)	0.06

* Local HFs include basic (local level) hospitals, PHCCs HPs and BHSCs.
AOR, adjusted OR; CI, confidence interval; CRD, chronic respiratory disease; CVD, cardiovascular disease; DM, diabetes mellitus; HFs, health facilities; MH, mental health; NCD, non-communicable disease; PHCC, primary healthcare centre; Ref, reference group.

70% readiness score was 2.3% for CRDs, 3.8% for CVDs, 3.6% for DM and 3.3% for MH-related services. Federal or provincial hospitals were more likely to be ready to provide NCD-related services compared with Local HFs.

A similar analysis from NHFS 2015 showed the median readiness score of HFs to provide CVDs, CRDs and DM to be 18.8, 11.3 and 26.4, respectively,[25] which indicate improvement in the readiness score of HFs in 2021. One of the factors for the increase in the readiness score of HFs from 2015 to 2021 could be attributed to the roll out and expansion of the PEN which has been rolled-out in majority of HFs throughout the country.[8] In addition, the National mental health strategy and action plan was launched in 2021 which can further improve the preparedness of health system to deliver mental health services in future.[8 26]

The availability of guidelines and staff training had lowest readiness score which is similar to the case in Bangladesh, where the shortage of guidelines was commonly reported across HFs.[27] This finding is also in congruence with a

prior study in Nepal that highlighted a lack of national guidelines and protocols for treating CVDs as a significant obstacle to providing evidence-based treatment.[28] The other study on DM suggested that there is a significant shortfall in the implementation of existing policies, plans, strategies and programmes aimed at addressing DM, with a lack of clarity on how they should be implemented.[29] This evidence suggests that not only there is a need of formulating evidence-informed guidelines and policies but also ensuring the availability and implementation of guidelines in HFs through strengthened communication across all tiers of governments and developing a clear understanding of the policy documents. These areas should be improved and addressed concurrently as they have been demonstrated to be cost-efficient in terms of healthcare delivery.[30]

Our study revealed that HFs with external supervision had significantly higher preparedness scores for DM and CRDs. External supervision mechanisms in HFs are essential in facilitating the overall management process and improving the effectiveness of the facility. Such supervision enables information sharing and performance review which is pivotal in streamlining the facility's management process and enhancing its efficiency.[31]

In tune with our findings, previous studies have also shown disparities in the availability of healthcare resources for the prevention and control of NCDs between different levels of healthcare, types of HFs and regional settings.[32] Our study found that there was a notable lack of essential medicines and commodities for NCDs in local HFs, similar to findings reported by other studies.[33 34] Several other studies have shown that the essential medicines, especially those for NCDs, are less available in LMICs compared with medicines for acute illnesses. Furthermore, the availability of these drugs is lower in the local HFs compared with the private hospitals. This disparity in availability can be attributed to various factors such as inadequate financial resources for purchasing medicines, inaccurate forecasting of drug requirements, ineffective procurement processes and inefficient distribution systems in the public sector.[35–37] The shortages of essential medicines and commodities were often accompanied by the shortages/lack of training of the staff, which further hindered access to proper medical care for patients; which has also been the case for a study done in Nepal using the 2015 health facility survey data.[25] This is a cause for concern as it can negatively impact the health outcomes of individuals suffering from NCDs.[38] It is crucial to stress the relationship between the availability of drugs and supplies, and the training of healthcare professionals. For instance, even if trained personnel were available to provide services, a lack of drugs and supplies will prevent the health professional from providing quality healthcare, and the other way around.[39] Therefore, there is an urgent need to address the scarcity of both trained personnel and medicines.

Within South Asian regions, differences regarding the lack of trained personnel, availability of essential medicines and commodities and guidelines in service-specific readiness have also been documented.[40] A systematic review carried out with studies from resource poor setting demonstrated that healthcare systems have been negatively impacted by insufficient supply of medication, equipment and trained healthcare personnel.[41] The region's progress in the management and prevention of NCDs has been hampered by the widespread absence of key resources. According to a recent report by the WHO, most countries, particularly LMICs, failed to achieve the global targets set for NCDs progress in 2020. This report, which evaluated data from 194 countries, highlights the pressing need for increased global efforts in NCDs prevention and control.[42]

Alongside the issues discussed, Nepal's health system does have the potential to effectively address NCDs. Nepal has implemented policies and strategies, developed treatment guidelines and protocols, an essential drug list, a multisectoral plan for NCDs prevention, surveillance and prevention strategic planning, and an action plan for NCDs. These findings suggest that Nepal should strengthen and orient health systems for the prevention and control of NCDs and strengthen supervision and monitoring as aligned with the action plan for the prevention and control of NCDs.[26] The disparities identified across various diseases and healthcare types and levels, as well as the noticeable differences in availability between urban and rural areas, along with a lack of basic medicines and supplies, underline the importance of an all-inclusive approach to upgrading healthcare facilities' ability to deliver successful NCDs interventions. Also, the findings point to enhancing the management of NCDs by increasing the capacity of the healthcare workforce, which is crucial. This can be achieved by providing more training opportunities for healthcare professionals and expanding the number of clinicians skilled in managing NCDs. It will be impossible to achieve global NCDs targets by 2025, as part of the SDGs by 2030, without significant efforts in both policies and programmes. Therefore, it is imperative to take immediate action to enhance the provision of NCD services in both public and private HFs in Nepal.

This study has several strengths such as (a) use of a nationally representative sample that enables us to generalise the study findings throughout Nepal, (b) use of a validated survey tool and presence of adequate quality control and implementation strategies including recruitment strategies, data collection and data analysis in the survey ensures the internal validity of the study findings and (c) use of appropriate statistical procedures to account for complex sampling procedures and non-responses. There are some potential limitations to consider in this study. First, as the survey was carried out during the time of COVID-19 pandemic, there could be some level of impact due to pandemic on the availability of tracer items and readiness of the HFs. Second, this study lacks readiness of HFs for cancer and chronic kidney diseases. Finally, this study lacks an important variable that is, the number

of CVDs, CRDs, DM and MH patients seeking care each month from the HFs which is important to understand the patient burden in HFs which impacts the readiness of HFs.

Implication to managers or decision makers

The study has important implications to managers and decision-makers in the health sector in Nepal. First, decision makers could prioritise improving the readiness of HFs to provide NCD-related services, particularly at the peripheral level. This can be achieved through increased investment in equipment, and essential medicines. Second, there is a need to increase the number of qualified health staff and provide training on NCDs prevention, screening and management. Managers could explore innovative approaches such as telemedicine and task-shifting to enhance access to NCD-related services in remote areas. Third, strengthening the supply chain system and improving the forecasting of drug requirements would ensure the availability of essential medicines for NCDs management. Finally, policymakers and managers could promote public–private partnerships to improve the quality of care provided in the private sector, which was found to have higher readiness for NCD-related services than the federal/provincial hospitals. These measures would help to enhance the overall readiness of the health system to provide NCD-related services and improve the health outcomes of the population.

CONCLUSIONS

Readiness of local HFs to provide NCD-related services in Nepal was relatively poor compared to federal/provincial hospitals with the guidelines and staff training being the weakest domain. HFs that were ready to deliver NCD-related services were very low in all categories of HFs—federal/provincial hospital, local HFs and private hospitals. The readiness of HFs to provide different NCD-related services is associated with presence of external supervision, quality assurance activities, review of client opinion.

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