*Original Research*

# Availability, Price, and Affordability of Essential Medicines to Manage Noncommunicable Diseases: A National Survey From Nepal

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## Abstract

The aim of this study was to evaluate the availability, price, and affordability of essential noncommunicable disease (NCD) medicines in Nepal. A cross-sectional survey was conducted in Nepal in 2015 using World Health Organization/Health Action International (WHO/HAI) methodology. We collected data on the availability and price of 60 essential NCD medicines from medicine distribution outlets in both the public and private health care sectors in 6 regions. Essential NCD medicines were more available in the private sector (78%) than the public sector (60%). Furosemide tablets were the cheapest (NPR 0.6/10 tablets) and streptokinase injections were the most expensive (NPR 2200/vial) drugs. There was no significant difference ($P > .05$) in availability and affordability of essential NCD medicines across the 6 survey areas. Treating selected NCD conditions with medicines was generally affordable, with 1 month of treatment costing no more than a day's wage of the lowest paid unskilled government worker. The lower availability of NCD medicines in the public sector limits the effectiveness of the government's policy of providing free health services at public facilities. Although NCD medicines were generally affordable, future health policy should aim to ensure improved equitable access to NCD medicines, particularly in public facilities.

## Keywords

access to medicines, essential medicines, low- and middle-income countries (LMICs), Nepal, noncommunicable diseases

> **What do we already know about this topic?**
> Access to essential medicines is one of the topical issues in low- and middle-income countries (LMICs) like Nepal. There have been reports about the unavailability and unaffordability of essential medicines in many LMICs, which can be a challenge to the health care system of such countries.
> **How does your research contribute to the field?**
> It generates evidence on the availability, cost, and affordability of essential medicines to treat noncommunicable diseases in developing countries like Nepal. This can be reference cost to Nepal and other LMICs with similar health care system.
> **What are your research's implications toward theory, practice, or policy?**
> The research will be useful for policy makers, funding agencies, donors, and other stakeholders to plan funding priorities and decisions for much awaited Universal Health Coverage in Nepal; it can also be important to other similar countries. Nepal is planning social health insurance; therefore, the data on cost and affordability will be of topical interest and can influence on its policy.

## Background

Nepal is a small landlocked country (147 181 km$^2$) of 29 million people where almost 2 out of 5 live below the poverty line as determined by the multidimensional poverty index.[1] While contagious or communicable diseases have been the focus of treatment efforts for many years like many low- and middle-income countries (LMICs), but recently, the rising burden of noncommunicable diseases (NCDs), such as cardiovascular diseases (CVDs), cancer, chronic respiratory diseases, and diabetes, has created substantial attention.[2-4] This growing burden of NCDs, along with the preexisting burden of communicable diseases, has challenged the health care systems in Nepal, as it has in other LMICs. The mortality and

morbidity due to NCDs are increasing globally but the rate of mortality and morbidity is higher in the South East Asian region (which includes Nepal) than in other regions (excluding Africa).[2] With an estimated 39% of total disease burden and almost half of the total death attributed to NCDs (22% CVDs, 7% cancers, 5% respiratory diseases, and 1.7% diabetes related deaths out of all deaths), Nepal face huge NCD-related challenges.[5] Although there are many measures to prevent these diseases, once diagnosed the main treatment modality is often medication. Hence, the need for NCD medicines will increase and countries like Nepal need to plan to make these medicines available and affordable for the population. This will have implications for the budgets of both governments and the wider public, especially in LMICs. The cost of medicines is a major component of the health budget of any country. Most (50%-90%) of the direct medical costs (excluding salaries for health care workers) are for medicines.[6,7]

Developing and adhering to the essential medicine list (EML) is one of the most efficient ways to ensure availability and affordability of medicines for the population.[8,9] The essential medicine list is the basis of the national medicine policy in many countries.[8,9] It comprises a list of medicines which satisfy the health care needs of most of the population. These medicines should, therefore, be available at all times in adequate quantity and in appropriate dosage forms, at a price the community can afford.[9] We previously compared the World Health Organization (WHO) EML 2011[9] and Nepal's EML 2011[10] for the inclusion of NCD medicines. Of 28 noncancer NCD medicines in the WHO EML, 23 were present in the Nepalese EML. Five medicines were not present in Nepal's EML but most of them had equivalent medicines (eg, glipizide was in the Nepalese EML in lieu of gliclazide in WHO EML). The inclusion of NCD medicines in Nepal's EML may not, however, reflect the actual availability and affordability in the country or may not be best indicator to represent if people in Nepal have access to certain medicines. Access to essential NCD medicines is a concern in Nepal.[11] The Government of Nepal, through the Ministry of Health and Population, used to provide 70 essential medicines (during the period when this survey was carried out), including those for NCDs, at public health care facilities free of cost. However, the universal coverage of these free medicines has been questioned, as some studies reported that free medicines were not available most of the time in health care facilities and there were many administrative steps to get the medicines for free.[12-14] Until the universal health coverage becomes reality, it is very important to determine whether medicines are actually available to the people in Nepal; it is also very important to determine whether there is any price variation between same medicines within different geographic area in Nepal. With data about the price of medicines, the concerned stakeholders (funding bodies, health policy bodies, and so on) can determine whether people in Nepal can afford the treatment for NCDs. Like other LMICs, Nepal needs to use its limited health care resources efficiently to care for people with NCDs. It requires a sustainable patient-centered and community-based program at the level of primary health care (PHC). Although there are not standard treatment practice guidelines for chronic diseases at the primary care level, there is need for such guiding documents. WHO has developed a framework known as the "Package of essential non-communicable (PEN) disease interventions for PHC in low resource settings."[15] We developed a list of medicines required to treat NCDs based on the WHO EML,[9] Nepal EML,[10] PEN recommendations,[15] and current treatment practice in Nepal. With this background, we aimed to investigate the availability, price, and affordability of NCD medicines in Nepal. We hope this research will help to gather information about whether people in Nepal can afford treatment for NCDs, and we also believe the information can be used by different stakeholders to budget medicine price for NCDs.

## Methods

We followed standard methods recommended by WHO and Health Action International (HAI) to conduct and report our survey.[16] We registered the protocol of this survey with WHO/HAI Medicine Survey Database.

### Survey Areas

We collected data on the availability and price of selected NCD medicines from 6 survey areas in Nepal in March 2015. We surveyed 5 public and 5 private medicine outlets in each of the 6 areas for availability and price. Medicines in Nepal are sold either in private pharmacies (private outlets) or

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**Figure 1.** Map of survey areas in Nepal.

distributed free at government health facilities (public outlets) such as subhealth posts, health posts, primary health care centers, and government hospitals. The medicines in public outlets are generally not distributed via their own pharmacies; pharmacies inside the hospital are run privately. Free medicines in public hospitals are stored in a separate place (commonly called medical store) from where medicines are distributed to poor patients who satisfy requisite administrative requirements; usually, the decision of providing medicines for free should be approved by hospital superintendent or higher authority. Their decisions are usually based on the recommendation letter from the local government stating the patients cannot afford the treatment.

We did not collect price data from public medicine outlets because medicines in the list are generally distributed free of charge. The WHO/HAI methodology recommends selecting the capital city and at least 5 other survey areas based on the location and population. Therefore, we selected 6 cities for our survey: Kathmandu (capital city); Biratnagar (Eastern Development Region); Janakpur (Central Development Region); Pokhara (Western Development Region); Nepalgunj (Mid-Western Development Region); and Dhangadi (Far-Western Development Region). The selected survey areas represent the capital city (Kathmandu) and the most populous cities from each of the 5 administrative divisions of Nepal (Figure 1).

## Data Collection

S.K. trained 6 area supervisors, 6 data collectors, and 2 data entry personnel over 3 days in the knowledge and skills required to conduct the survey in accordance with the WHO/HAI method.[17] We used a standardized data collection form to ensure data reliability and consistency. We also conducted a localized pilot study in Baglung (not a part of the main survey) during the training to verify the feasibility of the survey.

We collected data on the availability and patient prices (lowest priced generic) of specified medicines at the selected public facilities and private retail pharmacies. Area supervisors made appointments with responsible people at the survey outlets before the formal data collection to ensure survey efficiency. Subsequently, data collectors surveyed each outlet. Area supervisors met with them at the end of each day to check completed data collection forms and ensure that the data were complete, consistent, and legible. The data collection was completed within 2 weeks.

## Data Entry and Analysis

We used the workbook developed by WHO/HAI for data entry.[16] All data were entered twice by 2 people, followed by software verification and validation through "double entry" and "data checker" functions to identify any data entry errors. Furthermore, we used codes to identify the public health care facilities and private pharmacies, instead of the actual names, to maintain their anonymity.

The study end points focused on 3 measures: medicine availability, price, and affordability. Availability was defined as the proportion of pharmacies in which the medicines were available at the time of the survey. We determined the availability of any type of generic medicines in public facilities and private pharmacies. Prices were presented as Nepalese Rupees (NPR). We estimated affordability by comparing the total cost of a medicine for a standard course of 1 month's treatment to the daily wage of the lowest paid unskilled government worker, which was 265 NPR per day at the time of the survey.[1]

**Table 1.** Availability of the Core List of Medicines Required for Implementing Essential Noncommunicable Disease Interventions in Primary Care (World Health Organization).

| Medicines (any dose or dosage form unless indicated) | Public sector, N = 30 | Private sector, N = 30 |
|---|---|---|
| Thiazide diuretic | 67% | 100% |
| Calcium channel blocker (long acting) | 73% | 100% |
| Beta-blocker | 67% | 100% |
| Angiotensin converting enzyme inhibitor (long acting) | 53% | 100% |
| Statin | 67% | 100% |
| Insulin | 20% | 47% |
| Metformin | 60% | 100% |
| Glibenclamide | 73% | 100% |
| Isosorbide dinitrate | 27% | 97% |
| Glyceryl trinitrate | 27% | 100% |
| Furosemide | 67% | 93% |
| Spironolactone | 67% | 97% |
| Salbutamol (tab/inhaler/ rotacap) | 100% | 100% |
| Prednisolone | 100% | 100% |
| Beclometasone (inhaler) | 0% | 87% |
| Aspirin | 100% | 93% |
| Paracetamol | 100% | 100% |
| Ibuprofen | 100% | 100% |
| Codeine | 80% | 73% |
| Morphine | 20% | 10% |
| Penicillin | 80% | 60% |
| Erythromycin | 63% | 80% |
| Amoxicillin | 100% | 100% |
| Hydrocortisone | 53% | 67% |
| Epinephrine | 53% | 73% |
| Heparin | 20% | 10% |
| Diazepam | 40% | 63% |
| Magnesium sulfate | 20% | 40% |
| Promethazine | 60% | 80% |
| Senna | 0% | 0% |
| Dextrose infusion | 100% | 83% |
| Glucose injectable solution | 50% | 60% |
| Sodium chloride infusion | 100% | 73% |
| Oxygen | 20% | 0% |

### Medicines Surveyed

We compiled a list of 60 NCD medicines (Table 2) based on the WHO recommended Package of Essential NCD (PEN),[15] WHO EML,[9] Nepal EML,[10] and treatment practice in Nepal. This list included basic medicines required to provide primary health care for CVDs, diabetes, and chronic respiratory disease and medicines used for palliative care in cancer.

## Results

### Availability

The availability of medicines was higher (78%) in private outlets than public outlets (60%). There was very good availability (more than 90%) for 13 out of 34 NCD medicines in private outlets but only 8 medicines had more than 90% availability in public outlets. Most of these highly available medicines were for treating CVDs. Senna was not available in any of the outlets. Oxygen was not available in the private sector and had poor availability in the public sector. Overall, private outlets had better availability of medicines required for treating NCDs in primary care than public outlets (Table 1). There was no significant difference ($P < .05$) in the availability of medicines across the 6 survey areas in our study.

## Price of Medicines

The price of selected NCD medicines is presented as the median price in Nepalese rupees (NPR, Table 2). Two medicines (senna and oxygen) were excluded from the price analysis because they were not available in private outlets. Furosemide tablet was the cheapest (NPR 0.6/10 tablets) and streptokinase injection was the most expensive (NPR 2200/ vial). There was no significant variation ($P < .05$) in the price of medicines across the 6 survey areas. Most of the surveyed medicines (especially those for blood pressure, diabetes mellitus, and asthma) cost less than NPR 210 for 10 dose units.

## Affordability

We calculated the affordability of medicines for a Nepalese person to treat selected NCD conditions: asthma, diabetes, hypertension, and hyperlipidemia. We included the price of medicines in the private sector only as some medicines are available free of charge in the public sector. Because there was the poor availability of many medicines in the public sector, we anticipated that people would purchase medicines from private outlets. For all of the NCD conditions evaluated in this study, patients would need to spend less than a day's wage to purchase medicines for 1 month of treatment (Table 3). NCD conditions and the standard treatment to treat the condition have been adopted from WHO/HAI methods.

## Discussion

The WHO global action plan for the prevention and control of NCDs has set a voluntary target for LMICs to make essential NCDs medicines available (in both public and private sectors) and affordable to 80% of the population by 2025.[18] Our study showed the availability was suboptimal in the public (60%) sector, with better availability in the private (78%) sector. The reduced availability of public outlets might be due to inadequate government funding, the inability to

**Table 2.** Median Price of Lowest Price Generics of Selected Noncommunicable Disease Medicines in Private Outlets by Dose, Strength, and Units.

| Medicine | Median price (IQR) in Nepalese rupees (NPR) | | | |
| --- | --- | --- | --- | --- |
| | Kathmandu (capital city) | Other 5 major cities | Overall (capital and other 5 major cities) | P value |
| Aminophylline (100 mg cap/tablet), 10 units | 15 (14-16) | 15 (14-16) | 15 (14-16) | 1.000 |
| Amlodipine (5 mg, cap/tablet), 10 units | 31 (30-32) | 31 (30-32) | 31 (30-32) | .914 |
| Amlodipine (10 mg, cap/tablet), 10 units | 55 (54-58) | 55 (55-58) | 55 (55-58) | .872 |
| Amoxicillin (500 mg, cap/tablet), 10 units | 110 (110-112) | 110 (110-122) | 110 (110-119) | .589 |
| Aspirin (100 mg, cap/tablet), 10 units | 61 (60-62) | 61 (60-63) | 61 (60-62.75) | .829 |
| Aspirin (50 mg, cap/tablet), 28 units | 52 (47-53) | 49 (48-52) | 49 (48-52.75) | .787 |
| Aspirin (75 mg, cap/tablet), 10 units | 80 (78-82) | 80 (80-82) | 80 (80-82) | .516 |
| Atorvastatin (5 mg, cap/tablet), 10 units | 66 (62-70) | 66 (65-70) | 66 (65-70) | .516 |
| Atorvastatin (10 mg, cap/tablet), 10 units | 86 (85-90) | 88 (86-90) | 88 (86-90) | .481 |
| Atorvastatin (20 mg, cap/tablet), 10 units | 160 (160-175) | 160 (160-170) | 160 (160-173.75) | .872 |
| Beclomethasone inhaler (0.05 mg/dose, inhaler), 1 unit | 180 (180-185) | 184 (180-185) | 184 (180-185) | .448 |
| Benzathine benzylpenicillin (2.4 M IU, vial), 1 unit | 160 (160-160) | 160 (160-170) | 160 (160-170) | .552 |
| Budesonide (200 μg/dose, inhaler), 1 unit | 208 (206-215) | 210 (208-210) | 210 (208-213.75) | .627 |
| Codeine (30 mg, cap/tablet), 10 units | 90 (90-90) | 88 (88-90) | 89 (88-90) | .074 |
| Diazepam (5 mg, cap/tablet), 10 units | 65 (65-66) | 65 (65-68) | 65 (65-67.5) | .872 |
| Digoxin (250 μg, cap/tablet), 10 units | 124 (122-125) | 122 (120-124) | 123 (120-124.75) | .552 |
| Digoxin injection (250 μg/mL, 2 mL), ampoule, 1 unit | 40 (40-40) | 45 (45-48) | 45 (44.25-48) | .049* |
| Enalapril (2.5 mg, cap/tablet), 10 units | 31 (30-32) | 31 (28-35) | 31 (28-34.25) | .957 |
| Enalapril (5 mg, cap/tablet), 10 units | 44 (44-45) | 44 (40-45) | 44 (40.5-45) | 1.000 |
| Enalapril (10 mg, cap/tablet), 10 units | 74 (72-74) | 75 (74-76) | 74 (74-76) | .122 |
| Epinephrine (100 μg/ mL, 10 mL), ampoule, 1 unit | 12 (12-14) | 14 (12-15) | 13 (12-14.75) | .589 |
| Erythromycin (250 mg, cap/tablet), 10 units | 145 (140-145) | 145 (140-150) | 145 (140-150) | .914 |
| Furosemide (40 mg, cap/tablet), 10 units | 6 (6-6) | 6 (6-6) | 6 (6-6) | 1.000 |
| Furosemide (10 mg/ mL, 2 mL) ampoule, 1 unit | 7 (7-7) | 7 (7-7) | 7 (7-7) | 1.000 |
| Glibenclamide (2.5 mg, cap/tablet), 10 units | 8 (8-8) | 8 (8-10) | 8 (8-10) | .516 |
| Glibenclamide (5 mg, cap/tablet), 10 units | 15 (14-15) | 15 (14-15) | 15 (14-15) | .914 |
| Glibenclamide (10 mg, cap/tablet), 10 units | 25 (25-25) | 25 (24-25) | 25 (24-25) | .448 |
| Glucose injection solution (0.05%) bottle, 1 unit | 90 (85-90) | 88 (85-88) | 88 (85-90) | .589 |
| Glyceryl trinitrate (500 μg, cap/tablet), 10 units | 160 (150-160) | 155 (155-160) | 155 (151.25-160) | .787 |
| Hydrochlorthiazide (12.5 mg, cap/tablet), 10 units | 14 (14-15) | 15 (14-16) | 15 (14-16) | .074 |
| Hydrochlorthiazide (25 mg, cap/tablet), 10 units | 24 (22-25) | 25 (24-25) | 25 (22.5-25) | .385 |
| Hydrochlorothiazide (50 mg, cap/tablet), 10 units | 52 (48-53) | 48 (46-50) | 48 (47.25-52) | .169 |
| Hydrocortisone (100 g vial), 1 unit | 55 (52-57) | 55 (50-55) | 55 (50.5-55) | .481 |
| Ibuprofen (400 mg, cap/tablet), 10 units | 18 (15-18) | 18 (15-18) | 18 (15-18) | .787 |
| Insulin (intermediate acting)—zinc 40 IU/mL (10 mL), vial, 1 unit | 210 (210-210) | 210 (210-212) | 210 (210-212) | .914 |
| Insulin (soluble) 40 IU/ mL (10 mL), vial, 1 unit | 285 (285-285) | 285 (285-285) | 285 (285-285) | 1.000 |
| Ipratropium bromide (20 μg/dose, inhaler), 1 unit | 230 (225-230) | 225 (225-230) | 225 (225-230) | .448 |
| Isoprenaline (1 mg/5 mL, vial), 1 unit | 530 (520-540) | 525 (525-540) | 525 (525-540) | .957 |
| Isosorbide dinitrate (5 mg, cap/tablet), 10 units | 35 (35-35) | 35 (35-35) | 35 (35-35) | .589 |
| Metformin (500 mg, cap/tablet), 10 units | 21 (21-22) | 21 (21-22) | 21 (21-22) | .829 |
| Metformin (850 mg, cap/tablet), 10 units | 30 (30-30) | 28 (25-32) | 29 (28-32) | .481 |
| Methyldopa (250 mg, cap/tablet), 10 units | 25 (25-25) | 25 (24-25) | 25 (24-25) | .914 |
| Methyldopa (500 mg cap/tablet), 10 units | 66 (65-68) | 66 (65-68) | 66 (65-68) | .706 |
| Metoprolol (12.5 mg, cap/tablet), 10 units | 28 (27-29) | 27 (25-28) | 27 (25-28) | .251 |
| Metoprolol (25 mg, cap/tablet), 10 units | 40 (40-45) | 43 (42-44) | 43 (42-44) | .589 |
| Metoprolol (50 mg, cap/tablet), 10 units | 50 (45-50) | 50 (50-50) | 50 (50-50) | .481 |
| Morpphine sulfate (30 mg, cap/tablet), 10 units | 64 (60-80) | 65 (60-66) | 65 (60-66) | 1.000 |
| Paracetamol (500 mg, cap/tablet), 10 units | 10 (7-10) | 10 (7-10) | 10 (7-10) | .914 |
| Phenoxymethyl penicillin (250 mg, cap/tablet), 10 units | 185 (185-190) | 189 (185-190) | 189 (185-190) | .589 |

**Table 2.** (continued)

| | Median price (IQR) in Nepalese rupees (NPR) | | | |
|---|---|---|---|---|
| Medicine | Kathmandu (capital city) | Other 5 major cities | Overall (capital and other 5 major cities) | P value |
| Prednisolone (5 mg, cap/tablet), 10 units | 18 (18-18) | 18 (18-20) | 18 (18-20) | .829 |
| Prednisolone (20 mg, cap/tablet), 10 units | 50 (50-50) | 50 (50-50) | 50 (50-50) | 1.000 |
| Salbutamol inhaler (0.1 mg/dose, inhaler), 1 unit | 161 (160-162) | 161 (160-164) | 161 (160-164) | .516 |
| Salbutamol rotacap (200 µg, cap/tablet), 30 units | 15 (15-20) | 17 (16-18) | 17 (15-18) | .706 |
| Salbutamol tablet (2 mg, cap/tablet), 10 units | 16 (14-16) | 16 (16-18) | 16 (16-17.5) | .122 |
| Sodium chloride infusion (0.009500 mL bottle), 1 unit | 50 (50-50) | 50 (50-55) | 50 (50-55) | .208 |
| Spironolactone (25 mg, cap/tablet), 10 units | 88 (88-88) | 88 (86-90) | 88 (86-90) | .957 |
| Streptokinase (1500000 IU, vial), 1 unit | 2200 (2200-2200) | 2200 (2200-2200) | 2200 (2200-2200) | .746 |
| Timolol eye drop (0.0025, eye drop), 1 unit | 75 (75-75) | 77 (75-80) | 76 (75-78) | .169 |
| Verapamil (40 mg, cap/tablet), 10 units | 130 (126-130) | 125 (120-130) | 126 (120-130) | .416 |
| Verapamil (80 mg, cap/tablet), 10 units | 188 (180-220) | 189 (180-190) | 189 (180-190) | .957 |

*Note.* 1 USD = approximately 110 NPR. *P* value reports any difference in median price between Kathmandu (capital city) and other 5 major cities of Nepal. *P* value (2 sided) was calculated by Mann-Whitney *U* test.
*Significant at $\alpha = 0.05$.

**Table 3.** The Affordability of Selected NCD Medicines Based on the Number of Days' Wages Needed for the Lowest Paid Nepalese Unskilled Government Worker to Purchase Standard Treatments for Adults With Specific Conditions.

| Conditions and medicines | Treatment schedule | No. of medicines required/month | Unit price (NPR) | Total monthly cost NPR | Days wages to pay treatment |
|---|---|---|---|---|---|
| Asthma<br>  Salbutamol inhaler 100 µg/puff | 1 inhaler per month | 1 | 161 | 161 | 0.61 |
| Diabetes<br>  Glibenclamide 5 mg cap/tab | 1 cap/tab x 2×30 days | 60 | 1.5 | 90 | 0.34 |
| Metformin 850 mg cap/tab | 1 cap/tab x 2×30 days | 60 | 2.9 | 174 | 0.66 |
| Hypertension<br>  Enalapril 5 mg cap/tab | 1 cap/tab x 2×30 days | 60 | 4.4 | 264 | 1.00 |
| Amlodipine 5 mg cap/tab | 1 cap/tab x 1×30 days | 30 | 3.1 | 93 | 0.35 |
| Hyperlipidemia<br>  Atorvastatin 10 mg cap/tab | 1 cap/tab x 1×30 days | 30 | 6.6 | 198 | 0.75 |

forecast medicine needs accurately, and an inefficient purchasing system and/or supply chain management system.[19-22] The low availability of NCD medicines in the public sector is a common problem in many LMICs,[19,20,22] probably due to the lack of technical and economic resources required for the health system to deal with the double burden of communicable and noncommunicable disease.[23-25] The lower availability in the public sector needs more attention and the Ministry of Health needs to ensure these medicines are available to all. In Nepal, more than 60% of health care financing consists of out-of-pocket expenditure (for medicines, doctor visits, laboratory tests, transportation, and hospital stays).[26,27] Policy initiatives for universal health coverage and health sector reforms have been developed to improve health system efficiency, equity, and accessibility of health care for underprivileged groups,[26,28] but initiatives to improve the quality of health care services for patients at both private and public health facilities are still lacking.[12,29,30]

The treatment of some selected NCD conditions and risk factors such as asthma, diabetes mellitus, hypertension, and hyperlipidemia costs less than a day's wage for a month of treatment when purchased medicines from private outlets. These 4 NCDs share 4 main behavioral risk factors (tobacco use, physical inactivity, unhealthy diet, and the harmful use of alcohol) leading to 4 key metabolic or physiological changes (raised blood pressure, overweight/obesity, raised blood glucose, and raised cholesterol).[31,32] Hence, a patient with 1 NCD may be prone to having other NCD conditions.[31,33,34] Such multiple morbidities may lead a patient to spend several days' wage for treatment. The minimum daily wage for an unskilled government worker was 265 NPR per day at the time of the survey.[1] However, many people will earn much less than that, so the actual cost of treatment of NCDs is more than the day's wage equivalent shown in our survey.

New policies or a change in existing policies may improve the availability and affordability of NCD medicines in public and private sectors. Improved governance and management efficiency, and a realistic assessment of local supply options could increase the availability in the public sector. Strategies to ensure adequate funds to purchase essential medicines in

the public sector include sufficient and sustainable financing through national and international sources, pooling procurement, and other arrangements to improve purchasing efficiency and a sound supply chain management system.[11,19,21] Eliminating taxes and tariffs and regulating mark-up charges are initiatives that can reduce the price of NCD medicines in the private sector.[11,19] In Nepal, medicines are exempt from value-added tax and central government tax. Other policies are required to improve access to NCD medicines, eg, regulating the price of medicines, promoting generic medicines use, and implementing standard treatment guidelines.[8,19,30,35-37] Furthermore, there is a need to educate health professionals in the use of standard treatment guidelines which take into account price and affordability and encourage generic prescribing. Consumers need to be made aware of the availability, affordability, and acceptability of generic versus branded products. Promoting the use of generic medicines, price capping of essential medicines rather than allowing unregulated mark-ups; promoting rational use of medicines can be a way to address this problem.[35,36,38]

In this study, medicines to treat cancer were omitted because our survey was mainly based on the WHO Package for Noncommunicable Diseases Interventions for Primary Health Care, which did not have cancer medicine.[15] Incorporating cancer medicines was also technically an issue as most of the cancer medicines are not sold in most private pharmacies and are not available in primary care level public health care organizations. The results are limited, similar to all the studies adopting this method, because medicine outlets surveyed were not more than a day travel from a major urban area; data may be subject to external effects, such as market fluctuations and delivery schedules, and there were unavailable or missing, or both data. Furthermore, the study was not able to capture data about the medicines obtained through informal channels, such as street vendors. Nonetheless, the results highlight priority areas for action by the Ministry of Health and other stakeholders involved in improving access to medicines to improve the access issues related with NCDs. Series of consultations among the different stakeholders (eg, government, supply chain management system authority, pharmaceutical industries, importers, wholesalers, and retail pharmacies) may provide framework to work together to improve access to affordable medicines for NCDs.

## Conclusion

Patients with NCDs require a reliable supply of affordable medicines. This survey revealed that the essential medicines tend to be affordable in Nepal, but availability requires improvement, especially in the government facilities that cater for the poor. The article also discussed a range of policy and technical options which exist for governments to ensure that medicines for chronic diseases are consistently available and affordable.

## Author Contributions

S.K., M.E., L.N., L.V., and S.H. participated in the research design. L.N., L.V., and S.H. supervised S.K. through the whole project. S.K., L.H., and L.V. participated in the data analysis. S.K. wrote the first draft of the manuscript. All other revised and suggested the modification (if any) to the manuscript at various phases of manuscript preparation. All authors read and approved the submitted version of the manuscript.

## Consent for Publication

Not applicable

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Ethics Approval and Consent to Participate

Ethical clearance was obtained from Ethics Committee, School of Pharmacy, The University of Queensland, Australia (2014/14) and the Institutional Review Committee, Nepalgunj Medical College, Nepalgunj (2014/31). Participants were informed of the study's aims and details prior to obtaining their written consent to participate. All participants in both public facilities and private pharmacies were assured about confidentiality and their anonymity.

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